JANUARY 6, 1944

The IRON AGE

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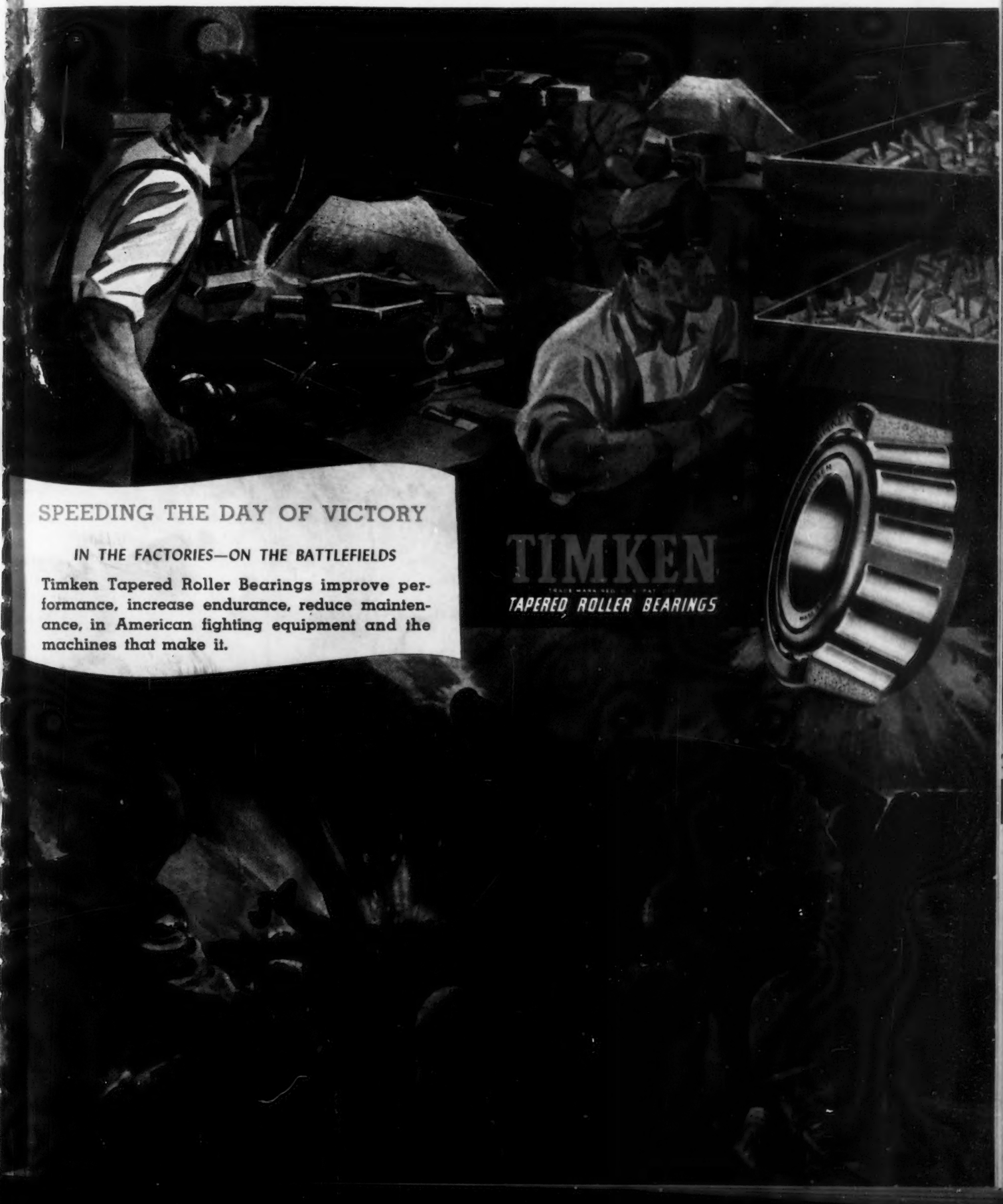

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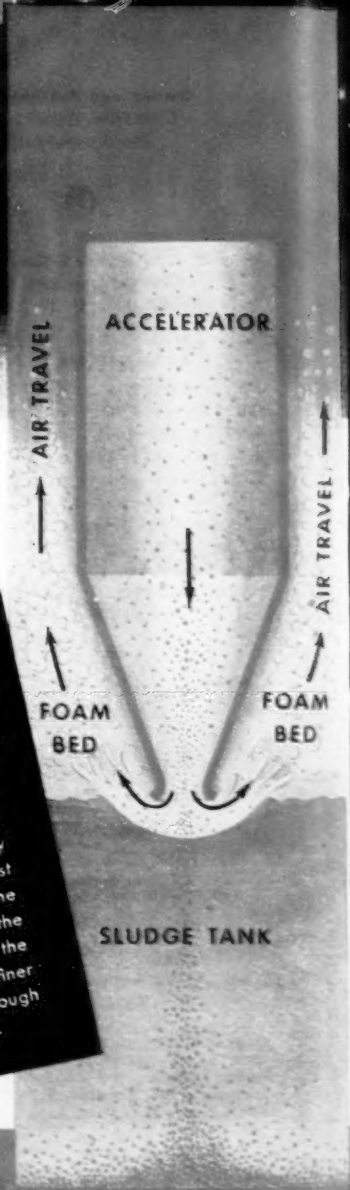

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Consider the Ant

"GO to the ant, O sluggard and consider her ways and learn wisdom." So said Solomon, the son of David, King of Israel, in his Book of Proverbs, written some 3000 years ago.

That was a thousand years after the ants, masters of organization since nearly the beginning of time, learned the hard way that organization itself cannot produce constructive results without the addition of a plus ingredient. The story goes as follows:

There were ants, of course, in the Garden of Eden, together with all the other species of animals, birds and insects. The ants differed from the others, however, in being naturally fond of work. So while the lions and tigers, elephants and deer, scorpions and black widow spiders spent their days indulging in peaceful contemplation and conversation, the ants hustled about looking for business. They didn't have to, of course, but they were made that way.

Each ant, in those days, went about pretty much on his own. If he felt like building a house he did so. If he felt like harvesting a crop of grass or leaves he did so. If he felt like exploring the surrounding country he did so. There was nothing for him to fear for he had no enemies and all creatures were vegetarians.

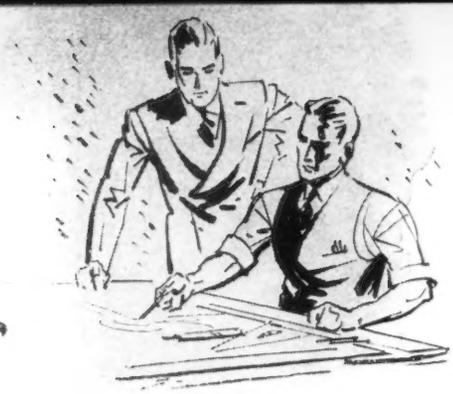
The picture changed, however, when Adam and Eve were evicted from the Garden and the premises were closed to the public. Peace no longer reigned on earth and life for all became a struggle for existence.

The ants met the situation by organization. They divided themselves into groups, builders, foragers, housekeepers, agriculturists, soldiers, etc. They initiated specialization and perfected it and this worked well for them for a time. But eventually it resulted in building a class consciousness between groups. The builders thought they were the most important because they made the houses, the foragers because they furnished the transportation, the agriculturists because they milked the ant cows, etc. So there began a struggle between groups for position that lasted until the coming of the great war with the spiders.

Ant armies were proverbially the best in the world and they did a fine job until the ants behind the lines, who were their suppliers, got to quarreling among themselves, each group seeking more recognition.

As a result of this pulling and hauling at home for selfish ends, the gallant ant soldiers were deprived of support and nearly exterminated by the spider army. Whereupon the chief of the ant republic borrowed a grasshopper's antennae and made a radio talk to his people. Said he: "My friends, organization has its excellent points but it may well be our undoing unless we add another ingredient — cooperation." And from that time on the ants have cooperated to beat the band and have multiplied and prospered.

Maybe we today could "consider her ways and learn wisdom!"



Design —

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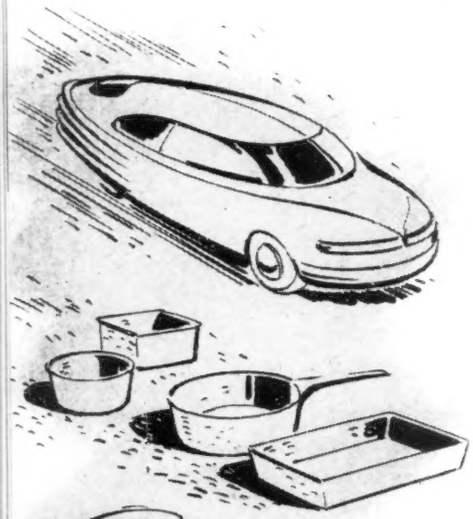

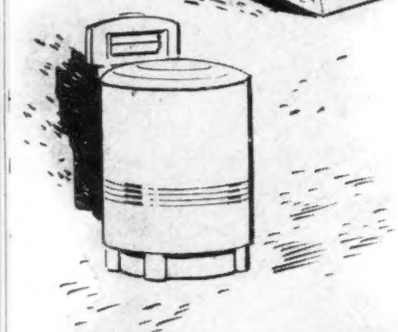

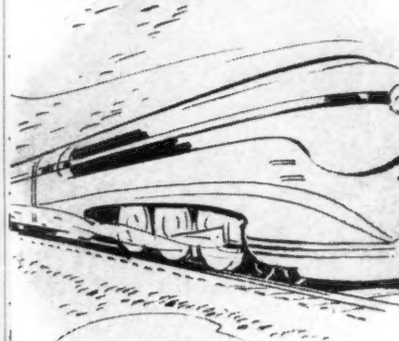

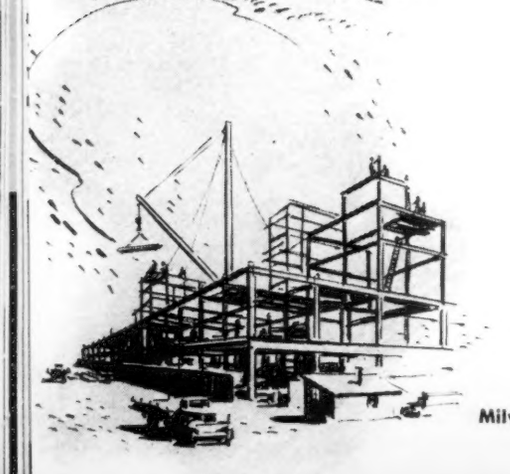

The buying public has learned to associate steel with safety and dependability. People ride in steel trains over steel rails, live and work in structures made strong with steel, travel the highways in steel automobiles, cross streams on bridges of steel, farm and manufacture with steel equipment, use steel furniture and innumerable household appliances—all with the knowledge that these things, made of steel, cost less, are more durable—have greater strength and safety.

Steel affords strength without excessive volume and weight. It is strong in tension as well as in compression. It quickly recovers from strain, and is resilient under shock. Steel reduces fire hazard to the minimum, and is practically unaffected by climatic conditions. Steel normally resists corrosion and can easily be more fully protected against such action. Steel absorbs neither moisture nor odors.

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The IRON AGE
JAN. 6, 1944

NEWS FRONT

• Walter Reuther, UAW leader and author of the 1940 Reuther Plan, has formulated a new program for reconversion to peacetime production. Reuther proposes a Peace Production Board with full powers over allocation of materials, manpower and tooling.

• Allocations would be granted by a system of "social priorities" under which the most urgent civilian needs would receive top preference.

• Recommending a 30-hr. week, Reuther says that 30 hr. of present production equals 40 hr. of 10 years ago. Pay for the 30 hr., of course, would equal the 40 hr. pay of an earlier day.

• Extension of the wartime patent pooling system is also proposed. Plan recommends setting up of a central research agency of the government to coordinate all research work on patents and technology.

• A sizable nickel property in Brazil (Livramento, Minasgeraes), owned by Cia. Nickel de Brazil, has been acquired by the American Smelting & Refining Co. A commercial plant will be erected on the property in 1944.

• The Allied advance in Italy captured a completely equipped Alfa-Romeo engine factory (including foundry, work shops, offices, etc.) concealed in four huge bomb-proof grottoes in Naples. The plant had turned out large numbers of 12-cylinder Benz motors. Another grotto near Naples contained the main repair shops of the chief technical headquarters of the Italian Air Force.

• Castings and forgings in England are being tested sonically. The equipment consists of a microphone, which picks up the vibrations when the casting or forging is struck with a hammer; an amplifier, which magnifies the sound; and filters, which suppress harmonic frequencies. Base frequency of a defective casting differs from that of a perfect specimen.

• The nation's basic mineral resources are being rapidly depleted while no new deposits of equal grade or magnitude have been discovered to replace dwindling ore reserves. Probably no more than 50 lb. of copper is recovered at best for each ton of ore mined. Average is about 20 lb. per ton.

• Although applications for domestic copper premium payments were no longer accepted after Dec. 31, contracts for zinc, lead and copper from Latin America run for two years after the war.

• Anticipated magnesium capacity of 700,000,000 lb. annually has not been realized. The size of the magnesium stockpile is probably no more than a few weeks' supply.

• During March, Canada's Dominion Magnesium Co., Ltd., produced an average of 8½ tons of magnesium daily at an average cost of 39.7c. a lb.

• Ninety-four per cent of magnesium production facilities are government owned. DPC plans after the war to shut down high cost plants or divert them to other uses.

• In addition to galvanizing and brass for construction, the zinc industry is looking forward to a postwar surge of zinc alloy die castings. In little more than 10 years die castings developed from a minor outlet to a market for 125,000 tons of special high grade zinc.

• Domestic production of copper threatens to decline in 1944 because of labor shortages. The favorable shipping situation, however, will permit greater imports.

• Decline in demand for molybdenum springs is following a reduction in foreign requests. Normally getting 2,000,000 lb. a quarter, the United Kingdom asked for 500,000 lb. for the fourth quarter.

• Overall use of molybdenum for the year, which amounted to 52,400,000 lb., ran 10,000,000 lb. below projected production figures.

• Total renegotiation cases completed during 1943 totaled more than 17,000. War Department estimates that all cases for 1943 will number 25,000. Pace in handling cases increased toward end of the year and remainder will be completed early in 1944.

1943 • 1944

By T. W. LIPPERT
Managing Editor, THE IRON AGE

WHAT is doubtless an apocryphal story has it that as the late George F. Baker and some ten golfing companions prepared to tee off at Tuxedo Park, one onlooker said to another, "Do you realize that those men getting ready to drive represent over $40,000,000?" Then, as Mr. Baker drove off and stepped from the tee, the onlooker observed, "And now, the group represents $18,000."

Apocryphal or not, the story pretty aptly portrays the state of business today. The government is driving off and, with something akin to masochistic fascination, nearly everyone from Jesse Jones to perhaps even Mike, the neighborhood garbage man, is watching that first tentative step from the tee to the hazards of a particularly tough course. In retrospect, even though Government's spastic approach to the tee in 1942 may have had its weird overtones, only those with the most shallow of factual underpinning can deny that the industrial follow-through in 1943 was smooth and powerful.

To be sure, the past year's industrial performance was one of wavering violently between the extremes of malnutrition and satiety. The virtual collapse of an enormous tank program, drastic cut-backs in ammunition requirements, and the killing off of an enervating submarine campaign, each lifted a sizable load from the productive structure. But, even so, the flood of the products of war was such as to warm the heart of the most ardent admirer of American industrial efficiency. All this, and with the civilians engaged in a record buying spree, and never approaching within radar distance of the "foothills of severe privation" that Mr. Nelson and many others so grimly and so frequently promised.

Now, while it is always a little presumptuous to build victory arches before the last battle is won, particularly with a whole inter-related series of labor disputes threatening, all evidence has it that the purely industrial phase of World War II has either hit a plateau or is actually beyond that onto the declivity. Of course, machine tools many months ago passed through their peak, and today all the common metals, with the possible exception of nickel and copper, have passed out of the critical classification. In fact, many producers of certain metals and metal products are not a little concerned with the size of their stocks and the rapidity with which additional accumulations are being made, as well they might be, what with inventories in many instances worth more than the companies involved. And, even in manpower, some of the strain is disappearing and there is a declining tendency to hire a body just so long as it is still warm. It is not too unlikely that in 1944 there actually might be annoying (sic!) labor surpluses unless the whole industrial tempo is supported by a greater return to civilian production than is now anticipated.

The sunshine of industrial fruition has tended to soften considerably the mistakes of tooling up—mistakes not really very deplorable in view of the size, complexity and urgency of the job done. Shortage zealots, in general, have been reduced to mumbling in their beards or searching for more promising fields for exploitation. What is even more frustrating, regional political cliques are receiving more and more evasive answers to their pet ideas for the location of marginal or downright uneconomic productive facilities, and are consequently beginning to turn their attention to rather obviously spurious protective schemes for facilities now in operation that may soon have to search for markets against the first faint stirrings of fierce competition. Probably not even the most cynical fully realize the innumerable distortions woven into the industrial fabric by enormous sums of government money and the gush of hell-with-the-cost war orders, two props either now slowly wilting or destined for sudden collapse as Washington goes through an inevitable but probably short-lived phase of parsimony.

Meanwhile, the past six months or so have been favored with the flowering of a whole new cult of statistical commandos, with certainly as many representatives in industry as in government, who plot a rather precise return to pre-war normalcy with almost the exactitude of differential calculus and with a sublime confidence that is indeed quite warming. Certainly no sane person could possibly quibble with the end result desired, whether it be return to even 1938 or, better yet, 1937 normalcy—but, above all, not to 1932 abnormality. But the very lushness of the parade of plans and the very ostentatiousness of the publicity involved may suggest to some Freudian a subconscious recognition of the imponderables of Government's economic and political policies, the citizen's attitude toward taxation and spending, international trade decisions, all the doubts best reflected by Shakespeare in the lines,

> "Oft expectation fails, and
> most oft there where most
> it promises."

Or, perhaps, all this is unduly pessimistic. In any case, the writer could function somewhat as a devil's advocate to examine unpleasant possibilities, albeit unpopular. Certainly it would seem that three years or more of the most costly war of history has possibilities of really wrenching a social structure. And it is difficult to believe that the return to a healthy industry, a prosperous and happy people, can be achieved solely by a few simple easy-to-take pills, whether they range the extremes of the elaborate complexities of currency shenanigans as exemplified by, say, Stuart Chase's "compensatory" economy, to

With a welter of superficial post-war planning slanted in favor of some industrial or ideological group or area assuming the proportions of national escapism, perhaps a little more attention should be afforded the issues at hand rather than the tooling-up for something cosmic in the future. There are a lot of bleak problems that would better be sweated out before extrapolating war-inflated production to a millennium demand of the good life as pictured in the sleeker magazines.

the sweet faith of prohibitionists in the power of abstinence. To the writer, all the industrial, social, political, economic and psychological factors involved in adjusting industry and individuals back to a peace economy, cross and intermingle to such a degree as to daze the sight, and in some instances cut across so many emotions as to propound very complicated problems for solution. And, if industry, labor, politician, and J. Q. Citizen, vox pop, the average American that cartoonists always picture getting it in the neck, don't thread this maze with some degree of sensitive and intelligent sacrifice, they may well fall prey to the blandishments of collectivists either of the left or right—those elite-ins who have such facile answers to any and all difficulties.

Whether readjustment to and functioning in the post-war economy is covered in the plan of an earnest business man, tinkering with some new or improved product, or painted with broad strokes on a world-wide canvas by a theorist, there is considerable unity in basic pattern, a number of threads of thought common to them all. These are:

(1) That Germany will be defeated this fall and that Japan will fold up perhaps a year or so later.

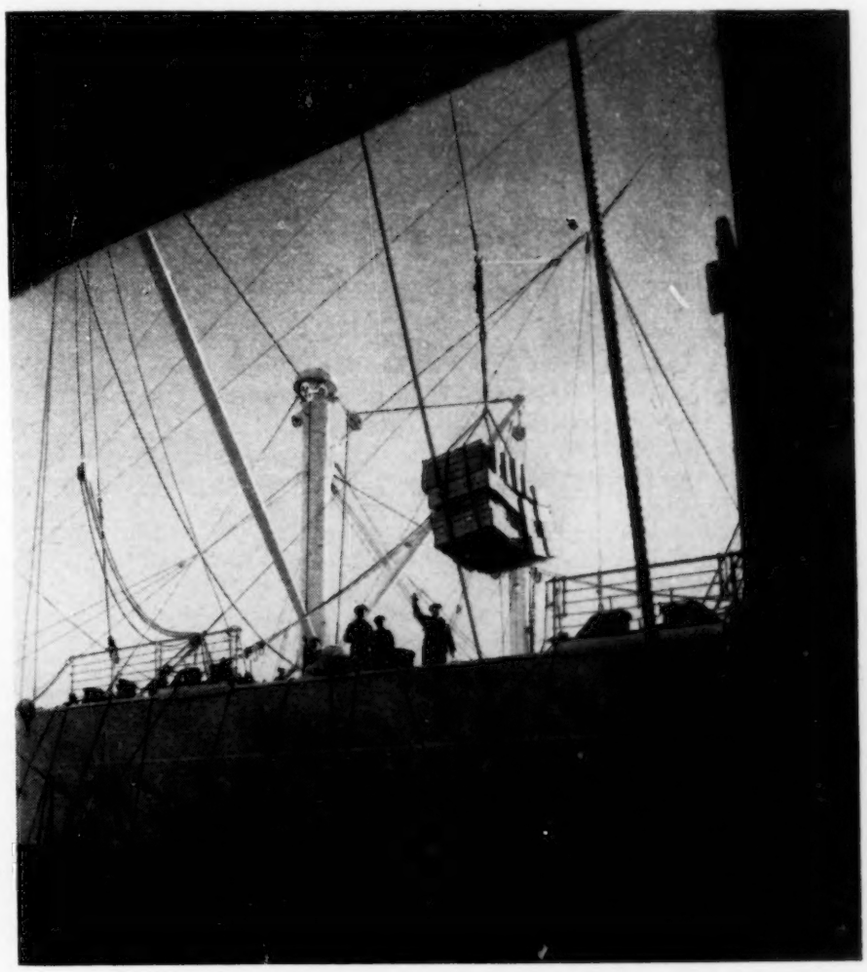
(2) That, following, or even somewhat anticipating, Germany's defeat there will be a rush to return to production of civilian goods, as war output is drastically cut back to a replacement schedule barely balancing the requirements of the Pacific campaign.

(3) That, as soon as large blocks of industry return to civilian production thereby absorbing the millions of orderly demobilized soldiers, there also will be available a frenetic market starved for luxuries and necessities and flush with savings and readily cashable war bonds that can serve as a base for a phenomenal pyramid of installment buying.

(4) That, the war debt can be serviced over a very long period and therefore be more of an annoyance than a burden. And, even perhaps if it is pushed around enough it will, like quicksilver, slither down through the cracks in the economic structure and quietly disappear.

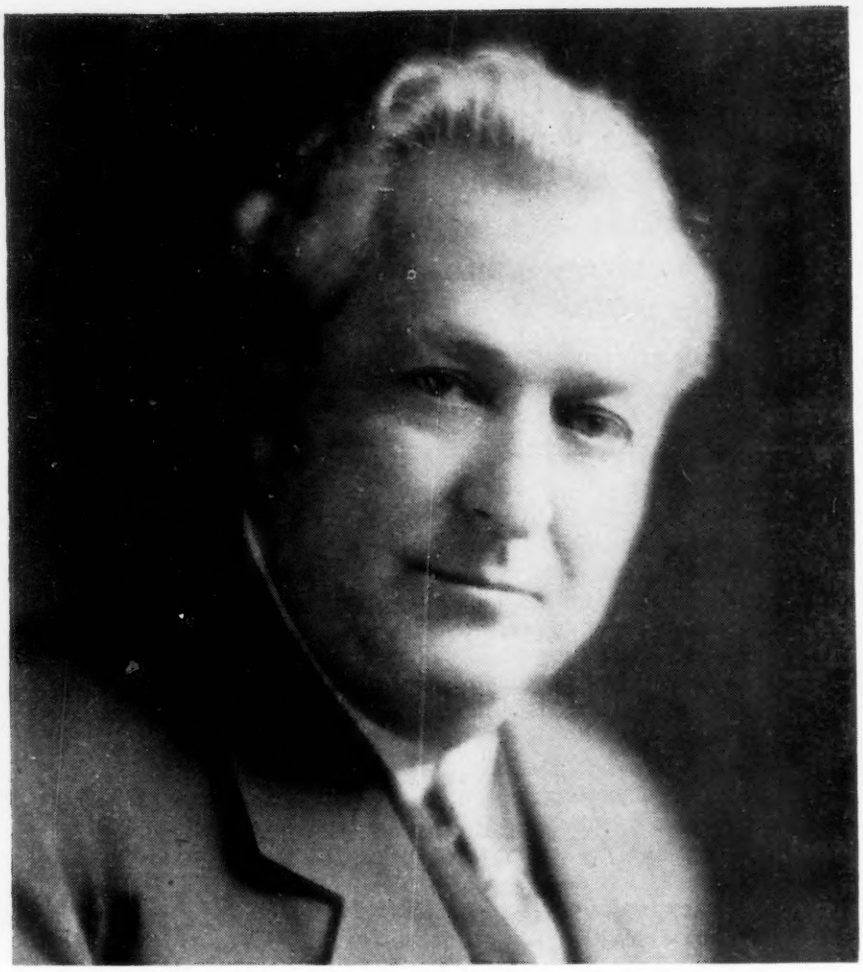
(5) That, the U. S. will become a great exporting nation, dominant in the new air transport routes lacing the world, also the greatest maritime power of all time. All these facilities will afford convenient channels for releasing troublesome capital goods and even consumer goods surpluses to all the war-torn countries of the world.

(6) That, under the impetus of new inventions and a super-vitalized, war-bred technology (technology being the one and only thing ever improved by war!), capital and consumer goods industries will flourish for several years after which there will be a de-



EXPORT

. . . Is conspicuous in many a post-war plan. But, while the experts prattle of currency groups, of "bancors", of "unitas", can ingrained U. S. insularism forsake tariff interferences to team imports with exports?



SENATOR PAT McCARRAN
. . . Like many another, his recipe for the financial and industrial future is the pernicious economics of narrow self interest. Armed with the plenary powers of S. Res. 190, he intends to recentralize industry.

cline and a breathing spell to take up the slack of some deferred readjustments.

(7) That employment must and will be kept at an extremely high level if government ceases interfering with business, and that the full flowering of free enterprise can well meet the demands so imposed.

The seven steps on the return to normalcy are orderly, to say the least. Few pitfalls are recognized and everybody [illegible] is up the next decade prosperous, happy, loved by the whole world, with a standard of living so infinitely superior as to make the present appear a little stuffy, static and unimaginative. Even so, just to be doubly sure, perhaps each of the seven steps could be examined in detail.

(1) That Germany will be defeated this fall, and that a year or so later will see the finish of Japan, all seems rather likely. As the headlines proclaim, even conservative military men are now going on record for both the timing and the end result. But the very severe casualties in the immediate offing may well bring the country up with a jolt and create for the first time a definite real awareness of the sacrifices at the front that deserve better at home than a promise of dismissal pay or bonus.

(2) A severe drop in war production may, however, not follow Germany's defeat, but could easily be well developed long before that time. For some industries, the post-war period may actually be right now, not in the future, and Baruch just recently cautiously intimated as much. (He has also said that a country at war should order its national life as to admit of no other thought.)

The great supplies of metals available for other than war use, the very great possibility that there will be sectional surpluses of manpower very soon, and the spate of activity on the part of the Office of Civilian Requirements are all sign-posts leading to a greater and greater attention to filling up the pipe-lines of civilian consumption. Perhaps all this will spurt along at a pace considerably faster than is anticipated; in fact, it is just barely possible that when the first great waves of demobilization occur there will already have been made in this country large quantities of civilian goods which will have taken the edge off of the civilian market just at a time when from a manpower standpoint it might be desirable to have the biggest possible backlog of orders.

As contract cut-backs occur in various localities every effort will be exerted by labor and by business organizations in these areas to maintain peak production. A rudimentary tendency in this direction already has been evidenced. The natural result of all this will be an increasing effort on the part of the War Production Board through its division of civilian supply to O.K. production of various types and quantities of civilian goods. At first, the excuse will be given that these goods are absolutely essential to the maintenance of bedrock civilian economy, but later on it may become all too obvious that rather than the maintenance of bedrock economy the operation will be one of bowing to pressure groups or maintenance of employment. Many of these goods are liable to be made by groups of war workers, including large blocks of women working at war inflated wages.

Through the country as a whole there may thus develop numerous anomalies. On one hand women will be enticed from hearth and family to work in war plants; men will be removed from war jobs by Army induction, and large blocks of workers will be turning out civilian goods which in no way can be considered essential to the prosecution of the war. Add to this the shearing across of competitive interests, and the obvious unfairnesses and inequalities of sacrifice to individuals and industry groups, and there is liable to be boiled up a brew that could well make what is blandly called the "unwinding process" something that could wreck many a beautiful friendship.

(3) Now, as to that moot third point, the all-important expectation that industry will automatically fall heir to a magnificently conditioned sellers' market, as everyone cashes in savings and war bonds to replace all the worn-out luxuries and necessities demanded by modern living. This writer cannot go quite so all-out on this as practically all his contempo-

1944 .

raries. In fact, so very many refer to this phase of the return to normalcy as the coming post-war boom, a particularly unfortunate choice of word, what with its connotation of bust.

There have been a number of surveys made of the Gallup type which indicate what many millions of people intend to purchase in the way of enormous numbers of automobiles, refrigerators, stoves, houses, television sets, helicopters, air-conditioning, ad infinitum, to satisfy all of the frustrated desires for necessities, transportation and luxury. This type of market survey is ground through the statistical mill and translated into demands for raw materials and labor. There are literally thousands of post-war committees working in various industrial companies which have mapped out elaborate charts showing how all of this is to seep down into the individual companies to support various rather rosy rates of operation. Parenthetically, it might also be mentioned that while many companies talk freely of new post-war products, very few are actually doing much more than give the idea lip service.

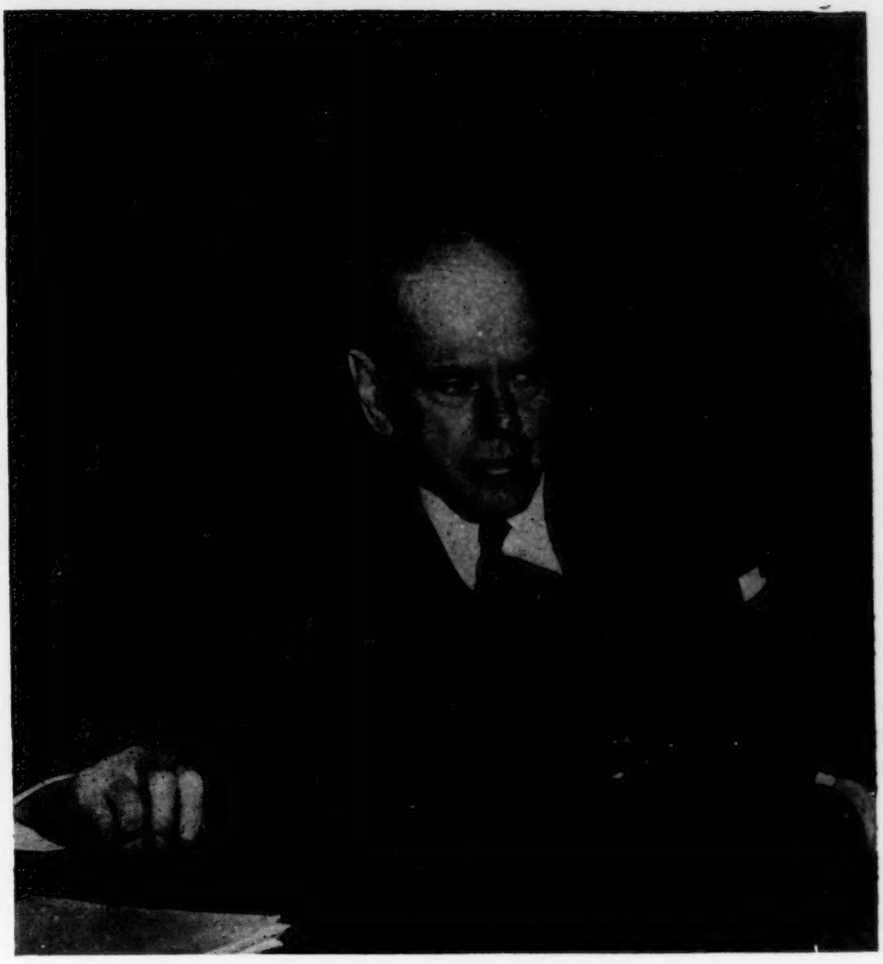
Now, the writer's survey is strictly of the men's washroom type rather than of Gallup precision. But, here again, it is very possible that the buying pattern may not be as explosive or as insistent as many envisage, although undoubtedly there will be a period of release of pent-up demand supported by a flood of easy dollars. In fact, this is a dangerous period of the transition and too widespread a liquidation of wartime savings, temporarily invigorating as it might be to industry, could well jeopardize the entire economy and enmesh business and individuals in a deflationary spiral leading to a whole new futile series of government, social and monetary panaceas.

The average citizen, while unfamiliar with all the economic nuances involved, still carries scars of the psychological devastation of the depression and is more unnerved about post-war conditions and perhaps more prone to welcome corrective safeguards than is generally recognized.

Talk of post-war possibilities is easily on about a 10 to 1 ratio to concern regarding the war. This not only applies to civilians but applies to soldiers, and while relatively few instances do not prove the whole, there are certainly many soldiers who are saving money and in general preparing as best they can for what may be a difficult period before they can re-orient themselves into the civilian framework. And, while these soldiers are returning and trying to readjust themselves into the civilian pattern, and while on every hand many are losing war jobs to be statistically reabsorbed into civilian industries, the psychological conditioning will be such as to discourage too careless or spendthrift an entree into the marketplace. The over-all civilian economy has in no way been driven down into a desperate level. Automobiles can be stretched out to an extremely long life at minimum usage; refrigerators can be tinkered with and kept in operation, and all that multitude of usual consumer goods may not find everyone beating out other's brains trying to get the first ones to pop off the assembly line.

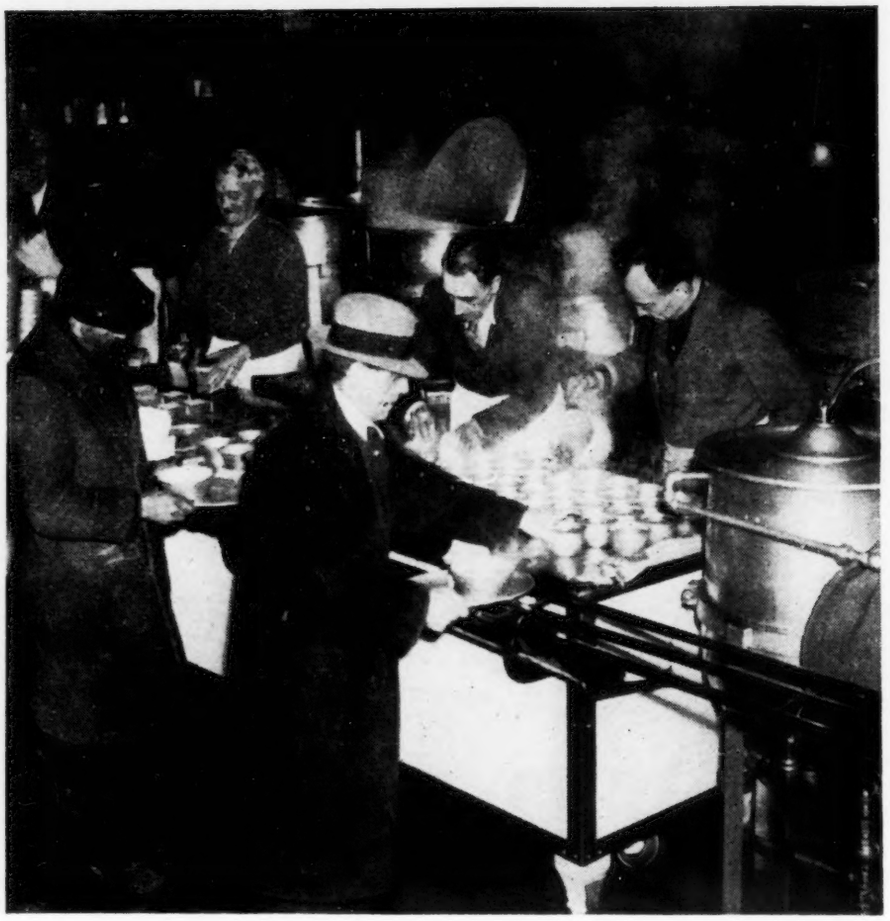
Furthermore, as for (4), it is always pleasant to dream of all those innumerable trick extensions of payment of war debts and all those very flossy economic aberrations such as "the debt is owed to ourselves and therefore is no burden," or perhaps "some little inflation can be permitted and everything sort of wiped out in a rather painless fashion," or "war goods were paid for in manpower when they were produced and even though they were destroyed there is actually no debt involved," or "the war debt can be stretched out over a long period of years and thus become no great burden." But dreams are illusive and fickle figments and beyond all dreams lies reality.

No one has satisfactorily explained how all the war bonds are to be cashed without (a) a simultaneous increase in taxes to cover their payment, or (b) further loading of still more long-term bonds onto already overloaded banks. Add to the $6,000,000,000 or so needed to service a war debt of over $250,000,000,00; continue to add to that debt with some $8 - $9,000,000,000 dismissal pay for the armed forces; and add to that untold



EUGENE G. GRACE

. . . Boss of Bethlehem Steel Co.'s $2,000,000,000 of war goods produced in 1943. Personal remuneration in 1943 after going through the tax mill, $42,546; in 1942, $90,527; in 1941, $163,000.



UNEMPLOYMENT

. . . Is not a luxury a vigorous nation can afford. The psychological shattering of individuals and the nation in 1932 need not recur unless realistic action is reduced to the status of a bit player on the stage of peace readjustment.

billions for inevitable pensions; and add to that a spate of billions to take care of miscellaneous pump priming and subsidies for the various pressure groups even now developing their campaigns of attack.

Pre-war British experience indicated that a national debt of about twice annual national income can be borne without too much difficulty. On this basis a post-war national income of $150,000,000,000 (at 1943 prices, when national income passed $130,000,000,000; pre-war income equalled $65 - $80,000,000,000) can manage a debt of $300,000,000,000 (Federal + State + local). The figures however all rattle around up in that zone wherein lies the final sensitive cracking point from which there remains only a rapid slide to national bankruptcy and debt repudiation. Certainly this outlook cannot be viewed by the author with quite the frigid tranquillity of Wall Street's Edward L. Barnes, who points out that "not before 1949-50 at the earliest is the country expected to be in a sufficiently troublesome economic, fiscal, or business predicament to force deliberate recourse to some form of currency debasement."

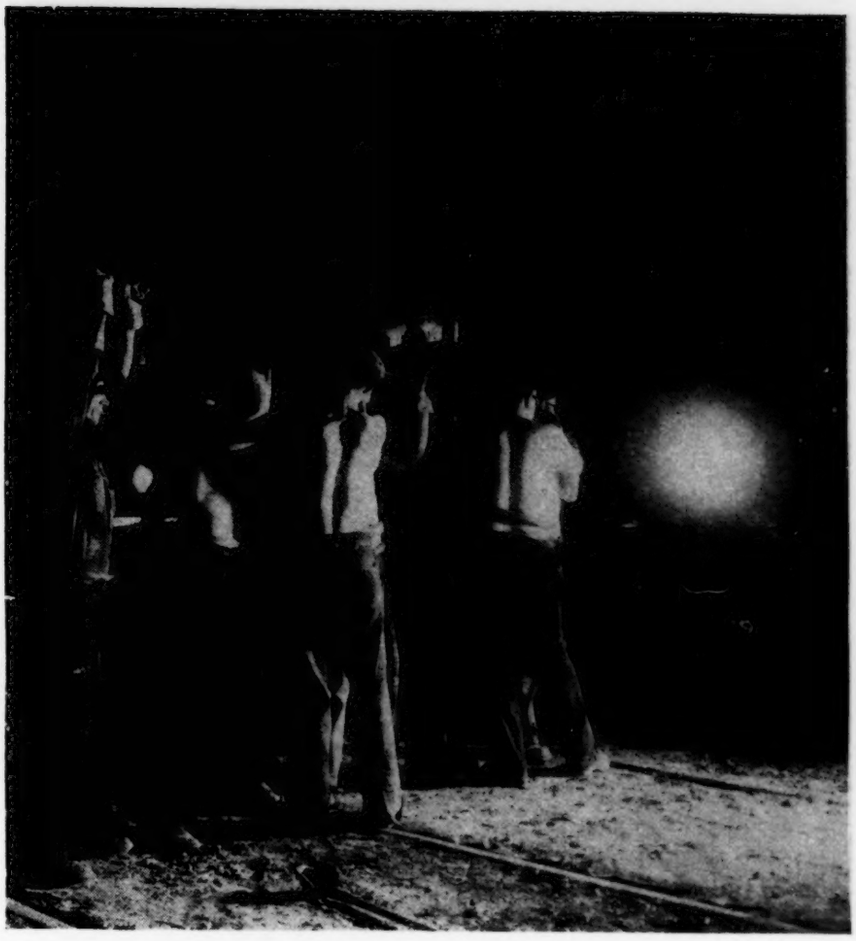
Sometime, somewhere, before the last bucket is thrown into the Treasury only to thump on the bottom, the whole national consciousness must accept the fact that debts must be paid, that debt payment is always unpleasant, and the only way to pay is by severe taxation. And, the sooner the better. Furthermore, business, labor groups and the very least citizen must participate in the repayment.

Meanwhile the errors of omission as regards taxation policy over the past several years have been of such magnitude that if continued much longer they will completely erode the whole core of the country's economy. With the greatest quantity of money in the country's history jingling in pockets, bulking bank accounts and flooding the market places, tax policy has been unbelievably flaccid and tax load relatively moderate. While both Executive and Congress must share the bulk of the condemnation for this rank dereliction in responsibility, even the least citizen is minutely involved, as his day-to-day determination to fight a hard, an all-out war has not been quite so firmly entrenched as all his brave words to that end would indicate.

While the details of taxation technique are such as to baffle even the experts, there does seem to be a great deal of common sense in the contention of industry spokesmen that only through the easing of corporate tax structures can free play be given to the risk capital that has so long been repressed and which will be so very essential in implementing exploitation of all the new technologies available after the war. Unfortunately, every time industry spokesmen plump for such easing, the words are rammed back down their throats by labor and political spokesmen as just one more indication that industry is attempting to squeeze one more good thing out of the war. Now the Treasury is proposing increasing corporate taxes even further, rather than shift some of the tax load from corporate income to individual income, whether the latter be in dividends or in pay. All this despite the fact that the real function of corporate income kept in the business is to finance more goods and more jobs, and after performing its function there it can subsequently go through the tax wringer when it is released to individuals as dividends.

The disinclination of the State to recognize the serious deterrents to industrial activity inherent in certain taxing practices, bodes ill for more widespread and dramatic alterations in taxation policies that could perhaps give a really worth-while fillip to post-war private enterprise. The British, for instance, are giving serious consideration to a number of tax renovations of apparent merit. Sums needed for maintaining intact the existing productive power of a business would be free of all tax; depreciation allowances would be raised and the definition of obsolescence would be widened; profits put into *financial* reserves would be taxed, although the reserves "ploughed back" would be taxed at something below the standard rate, and the rate may vary according to trade cycles; and, businesses might be asked to form special reserves called "extension accounts," such profits being taxed at rates lower than those available for distribution, and when unemployment threatens

1944 .



LABOR

. . . Has its post-war plans also, and they are just as self-centered as any that business might have. Despite irresponsible actions of minorities, labor and management together turned in a 1943 production performance that warrants an accolade for both.

the tax may go even lower and rebates made on all sums brought out of the extension account and spent on approved purposes. Certain phases of these possibilities involve undesirable encroachment of Government in the affairs of business, but in this country Government has already wriggled in pretty far.

Policies and actions bearing on export and foreign trade (5) will have a crucial effect on the industrial health of the country and in turn on the virility of private or free enterprise. It is generally agreed that conditions have altered somewhat since 1776, when the *Pennsylvania Journal* said, "America's situation is remote from all the wrangling world, and she has nothing to do but to trade with them."

The question of foreign trade breaks down into the nearby phase and the long-term phase. The latter is bound up in a maze of top-drawer policy-making now in the formative stage. There is justification, however, in holding out hope that international exchange stabilization, tariff adjustment and quota elimination will be correlated on a sufficiently realistic and unselfish basis as to stimulate the international flow of goods to such an extent as to bolster the economy of all nations. This country's participation in such agreements need in no way be one of top-lofty sentimentality lubricated by a gush of cash, nor can it be one of hogging the works in the belief that this country, not Germany, is the real home of the Herrenvolk. Be all these decisions and plans as they may, in the end the whole question of export of labor and materials in the form of goods and services has to be one of balance by acceptance of goods and services in return. For the U. S., with its great stock of gold and overwhelming credit position, this will involve particularly drastic alterations in policy and psychology.

Several factors involved on the immediate export situation are directly related to the pattern of industrial reconversion to peace in the U. S. Some attention, sans political overtones, is long overdue regarding the innumerable ramifications of Lend-Lease. While there can be no possible justifiable criticism of the bulk of Lend-Lease activities which further or facilitate the war effort, there is a great deal of secondary evidence that very large quantities of products, both of the consumer and capital goods types, are going to Australia, New Zealand, Russia and other countries which are being laid up for use after the war. And, while Lend-Lease considers the quantities of tanks, airplanes and guns shipped to other countries as no longer a military secret, there has been remarkable resistance to flushing out figures on consumer goods and products not of a military nature. And, there are orders for productive facilities even now passing through the hands of Lend-Lease which cannot be shipped and put into operation before the war's end.

Through export channels a means will likely be found to relieve American industry of the tremendous overload of capital goods, automotive equipment and certain types of consumer goods that are of such magnitude as to obviously threaten a healthy return to peace-time production. Industrial equipment producers — furnaces, cranes, rolling mills, fabricating machinery, etc., etc.—and the machine tool industry particularly are faced with the existence of stocks and facilities that could well support the next decade or so of general industrial activity. And, while inventive ingenuity can render existing equipment obsolescent, the inertia of such large quantities promises at best a slow squeezing of the equipment down through various levels of the industrial framework and finally onto either the scrap heap or into secondary export channels. Meanwhile, the creators of the equipment are so deflated as to threaten the pace of the entire industrial effort, integrated and interrelated so intimately as they are with all industries.

The imperativeness of lifting this burden and the certainty of many European nations starved for such equipment after the war so neatly complement each other, that disposal abroad came to be recognized by practically everyone at about the same time. The idea certainly has far more merit than half formulated and ill-

concealed opinions that the stuff should be tossed into the ocean, burned, or for God's sake gotten rid of somehow.

But, to give the equipment away, even if disguised by some impossible form of Government or private credit, would be merely a multiplication of the follies following the last war. There's too much wealth involved, and much of the payment for the equipment is yet to be sucked out of each individual, to expect popular acceptance of the action irrespective of what relief might be afforded business. Rather than the repudiation of international obligations that were so inevitable in the late twenties, product repayment would be preferable even if it had to be in liquor so that everyone could at least have the wry satisfaction of a beautiful hangover.

So what to get in return? It should be something immediate that wouldn't interfere with future export activities. Here, again, the serious inroads into U. S. material reserves and the slicking off of the cream of high-grade metallic resources brought many simultaneously to about the same conclusion—the creation of a strategic reserve of critical and semi-critical minerals, and to a much lesser extent of productive equipment, the shortages of which have so impeded the prosecution of this war. Definite declarations in an Act to this end would have to limit the size of such impounded stocks, would have to confine its liquidation to an obvious *military* emergency as distinguished from some economic disturbance, and would have to propound elaborate safeguards to protect the Act from being hugged to collapse by the innumerable pressure groups which would inevitably endeavor to use it as a catch-all for all types of over-production or marginal output.

It could be argued that such a creation of a military reserve would be a provoking step and could well quench the faith of other nations in America's spirit of high endeavor in leading the world to the peaceful world to come. And, it could also be argued that such action is costly. But, no one is of the opinion that military equipment will be liquidated with the careless abandon following the last war, and the costs involved in the impounding of such stocks would be only a fraction of that represented in military equipment. High endeavor be as it may, and a future emergency be as remote as it now seems, no one involved in the war production effort can take other than a gloomy view of a repetition of the confusions, close squeaks and dangers that threatened this nation's very existence in the six months following Pearl Harbor. An opinion to the contrary would be equivalent to distrust of life insurance as an accelerator of death.

While acceptance of the scheme of stock accumulation may imply recognition of merits in the stock-piling proposal of Nevada's Senator James T. Scrugham, there are very all-important differences from the bill S 1160, on which hearings have already taken place. The honorable Scrugham, being from Nevada, quite naturally expressly excludes iron ore, coal and petroleum from the provisions of his Act, and with typical high-minded statesmanship drags in economic security for small and marginal mines. That is, mines which by the smallness and low tenor of their ores, unfavorable geographical position, or some other controlling characteristic, are unable to profit at established market prices, and require the crutch of financial subsidy as a prerequisite of operation.

Stock accumulation as conceived by others seeks to avoid these types of regional log rolling, and envisages no support of uneconomic operations for periods long after the war. Rather, it is a means of trading what is possessed in excess for something that contributes to the long-term wealth of the nation. At the same time the in-

(*Continued on page* 194)

. 1943

Steel's Record Performance in Detail

THE tableau of steel in 1943 was one of coming into the year on a wave of improvisation, of shifts and expedients to cram the last wad of steel into each of a multitude of armament pipelines and to accommodate urgent and progressively larger over-all demands. As the pace of war shifted and veered, so was one program compressed as another accelerated. All these tricky patterns of demand would indeed have been an overwhelming frustration to the industry if the labyrinthine ways of priority control had not given way in the second quarter to the flexibility and elastic-exactness characteristic of the Controlled Materials Plan.

At year's end, December found the steel supply picture one of sufficiency. Perhaps not an elegant sufficiency, but still fully enough to meet any and all the varied ordnance requirements, the drain of history's greatest Naval construction program, and even the seemingly insatiable requests of Admirals Vickery and Land over in the Maritime Commission. And there was just enough steel left over to really whet the appetite of manufacturers champing at the bit to initiate limited production of civilian products.

Very early in 1943, about the end of the first quarter, it became obvious that production facilities were completely incapable of fulfilling the

TABLE I

Production of Iron and Steel, by Product (1929, 1935-1943)

(In Net Tons and Per Cent of Total)

Year	Plates (Universal and Sheared) Tons	% of Total	Sheets and Strip Tons	% of Total	Shapes Tons	% of Total	Bars (Hot Rolled, Cold Finished, Tool Steel, Carbon and Alloy) Tons	% of Total	Pipe and Tubes, Skelp and Billets Tons	% of Total	Wire and Wire Products, Wire Rods Tons	% of Total	Tin, Terne and Black Plate Tons	% of Total	Rails, Wheels, Axles, Ties, Splice Plates Tons	% of Total	All Other Tons	Total Production Net Tons
1929	5,624,798	12.2	8,688,726	18.8	5,351,382	11.6	8,314,316	18.1	5,487,339	11.9	3,510,538	7.6	2,418,274	5.2	4,389,938	9.5	2,212,435	45,997,746
1935	1,629,987	6.1	8,761,924	32.6	1,959,709	7.3	4,767,187	17.8	2,582,104	9.6	2,733,689	10.2	2,307,462	8.6	1,193,199	4.4	905,037	26,840,298
1936	2,829,950	7.5	11,447,319	30.2	3,245,346	8.6	6,822,492	18.0	4,225,272	11.2	3,357,626	8.9	2,945,232	7.8	2,053,851	5.4	930,456	37,857,544
1937	3,632,438	8.8	12,023,275	29.2	3,670,068	8.9	6,755,012	16.4	4,705,954	11.4	3,370,405	8.2	3,308,576	8.0	2,320,896	5.6	1,391,732	41,178,356
1938	1,919,835	8.1	6,948,749	29.5	2,082,685	8.8	3,484,923	14.8	2,882,471	12.2	2,361,630	10.0	2,191,905	9.3	993,684	4.2	703,069	23,568,591
1939	3,101,981	7.9	11,858,772	30.4	3,358,985	8.6	6,138,350	15.7	4,348,630	11.1	3,680,297	9.4	3,468,358	8.9	1,994,796	5.1	1,117,384	39,067,553
1940	4,323,408	8.9	13,783,700	28.4	4,232,346	8.7	7,885,261	16.4	5,029,966	10.5	4,351,848	9.1	3,625,551	7.5	2,399,494	5.0	3,028,795	48,660,369
1941	6,199,575	9.9	16,142,759	25.9	5,724,836	9.2	10,978,698	17.6	6,583,495	10.6	5,268,423	8.5	4,818,922	7.7	2,961,999	4.8	3,646,080	62,324,187
1942	11,799,600	18.8	11,248,392	18.1	5,969,009	9.6	11,939,982	19.2	5,939,915	9.5	4,632,017	7.4	3,520,059	5.7	3,090,294	5.0	4,306,646	62,445,914
1943	12,750,000	19.9	10,899,000	17.0	3,758,000	5.8	12,005,000	18.7	5,861,000	9.1	4,385,000	6.8	2,324,000	3.6	3,184,000	5.0	8,986,000	64,152,000

NOTE: Data for 1929, 1935-1942 from A.I.S.I.; 1943 figures are estimated by the author.

1944 .

year's distribution pattern laid down by WPB. At the same time it was equally obvious that completion of new capacity was going to require a bucketful of digitalis to snap back to even an approximation of the original construction schedule. And, as counterpoint to this discordant symphony, the Army and Navy and sundry (as, for instance, Texan) politicians were marshalling every conceivable force to mount construction of still another 10,000,000 tons of new capacity.

What to do! For a month or so WPB wallowed around in an abyss of indecision, trying to reconcile irreconcilables; finally to arrive at the opinion that the goal was based on fundamentally perverted analyses—that requirements overlapped, were bloated beyond all reason and included huge gobs of steel for shoehorning into inventory pipelines that were already stuffed. Then, at the insistent prodding of H. Q. Batcheller, the various agencies squeezed the water out of their requests, an action suddenly facilitated by virtual collapse of the $1,000,000,000 tank program, realization of the enormous over-estimates of ammunition requirements, and relief occasioned by licking the submarine menace. The military pulled in their horns, the pork-sniffing politicians were held at bay, and total steel demands were brought within several million tons of expected output.

The next steps were to whip producers into squeezing additional output out of existing capacity and to institute a paring of inventories all along the line—the latter "Share the Steel" program was in part voluntary and in part forced by WPB representatives touring the country probing into plant warehouses. With the several million tons of deficiency between supply and firm demands pretty well taken care of through the output spurt and putting the bite on inventories, the entire armament program was worried over the fourth-quarter hump without recourse to acceleration of construction of new capacity.

Thus was the country spared a futile construction spree and saved untold millions of dollars. Certainly, the re-balancing of the consumption budget rather than forcing in of one block after another of new capacity required considerable courage and foresight, for subsequent events indicated that, if completed, the bulk of the economically marginal productive facilities would have been called upon for little more than token operation. At year's end, at least 10 per cent of electric furnace capacity was idle, several new DPC blast furnaces were not even blown in, at least one eastern ore mine was not operating due to a labor shortage, and large integrated developments in Texas and in Utah were being carried to completion more as a gesture than because of dependence on their output.

That a somewhat weird program had been laid down for the steel industry in 1943, there is no denying. After an all-time record downlake movement of 92,000,000 gross tons of iron ore in 1942 (goal = 91,500,000 tons) a new and larger goal of 104,000,000 tons was set for the 1943 shipping season. Expansion of the ore boat fleet and completion of the deeper General MacArthur locks at Sault Ste. Marie were all directed to moving this phenomenal amount of ore in the 8 months between thaw and freeze-up. An extraordinarily late opening of the ice pack was an initial set-back to the program, but constant pressure resulted in progressive recovery during the season. As the boats "Olcott" and "Gov. Miller" docked at Lorain on Dec. 9, just one jump ahead of the freeze-up, a total of 84,404,852 tons had been brought down during the season and some 48,500,000 tons were stocked on lower lake docks and at the furnaces, fully sufficient to carry the steel industry through the winter months into the 1944 shipping season.

Coke supply was set at 61,768,000 net tons, whereas actual output skimped through to 56,000,000 tons, a goodly portion of the deficiency, the result of scattered slowdowns and formal work stoppages in anthracite and bituminous mines in May, twice in June, and in October, for a total loss of 5,520,000 man-days of output. It was in coke that the steel industry really ranged close to disaster, and, today, the stock situation is so scanty as to constitute an ever-present threat to full operation. On the other hand, scrap, which in 1942 was but a frail support to the whole production structure, was in 1943 no problem at all. In fact large quantities of alloy scrap were actually glutting the market, seeking homes even at no price differential. But melters had had their stomachs full of production delays and defining problems engendered by unsegregated alloy scrap and were loathe to utilize such scrap beyond the amounts forced by WPB or until grim necessity left no option. Scrap spokesmen are urging Metals Reserve to absorb the present alloy scrap surplus, and plans are afoot to permit certain S.A.E. numbers to be used in the blast furnace and the open hearth where the alloy content would do no harm. The steel industry's bogey for purchased scrap in 1943 was 14,386,000 net tons, whereas actual shipments during the year bettered that

TABLE II

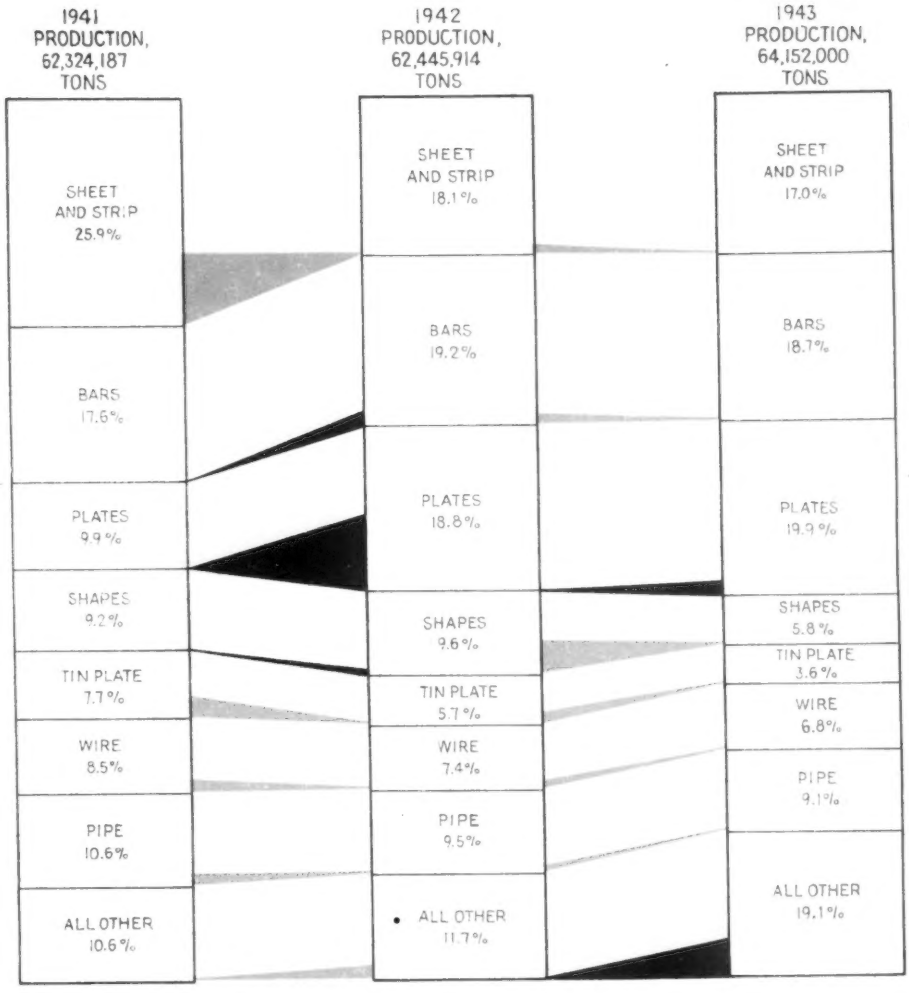
Steel Distribution by Consuming Industries (1937 to 1943)

(In Net Tons and Per Cent of Total)

	1937		1938		1939		1940		1941		1942		1943	
	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent	Tons	Per Cent
Agriculture	2,335,200	5.7	1,109,920	4.7	1,420,697	3.6	1,629,849	3.3	1,682,753	2.7	1,166,482	1.9	1,462,127	2.3
Aircraft	(a)		(a)		(a)		51,400	0.2	560,918	0.9	3,598,494	5.8	3,459,601	5.4
Automotive	7,814,240	18.9	4,053,280	17.2	5,906,358	15.1	7,964,923	16.4	9,847,222	15.8				
Construction	6,037,920	14.7	4,398,240	18.7	6,100,386	15.6	6,935,889	14.3	10,221,167	16.4	10,714,977	17.3	6,639,509	10.3
Containers	3,218,880	7.8	2,136,960	9.1	2,978,463	7.6	3,067,517	6.3	4,611,990	7.4	4,070,824	6.4	4,301,134	6.7
Furniture, furnishings	1,494,080	3.6	868,000	3.7	1,182,235	3.0	(b)		(b)		(b)		(b)	
Machinery, tools	1,804,320	4.4	831,040	3.5	1,460,000	3.7	2,330,365	4.8	3,365,506	5.4	2,852,077	4.6	3,275,323	5.1
Oil, gas, water, mining	3,034,080	7.4	1,820,000	7.7	1,841,599	4.7	1,900,286	3.9	2,929,237	4.7	1,585,969	2.5	1,903,285	3.0
Pressing, form., stamp	(c)		(c)		659,864	1.7	2,296,355	4.7	3,677,127	5.9	2,782,752	4.4	2,838,530	4.4
Railroads	4,686,080	11.4	1,443,680	6.1	3,250,022	8.3	4,019,219	8.3	5,983,122	9.6	4,400,444	7.1	5,172,196	8.1
Shipbuilding	390,880	0.9	389,760	1.7	517,771	1.3	999,858	2.1	2,929,237	4.7	10,369,766	16.6	13,318,107	20.7
Exports	3,914,923	9.5	2,422,261	10.2	2,817,482	7.2	8,719,805	17.9	6,045,446	9.7	10,800,000	17.3	8,850,118	13.8
All other	6,447,753	15.7	4,095,810	17.4	10,932,676	28.2	8,744,903	17.8	10,470,462	16.8	10,104,129	16.1	12,932,072	20.2
TOTAL	41,178,356	100%	23,568,951	100%	39,067,553	100%	48,660,369	100%	62,324,187	100%	62,445,914	100%	64,152,000	100%

NOTE: Distribution 1937 to 1938 by M. W. Worthing, based on data from The Iron Age; 1939 to 1942 from The Iron Age, various Government reports, and A.I.S.I. estimates, with jobber tonnage distributed and other alterations made by the author according to the technique devised by M. W. Worthing; 1943 data are estimates by the author.

(a) Negligible, or not available and included in All Other.
(b) Included in Pressing, Forming, Stamping.
(c) Included partly under Furniture and Furnishings and partly under All Other.



• Shift of product participation in total steel consumed during 1943, as compared with 1942 and 1941. Note that the past year showed none of the spectacular shifts in product production so typical of 1942, the only sharp change being the decline in shapes as a reflection of constriction in construction. Pressure on plates continued to accommodate the Maritime Program, but all other products lost ground percentage-wise but not necessarily in tonnage. See chart above and Table I for details. Red indicates percentage decrease and black represents increase.

figure (included 900,000 tons obtained by detinning cans, 600,000 tons recovered from slag dumps, and some 5,700,000 tons developed through salvage drives, farm and city collections, etc.)

The plan was to have blast furnaces deliver some 68,579,000 net tons of pig iron during the year, whereas actual 1943 production was about 63,700,000 tons. And, the industry was scheduled to turn out 97,115,000 net tons of steel ingots of all types in 1943, whereas actual output for the twelve-month period was 89,100,000 tons. Thus, 1943 pig iron production of 63,700,000 tons represented an increase of 5.9 per cent over total 1942 output. Ingot production in 1943 of 89,100,000 tons was a 3.6 per cent lift over 1942 activity. Of the 89,100,000 ingot tons turned out in 1943, about 78,686,211 tons came from the open hearth, the average yearly operating rate being 98.3 per cent of capacity; 5,755,629 tons came from bessemers, the yearly operating rate being 91.2 per cent of capacity; and 4,659,169 tons was electric steel, the operating rate being 97.8 per cent of capacity.

According to the original plan, the 97,115,000 tons of ingots were to be converted into about 69,340,000 tons of semi-finished and finished steel products (a 71.3 per cent conversion factor), to be distributed in approximately the following manner (in net tons):

Semi-finished (for shipment)	8,400,000
Structural shapes	4,500,000
Plates	15,600,000
Rails	2,200,000
Bars	12,000,000
Pipe and tubes	5,160,000
Rod and wire	4,440,000
Tin and terne plate	3,000,000
Sheet and strip	10,800,000
All other	3,240,000
Total	69,340,000

• 1943

But against these estimates, the actual 1943 output of 89,100,000 tons of ingots were converted into 64,152,000 tons of semi-finished and finished products distributed in the following manner:

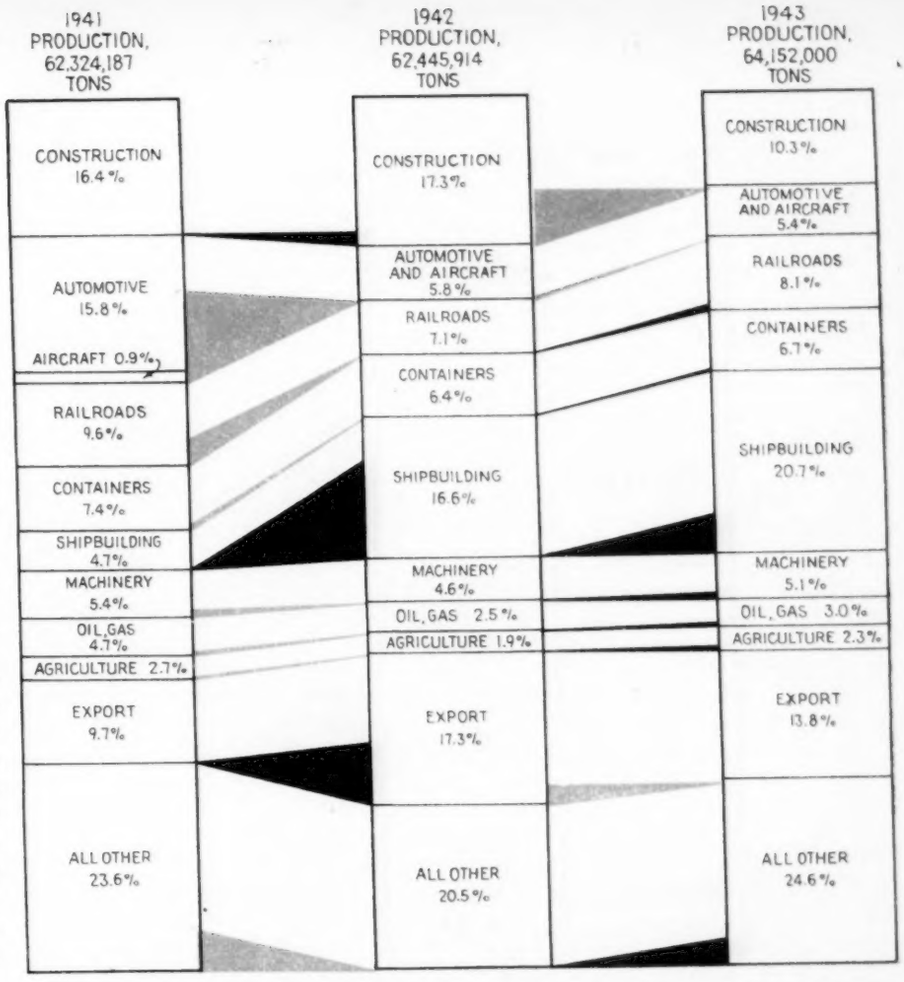
Semi-finished (for shipment)	5,781,000
Structural shapes	3,758,000
Plates	12,750,000
Rails	3,184,000
Bars	12,005,000
Pipe and tubes	5,861,000
Rod and wire	4,385,000
Tin and terne plate	2,324,000
Sheet and strip	10,899,000
All other	3,205,000
Total	64,152,000

The most significant difference between intention and performance was the considerable drop in semi-finished steel shipments, the result of a sizable decline in export demands. Rather than ship so much steel for conversion abroad, primarily England and to a small extent to Russia, finishing facilities in the U. S. were loaded up more than originally projected. Export, which in the previous year of 1942 took 17 per cent of steel output, large quantities being raw steel such as ingots and billets, in 1943 dropped to 14 per cent of output, with finished steel represented in proportionally greater quantities.

Product distribution of total production, both in tonnage and percentage of total, are shown in Table I for the years 1929 and 1935 to 1943 inclusive. Significant changes in percentage distribution of the various products for the past three years are shown pictorially in the graph on this page. Note that drastic changes were made in most products, particularly in sheet and strip, in 1942 to accommodate a great spurt in plate output. In 1943, however, shifts in the distribution pattern were minor and, in general, continued the pattern laid down in the previous year.

Table II shows details of steel distribution by consuming industry groups for the years 1937 to 1943 inclusive. And, the chart on the opposite page indicates visually the changes in percentage distribution of steel output among consuming groups for the past three years. Here again, in 1942, some really terrific bites were taken out of automotive consumption

1944 .



• Following the trend established in 1942, shipbuilding continued to spurt in 1943, on the basis of percentage participation in total tonnage of steel consumed. At the same time there was considerable sweating down of construction participation, and exports fell off markedly. Most other industry groups enjoyed minor recovery, as detailed in the chart above and in Table II. Red indicates percentage decrease and black represents increase.

and to a lesser degree all other groups, to accommodate spectacular increases in shipments to the shipbuilding industry and to export. In 1943, the chart shows considerable whittling down of construction and export outlets, to accommodate continued sizable expansion in shipbuilding and minor recoveries in most other classifications.

Of the 89,100,000 tons of ingots produced in 1943, very close to 13,500,000 tons were alloy grades and the remainder, 75,600,000 tons, were carbon analyses. Only six years ago, in 1938, the 1,654,000 tons of alloy steel produced represented about 5 per cent of the total steel output. By comparison, in 1943 alloy steels were turned out in nearly nine times the 1938 tonnage, accounting for 15.2 per cent of total steel produced. Even so, this striking 1943 alloy performance was not as prominent as had been anticipated early in the year. With a tank program in full swing and shell and bullet core deliveries swinging along on an upward trend, the alloy sights were set very high and only were cut back severely after the middle of the year, when various programs were pared to sensible proportions.

The trend in alloy and carbon steels, vis-a-vis total production, for the past six years, is as follows:

	(Millions of Net Tons)		
	Alloy	Carbon	Total
1938	1.654	30.098	31.752
1939	3.212	49.587	52.799
1940	4.966	62.017	66.983
1941	8.206	74.633	82.839
1942	11.526	74.506	86.032
1943	13.500	75.600	89.100

Of the 13,500,000 tons of alloy steel turned out in 1943, just about 3,880,000 tons came from electric furnaces and 9,620,000 tons from open hearths. Here again, every pressure was being exerted to complete new electric furnace capacity in the first half of 1943 to fulfill programs favoring electric furnace alloy specifications. Toward third quarter, however, program cut-backs wrecked electric furnace backlogs and emphasis shifted for a short time to pressing for carbon steels, the result being a shifting of certain open hearth alloy analyses to idle electric furnaces. However, by November the whole steel supply picture had eased to such a degree as to remove pressure from both types of refining units.

The rise in electric furnace participation in alloy steel output has been steady over recent years. From less than 372,000 tons in 1938, electric furnace alloy steel production has risen without interruption to the nearly 13,400,000 tons in 1943. During that period the percentage of alloy steel output produced in electric furnaces rose from 22 per cent to 29 per cent of the total.

Specific data showing this trend are as follows:

	(Millions of Net Tons)		
	Open Hearth	Electric Furnace	Total
1938	1.281	0.372	1.653
1939	2.462	0.750	3.212
1940	3.679	1.287	4.966
1941	5.744	2.463	8.207
1942	8.060	3.324	11.384
1943	9.620	3.880	13.500

Now, to carry the breakdown of alloy steel just one more step, it is interesting to examine the sharp increase in stainless steel output during 1943. Of the 3,880,000 tons of electric furnace alloy steel produced in 1943, very close to 425,000 tons were made up of various stainless analyses. This establishes by far a new high point in stainless production, being a rise of 24.8 per cent over 1942, and a rise of 14.3 per cent over the previous high total of 371,984 tons in 1941.

Specific data showing the trend in stainless output over the past six years are as follows:

(Thousands of Net Tons)	
1938	95.95
1939	179.62
1940	249.98
1941	371.98
1942	340.78
1943	425.00

Non-Ferrous Metals

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By the beginning of 1943, it became apparent that the lead and zinc premiums were inadequate. Therefore, there was established an additional quota bracket (known as the "B" bracket) beyond which another 2¾c. per lb. would be paid for lead, and two additional quota brackets ("B" and "C") for zinc beyond each of which an additional 2¾c. per lb. would be paid. For instance, a mine might be paid 8.25c. per lb. (the market price) for the first 100 tons of zinc produced monthly; 11c. per lb. for the second 100 tons; 13.75c. per lb. for the third 100 tons; and if its production reached or topped 400 tons, 16.5c. a lb. for that portion. By April, 1943, though nothing was said about it at first, special contracts had been authorized by which as much as 26½c. a lb., more than double the market price, would be paid for over-quota copper production.

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In June, the Mineral Resources Coordinating Division of WPB inaugurated a labor priority list giving preference to certain of the most critical minerals and to the most efficient mines producing each mineral. This list was intended to serve as a basis of referral of manpower by the U. S. Employment Service but since the Employment Service had very few people to refer the list actually made very little difference. It did, however, subordinate and channel labor away from less essential mines which theretofore had been posing as heavy contributors to the war effort.

After ten months of grunting and groaning, slightly more than a million tons of refined copper had been produced domestically, according to United States Copper Association, and it appeared that the year's production might top 1,200,000 tons. This compares with 1,135,708 tons in 1942, and 1,065,667 tons in 1941. Net domestic consumption (including deliveries on duty paid foreign copper), according to the Association, stood at 1,437,769 for the ten months period, which would extend on a yearly basis to 1,725,323 tons. In 1942, 1,517,983 tons were consumed; in 1941, 1,517,765 tons. The refined copper stockpile, about half of it government owned, is in the neighborhood of 400,000 tons.

Arizona is conceded to have produced more copper than any other state in 1943 although no single mine even approached the output of Utah Copper Co., whose mammoth Bingham Canyon operations undoubtedly made Utah a strong second. Anaconda pushed Montana to a poor third, and New Mexico, Nevada, and Michigan trailed.

From the standpoint of consumption, it is no secret that ordnance requirements for brass and bronze were dominant by far. More amazing and less talked about are the miraculously small quantities required by the utilities and electrical industries whose needs were supplied largely by reshuffling and patchwork. According to the Office of War Utilities, consumption of wire, cable, and bus bar was reduced from $29 million worth in 1940 to a current annual rate of $8 million, a cut of 72 per cent. Moreover, of the $8 million about $1 million is being obtained from wire mills, the remainder being largely salvaged from plant.

For 1944, the prospect is not one of easy availability of copper for civilian manufacture, although undoubtedly larger quantities will have to be released to the utilities for transmission lines, and wire products will be available to a greater extent for replacement and repair. At the outset of the war, many military products preferably made of copper were forcibly shifted to other materials, and these will be the first to be allowed back in the fold. In other words, only by continuation of the belt tightening policy can the supply-requirements picture be held in equilibrium.

Curtailment of manufacture of small arms ammunition has released huge tonnages, but these will be gobbled up largely by the shift back to brass from steel cartridge cases. Steel cases never had been fully satisfactory, and Dec. 1 marked the reconversion date. The Maritime Commission claims that use of iron and steel for a wide variety of ship fittings has saved more than 15,000 tons of copper and brass in the construction of its Victory Fleet, and the Navy no doubt has eliminated a comparable amount. Such items as these will, of course, take precedence over civilian manufacture if any real excess of copper appears.

Continued close control of civilian manufacture was foreshadowed by WPB's announcement Dec. 1 of a program for redistribution of 1,200,000 new bronze valves having a value of $3,500,000 through normal trade channels. On the other hand, it was announced that directives prohibiting the use of brass in the manufacture of radiator valve bodies would not be renewed following their expiration Dec. 31.

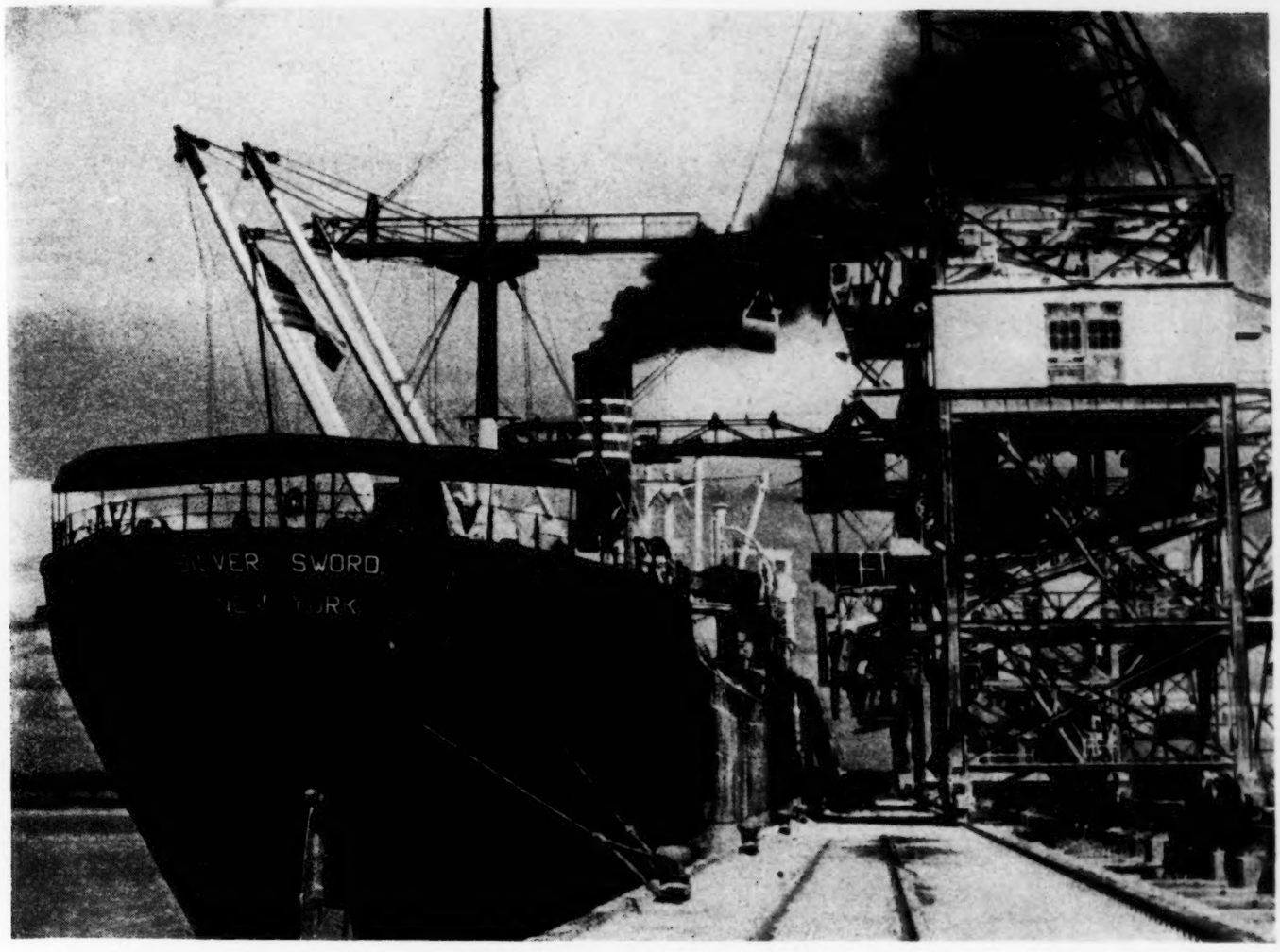
WPB's prologue to lifting the veil of secrecy on mine and metal statistics came early in November when it was announced that brass mills had produced 2,611,890 net tons of primary products during the 12 months ending June, 1943. The monthly production rate during the first six months of 1943 was 235,074 net tons, a 300 per cent increase from 1940 average monthly production of 67,500 net tons. During the 12-month period, the production included 214,787 tons of copper products; 152,463 tons of alloy tube; 478,419 tons of alloy rod; and 1,766,221 tons of alloy strip.

Unique from a metal finishing point of view was the conversion of steel rolling mills owned by Weirton Steel Co. to the rolling of brass strip. At Weirton, the slabs are hot rolled on a structural mill, cold rolled to gage on a 48-in. tandem cold mill. Capacity is about 25,000 tons monthly. Acme Steel Co., Chicago, is performing a similar operation with gilding metal, using a 16-in. mill.

Curiously enough, the war brought to America shortages in metals whose principal ore resources were domestic rather than foreign. In the early part of the year, copper, zinc and molybdenum all were high on the shortage list. For a time, zinc exceeded copper in scarcity by reason of the same basic production causes—lack of labor in the mines and smelters. On the requirements side the picture was also similar, for more than 50 per cent of our zinc requirements have been for brass and bronze.

What An Awful Scare

Domestic zinc mines began to stumble early in the year, and, with the aid of increased premium price payments, every effort was made to re-



● A large fleet of ships ferry bauxite from South American mines to this Gulf Coast plant.

suscitate even small properties which had been inactive for years. Despite its short anticipated future life, the Tri-State region contributed better than a quarter of total production. The Coeur d'Alene district of Idaho, which had been counted on to replace the faltering Tri-State mines, was one of the hardest hit by labor shortage. The slag-fuming plant of Bunker Hill and Sullivan at Kellogg, helped overall production and the fuming plants at Tooele, Utah, and East Helena, Mont., also were saving factors.

As in chrome and manganese, vessels returning from war zones conveniently situated near sources of raw material carried zinc concentrates which otherwise would not have been available. Thus, Australian imports continued steadily at a time when they were sorely needed.

When final figures are announced, it will be surprising if domestic mine production reaches three quarters of a million tons, compared to 1942, and 1941 totals of 760,210 and 749,125 tons respectively. Slab zinc stocks, incidentally, have been guessed to be at least 185,000 tons.

After consumption for brass and bronze, the remaining 50 per cent used was primarily for galvanizing, the peacetime leader, and for die-castings.

For the second successive year, smelters had difficulty in handling concentrates as fast as they were received, and by November stockpiles of two smelters in Texas and one in New Jersey had grown so unwieldy as to make it necessary for Metals Reserve Co. to purchase a half interest in the piles. This was done in order that the smelters might continue to receive shipments. As with copper smelters, comparatively low wage rates made it difficult for zinc smelters to recruit labor, and the undermanning in turn contributed to the production bottleneck.

The easier metal situation culminated in a revision of the WPB zinc conservation order, No. M-11-b on Nov. 11, easing restrictions on the use of zinc in the production of several comparatively minor items. Resumption of galvanized sheet production, which in peacetime constituted the largest single outlet for zinc, on a large scale is dependent as much on availability of steel sheets as of zinc. The current tight situation in the flat rolled market prohibits speculation as to when this field will again sprout. In the post-war period, the industry looks for an immediate strong demand through galvanizing, brass for construction, and especially zinc alloy die-castings which in a little more than ten years developed from a minor outlet to a market for 125,000 tons or more of special high grade zinc. The paint industry, whose civilian market has built up with the war years, is also regarded as a probable big post-war customer.

That Beauty Cocktail

From the early days of the war, while most of the other metals gained a glittering notoriety because of their scarcity, lead has been a bashful wallflower always available for the asking. But, in the latter days of 1943 as other metals became easier, lead became scarcer. Not a few persons were surprised to learn that only about 40 per cent of total consumption was being secured from domestic mine production, the deficit being made up

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The mine labor problem has been the principal limiting factor in copper, lead, and zinc production, reflecting the lack of desire by skilled men to do hard and dangerous work for low pay in remote, unattractive, and uncomfortable mining camps, even though the War Labor Board realistically allowed small wage increases. Concentrated recruiting campaigns by War Manpower Commission, in which mining was given top priority over all other industry in referral of job applicants west of the Mississippi were barren in result, and the same final desperate remedy that was applied in 1942 was repeated in 1943—the release of soldiers with mining experience to work in the mines. Some 4500 soldiers were released in September, mostly to molybdenum, copper, and zinc mines. Whereas the 1942 crop had been sent out by the army less because they were miners than because they were indifferent soldiers, the 1943 contingent was better equipped professionally and has stayed on the job in greater numbers.

In June, the Mineral Resources Coordinating Division of WPB inaugurated a labor priority list giving preference to certain of the most critical minerals and to the most efficient mines producing each mineral. This list was intended to serve as a basis of referral of manpower by the U. S. Employment Service but since the Employment Service had very few people to refer the list actually made very little difference. It did, however, subordinate and channel labor away from less essential mines which theretofore had been posing as heavy contributors to the war effort.

After ten months of grunting and groaning, slightly more than a million tons of refined copper had been produced domestically, according to United States Copper Association, and it appeared that the year's production might top 1,200,000 tons. This compares with 1,135,708 tons in 1942, and 1,065,667 tons in 1941. Net domestic consumption (including deliveries on duty paid foreign copper), according to the Association, stood at 1,437,769 for the ten months period, which would extend on a yearly basis to 1,725,323 tons. In 1942, 1,517,983 tons were consumed; in 1941, 1,517,765 tons. The refined copper stockpile, about half of it government owned, is in the neighborhood of 400,000 tons.

Arizona is conceded to have produced more copper than any other state in 1943 although no single mine even approached the output of Utah Copper Co., whose mammoth Bingham Canyon operations undoubtedly made Utah a strong second. Anaconda pushed Montana to a poor third, and New Mexico, Nevada, and Michigan trailed.

From the standpoint of consumption, it is no secret that ordnance requirements for brass and bronze were dominant by far. More amazing and less talked about are the miraculously small quantities required by the utilities and electrical industries whose needs were supplied largely by reshuffling and patchwork. According to the Office of War Utilities, consumption of wire, cable, and bus bar was reduced from $29 million worth in 1940 to a current annual rate of $8 million, a cut of 72 per cent. Moreover, of the $8 million about $1 million is being obtained from wire mills, the remainder being largely salvaged from plant.

For 1944, the prospect is not one of easy availability of copper for civilian manufacture, although undoubtedly larger quantities will have to be released to the utilities for transmission lines, and wire products will be available to a greater extent for replacement and repair. At the outset of the war, many military products preferably made of copper were forcibly shifted to other materials, and these will be the first to be allowed back in the fold. In other words, only by continuation of the belt tightening policy can the supply-requirements picture be held in equilibrium.

Curtailment of manufacture of small arms ammunition has released huge tonnages, but these will be gobbled up largely by the shift back to brass from steel cartridge cases. Steel cases never had been fully satisfactory, and Dec. 1 marked the reconversion date. The Maritime Commission claims that use of iron and steel for a wide variety of ship fittings has saved more than 15,000 tons of copper and brass in the construction of its Victory Fleet, and the Navy no doubt has eliminated a comparable amount. Such items as these will, of course, take precedence over civilian manufacture if any real excess of copper appears.

Continued close control of civilian manufacture was foreshadowed by WPB's announcement Dec. 1 of a program for redistribution of 1,200,000 new bronze valves having a value of $3,500,000 through normal trade channels. On the other hand, it was announced that directives prohibiting the use of brass in the manufacture of radiator valve bodies would not be renewed following their expiration Dec. 31.

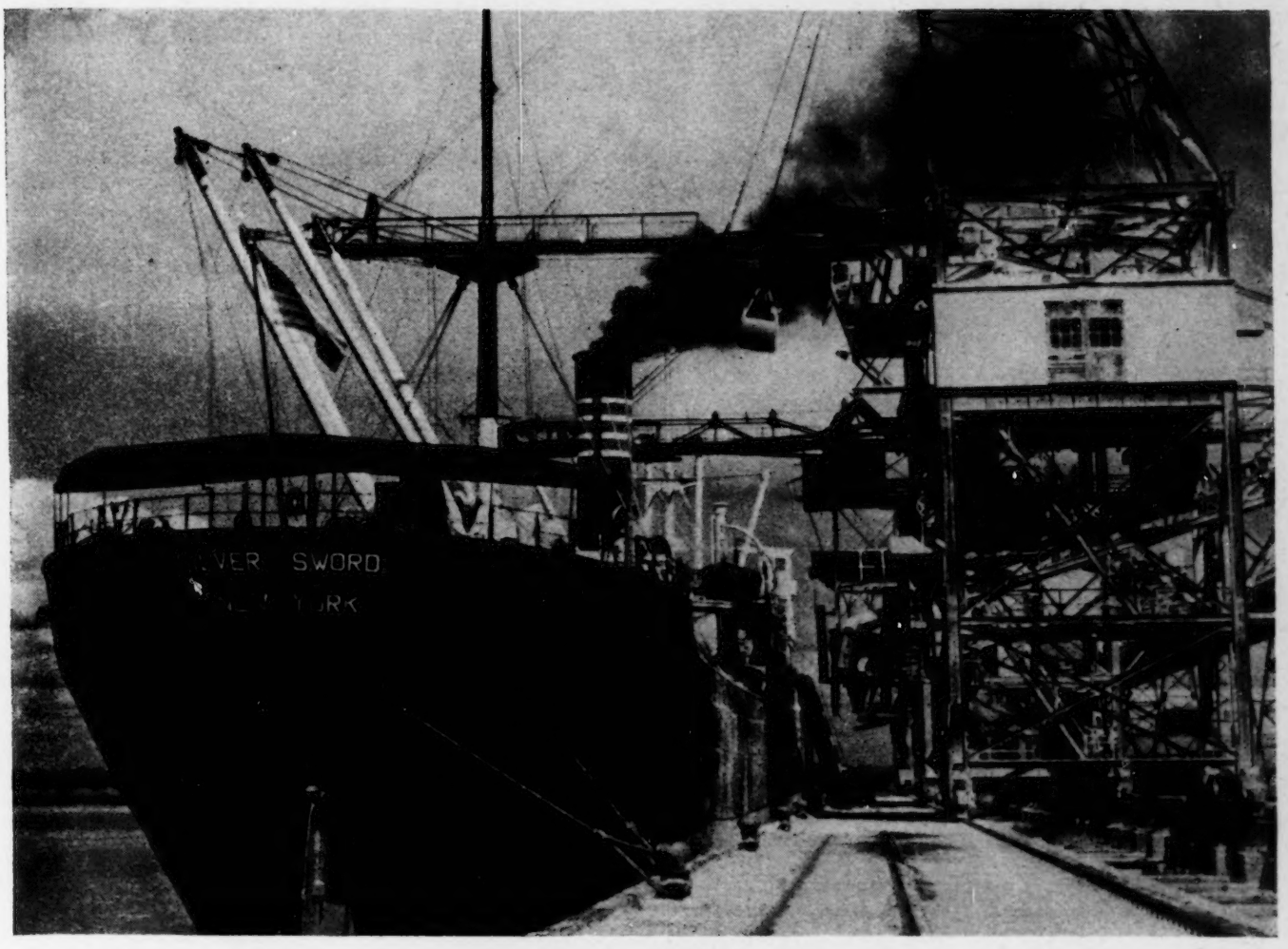
WPB's prologue to lifting the veil of secrecy on mine and metal statistics came early in November when it was announced that brass mills had produced 2,611,890 net tons of primary products during the 12 months ending June, 1943. The monthly production rate during the first six months of 1943 was 235,074 net tons, a 300 per cent increase from 1940 average monthly production of 67,500 net tons. During the 12-month period, the production included 214,787 tons of copper products; 152,463 tons of alloy tube; 478,419 tons of alloy rod; and 1,766,221 tons of alloy strip.

Unique from a metal finishing point of view was the conversion of steel rolling mills owned by Weirton Steel Co. to the rolling of brass strip. At Weirton, the slabs are hot rolled on a structural mill, cold rolled to gage on a 48-in. tandem cold mill. Capacity is about 25,000 tons monthly. Acme Steel Co., Chicago, is performing a similar operation with gilding metal, using a 16-in. mill.

Curiously enough, the war brought to America shortages in metals whose principal ore resources were domestic rather than foreign. In the early part of the year, copper, zinc and molybdenum all were high on the shortage list. For a time, zinc exceeded copper in scarcity by reason of the same basic production causes—lack of labor in the mines and smelters. On the requirements side the picture was also similar, for more than 50 per cent of our zinc requirements have been for brass and bronze.

What An Awful Scare

Domestic zinc mines began to stumble early in the year, and, with the aid of increased premium price payments, every effort was made to re-



● A large fleet of ships ferry bauxite from South American mines to this Gulf Coast plant.

suscitate even small properties which had been inactive for years. Despite its short anticipated future life, the Tri-State region contributed better than a quarter of total production. The Coeur d'Alene district of Idaho, which had been counted on to replace the faltering Tri-State mines, was one of the hardest hit by labor shortage. The slag-fuming plant of Bunker Hill and Sullivan at Kellogg, helped overall production and the fuming plants at Tooele, Utah, and East Helena, Mont., also were saving factors.

As in chrome and manganese, vessels returning from war zones conveniently situated near sources of raw material carried zinc concentrates which otherwise would not have been available. Thus, Australian imports continued steadily at a time when they were sorely needed.

When final figures are announced, it will be surprising if domestic mine production reaches three quarters of a million tons, compared to 1942, and 1941 totals of 760,210 and 749,125 tons respectively. Slab zinc stocks, incidentally, have been guessed to be at least 185,000 tons.

After consumption for brass and bronze, the remaining 50 per cent used was primarily for galvanizing, the peacetime leader, and for die-castings.

For the second successive year, smelters had difficulty in handling concentrates as fast as they were received, and by November stockpiles of two smelters in Texas and one in New Jersey had grown so unwieldy as to make it necessary for Metals Reserve Co. to purchase a half interest in the piles. This was done in order that the smelters might continue to receive shipments. As with copper smelters, comparatively low wage rates made it difficult for zinc smelters to recruit labor, and the undermanning in turn contributed to the production bottleneck.

The easier metal situation culminated in a revision of the WPB zinc conservation order, No. M-11-b on Nov. 11, easing restrictions on the use of zinc in the production of several comparatively minor items. Resumption of galvanized sheet production, which in peacetime constituted the largest single outlet for zinc, on a large scale is dependent as much on availability of steel sheets as of zinc. The current tight situation in the flat rolled market prohibits speculation as to when this field will again sprout. In the post-war period, the industry looks for an immediate strong demand through galvanizing, brass for construction, and especially zinc alloy die-castings which in a little more than ten years developed from a minor outlet to a market for 125,000 tons or more of special high grade zinc. The paint industry, whose civilian market has built up with the war years, is also regarded as a probable big post-war customer.

That Beauty Cocktail

From the early days of the war, while most of the other metals gained a glittering notoriety because of their scarcity, lead has been a bashful wallflower always available for the asking. But, in the latter days of 1943 as other metals became easier, lead became scarcer. Not a few persons were surprised to learn that only about 40 per cent of total consumption was being secured from domestic mine production, the deficit being made up

● Chipping room in American Magnesium Corp.'s Cleveland plant, where castings are made for aircraft use.

from imports, secondary lead, and steadily increasing withdrawals from stockpiles. Production during 1943 was down from 1942 because of the same labor shortage that haunted copper and zinc, but contrary to the scurry to get help for those metals, nobody seemed to care very much about lead. In fact, lead-zinc mines whose values were composed in too large a proportion of the former, were shunted from the top of the labor priority list, bluebook of essential producers. Because Australian rail lines were inadequate to haul both lead and zinc concentrates from mine to tidewater for shipment as ballast to American smelters, lead had to stay behind much of the time, being shipped only spasmodically. Likewise, copper and zinc were given priority on bottoms from South America, where Peru was the principal lead producer. Thus imports followed domestic production on the downward trail during the year, although Canada and Mexico, which also experienced trouble maintaining production, each contributed substantial amounts. The 1944 picture is no brighter. Domestic production threatens to decline further because of labor shortages, but with a favorable shipping situation easing the ocean transportation bottleneck, imports should be larger. Metals Reserve Co. will continue to dig slowly into the stock pile unless there is an unexpected drop in requirements.

Offsetting an expected 1944 decrease in small arms requirements, increases are anticipated in requirements for storage batteries, an essential in the submarine program, for cable, for tetraethyl lead for high octane gasoline and for other war uses. Lead azide, for instance, has to a large degree replaced mercury as a detonator.

Quick, the Cork

Aluminum production, which filled the broad base of the requirements bottle slowly during the early phases of the war, spurted up through the narrow neck in the latter part of 1943. Women who had tossed their saucepans into the community scrap pile soon after Pearl Harbor were astounded to read that aluminum scrap had become so plentiful that dealers were refusing to handle it, for a time, at any price, and finally that the government was relieving this situation by purchase and stockpiling of ingots cast from secondary metal.

WPB told the story of supply progressively forging ahead of allotments during the year in the following table:

1943	Total Supply (Millions of Lbs.)	Allotments
First quarter	582.1	534.8
Second quarter	633.4	585.5
Third quarter	790.4	661.6
Fourth quarter	871.2	774.0
Total	2877.1	2555.9

Reasons given were similar to those explaning the changed situation in other metals: (1) more careful screening of aircraft requirements based on bills of material; (2) more conservative statements of requirements by claimant agencies—ostensibly because of longer experience in compiling estimates; (3) trimming of allocations to processing capacity—in hammer forgings, for instance.

Successive relaxations in permitted uses of aluminum were culminated Dec. 4 in permission to use the metal for the manufacture of intregal passenger buses and collapsible tubes. A few weeks previously the order had been relaxed to permit several uses where copper previously had been employed — electric bus bars, bare

electrical conductor and current carrying accessories, and for various minor civilian uses.

Aluminum capacity today is rated at 2,200,000 lb. annually, but no where in official statements is there confirmation that actual production has reached that rate. At the reduction plants in the Pacific Northwest and in southern California, for instance, nearly a third of the total working force turned over in a month's time and it was reported in Congress that pot lines were dropped from original uncompleted plans because of the manifest impossibility of manning them.

Contributing to the total available supply are scrap now nearing the rate of 700 million lb. a year—twice the total pre-war primary production of aluminum—and imports from the Aluminum Co. of Canada. The Canadian firm had delivered 600 million lb. of a 1,300,000,000 lb. contract by the end of November, and was scheduled to deliver the balance at the rate of 40 million lb. a month to complete the contract early in 1945.

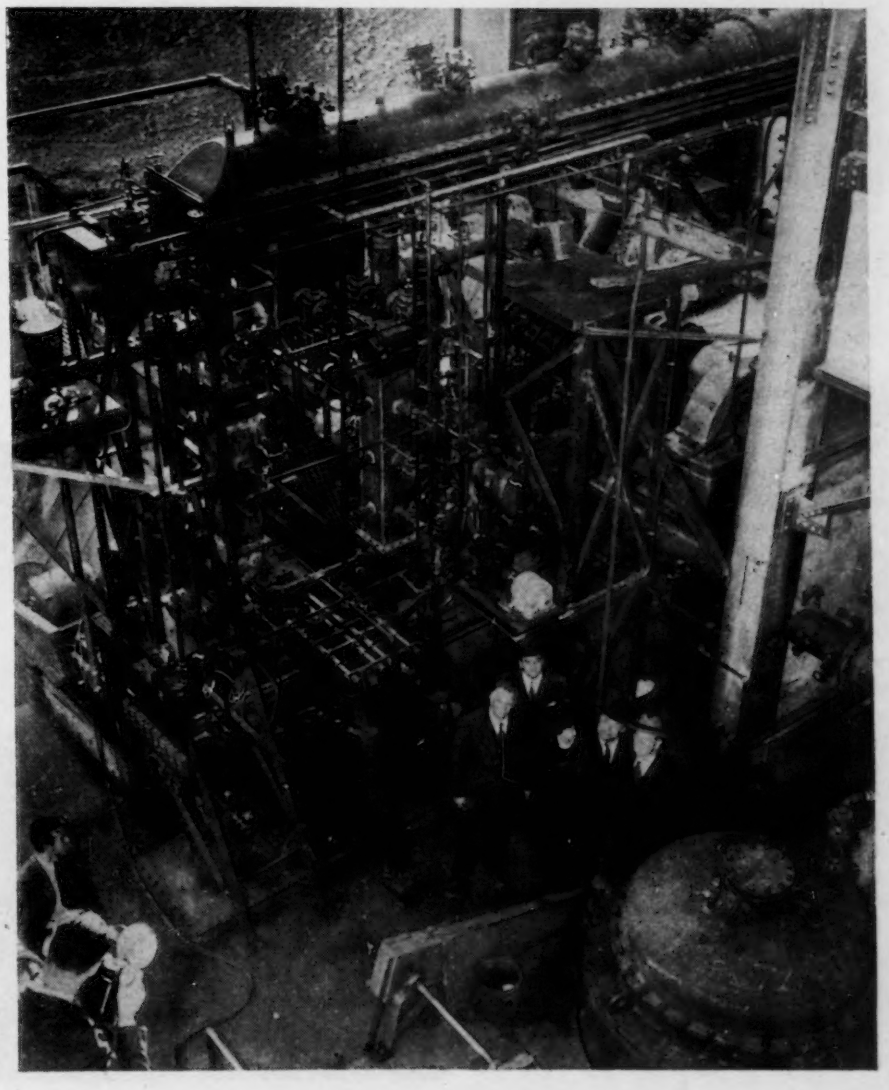
The aluminum fabricating program slurped up through the neck of its bottle with as much of a spurt as did primary reduction. In early November work was halted on a $16 million DPC extrusion plant at Memphis, Tenn., and another at Columbus, Neb. Two weeks later Phelps-Dodge was halted in its plans to revamp at railroad car shop at Hammond, Ind., for the same purpose. Reasons given: revisions of Army's estimated requirements and an unexpectedly high rate of productivity from plants already in operation. But the aluminum fabricating industry already was a giant. Compared to 1939, estimated 1943 output of aluminum forgings was 45 times as great, tubing 13 times, rod and wire 12 times, extruded shapes ten times, and aluminum sheets seven times.

On the raw material side, a scare developed early in the year when bauxite boats from Surinam were popped off by the Nazi-U-boats in the Carribean like shooting gallery ducks. Arkansas bauxite producers were spurred sharply to increase output, and railroads serving the Pacific Northwest reduction plants groaned. The Bureau of Mines took the opportunity to deliver a rabbit punch to WPB.'s Aluminum-Magnesium Division with which it had been battling ever since its proposals were rejected at the outset of the war program. At the annual meeting of the American Institute of Mining and Metallurgical Engineers, Reginald Dean, chief of the Bureau's metallurgical activities and its loudest talker, delivered an innocuous paper in the presence of WPB officials, but in his official press release quoted himself as renewing violent charges against the WPB program. In virtually unprecedented action, the A.I.M.E. magazine called the punch and the Bureau apparently had added to its enemies everyone needed to assure the success of any program it proposed. That was not the end, for in November, with the submarines dispelled, and the bauxite situation well in hand, the Bureau announced its intention to finish a half completed bauxite exploratory program in Alabama on the same day that WPB announced it was curtailing production of three major Arkansas producers.

Halted also by WPB was government financing of a $4 million commercial pilot plant to test the feasibility of using Oregon and Washington clays for the production of alumina. Were this substitution possible, the long raw material haul from Surinam or the deep South to Pacific Northwest reduction plants would be unnecessary. These plants, representing a big segment of the country's capacity, were located in the northwest because of bounteous power available from Grand Coulee and Bonneville dams, but with the slump in aluminum requirements after the war they would be at a competitive disadvantage with the Southern reduction plants nearer to Eastern fabricating plants and ultimate market. When citizens of Oregon and Washington heard of the clay pilot plant's destiny, they chipped in the necessary $4 million to build the plant contingent upon WPB approval. Among the backers was Eric Johnson of Spokane, youthful and dynamic president of the United States Chamber of Commerce.

One of the first OPA ceiling prices to break, and break badly, was that

● Dr. Fritz Hansgirg and Henry Kaiser point out details of the magnesium manufacturing process at the Permanente plant to Sidney Hillman during an inspection tour.



of aluminum scrap. Flow from mills, fabricators, and demolished aircraft from the battlefronts continued to pile in. The oversupply of scrap amounted to 10 million lb. by the end of August, and by late fall there were no buyers at any price. Secondary aluminum smelters secretly had lowered their quotations as much as 2½ to 3 cents per lb. by the end of November when WPB finally tossed a rope to the industry in the form of a Metals Reserve Co. purchase offer. Shaving the OPA ceiling price, so as not to be deluged, the program calls for the stockpiling by Metals Reserve of 16 types of high grade alloy ingots produced from scrap, and two classes of medium grade ingots, one for sand and permanent mold and one for die-casting. Purchase of B grade ingots from any one smelter is limited to 25 per cent of a foundry's total output. The ingots will be stored in Metals Reserve Co. warehouses at New York, Philadelphia, Buffalo, Cleveland, Detroit, Chicago, Kansas City and Los Angeles.

Scrap segregation, amounting to only 30 per cent of that marketed two years ago now amounts to 90 per cent, thus easing labor requirements for segregation by dealers. Along with its ingot purchase program, WPB fired a buckshot barrage for greater secondary aluminum utilization: The Army and Navy were ordered to expand their uses for such items as gun director parts in which substitute materials had formerly been used; the steel industry was permitted to use increased quantities for deoxidizing; Russia was persuaded to accept one-third of its fourth quarter requirements in secondary aluminum, instead of all in primary; a program was pushed to eliminate specifications calling for primary metal when secondary would do; and lastly, relaxations in the use of aluminum were written so that secondary metal would be used. Canada went so far as to remove all restrictions on scrap aluminum and secondary ingots.

The labor problem in aluminum reduction and fabrication plants was double-barreled. Many of the plants were located in labor shortage areas, a factor complicated by the fact that the industry's pay scale has not been in line with that of many other war plants. Foundries were the hardest hit, requiring 73,000 workers out of the 147,490 estimated to be needed by all types of aluminum plants in the last half of 1943. The industry's request for this many new employees, of course, met the same fate as Junior's request for a Flying Fortress for Christmas. Topping of the difficulty, the CIO union representing about 50,000 workers in 26 Aluminum Co. of America plants, announced on Nov. 19 a demand for 15c. an hr. pay increase.

But the questions of ore, capacity, distribution, labor, and scrap were only in the two, four, eight, sixteen and thirty-two dollar categories. The sticker which has been asked from the beginning of the aluminum program was "What will become of aluminum capacity after the war?" The sleeper in this puzzler consists of the fact that Uncle Sam owns a little more than one half the primary aluminum capacity and supplied more than 80 per cent of the cost of new fabricating facilities, which alone are valued at more than a billion dollars. Jesse Jones, who laid out the financial plant, thinks about 900 million lb. of primary aluminum, three times pre-war requirements, can be used in the post-war period—about 40 per cent of capacity. Plants producing this proportion, he feels, can be disposed of means of five-year leases with option to buy, affecting principally those plants located near to power and market. The others he thinks can be converted in part and that the loss to the government need not be total. Canada, with a similar problem, is not so optimistic. George C. Bateman, metals comptroller, told a parliamentary committee that "in about five days at the present rate of production we could fill all the probable annual requirements for post-war airplane production," and says that Canada's expansion of 12 times pre-war capacity is being used almostly entirely to meet the needs of the airplane program.

Uncle Jesse's Prodigy

Those who have tuned up on hosannas to welcome the light metals age because of aluminum's abundancy can take off their robes and go down the mountain for a while, however. Magnesium, the twin saint of the movement, is not shown to be abundant by WPB's cold hard figures, nor is there prospect that would-be makers of magnesium automobiles can get their raw material in 1944.

In the first place, even though primary magnesium capacity has left pre-war production no more than a childhood memory, full output at the originally anticipated figure of 700 million lb. annually has not been realized—and the deficit is substantial. Second, the aircraft program does not completely dominate magnesium requirements as it does aluminum. Third, secondary metal plays a relatively unimportant part.

Though production outstripped requirements by a very modest figure, less than 10 per cent, direct military needs have been filled during 1943. The last unit of the sprawling Basic Magnesium plant at Las Vegas, Nev., whose management was assumed by Anaconda in the fall of 1942, went into production on July 12, 1943. The output of the big $130 million plant alone, with a capacity of 102 million lb., was sufficient to take magnesium out of the critical class.

Then, too, Henry Kaiser's Per-

● One of the smelters at the plant of Alloys & Products Co., which can hold 3000 lb. of aluminum.

manente plant, down the peninsula from San Francisco, which had been bug-infested technologically from its inception finally accumulated sufficient scientific insecticide to cure its difficulties. Full production was achieved last year, about two years late, but welcome none the less.

On the other hand, the epidemic of labor shortage in the Pacific Northwest has so consistenly plagued the big Defense Plant Corp. ferro-silicon process plant at Spokane, operated by Electro-Metallurgical Co., that there is still serious worry whether capacity production can be achieved in 1944. Another ferro-silicon process producer, Ford Motor Co., at Dearborn, Mich., which commenced production in 1942, never has completely solved mechanical operating difficulties. Still another plant in the electrolytic group, has never fully found its production legs. Unless these producers are able to meet production quotas this year, the gap between supply and requirements can be measured with a micrometer. The size of the magnesium stockpile, though big by prewar standards, is believed to be no more than a few weeks supply.

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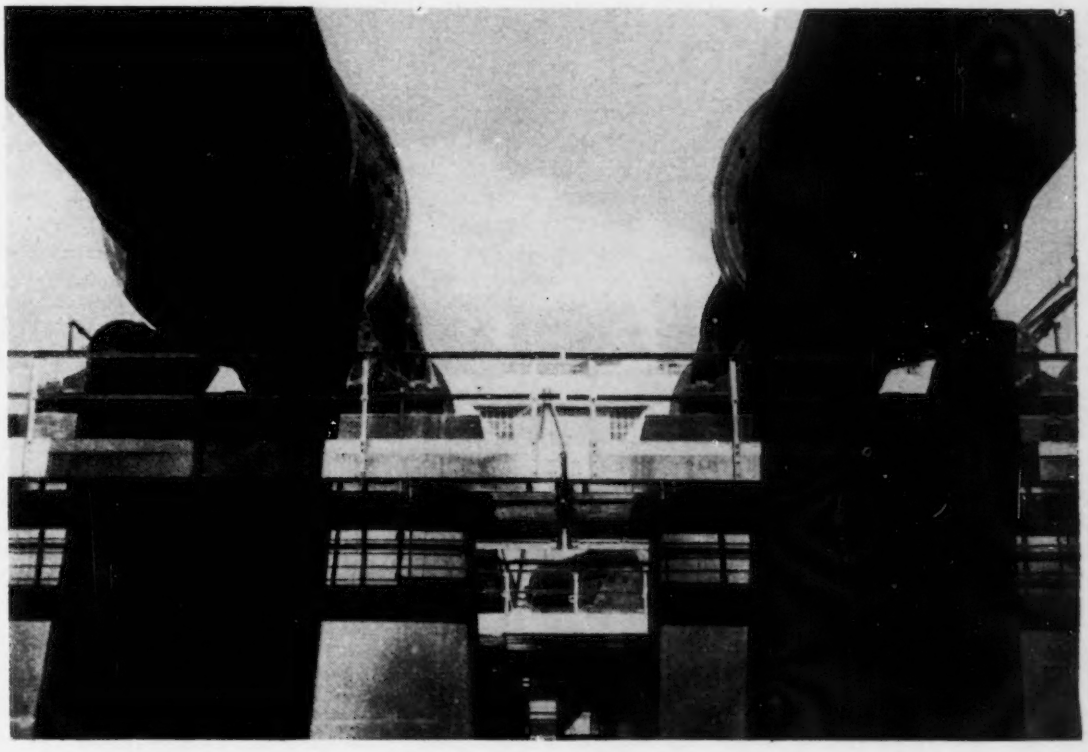
● Rotating kilns reduce bauxite to alumina. Liquid solution is dehydrated at 2500 deg. to produce powder alumina.

o o o



Special mention was given in a report by WPB to the Canadian Pidgeon process, which reduces power consumption although large quantities of ferro-silicon are required. It is used at the Spokane plant and several smaller plants. Despite its simplicity, much doubt has been bandied about over the process' postwar feasibility from a cost standpoint. The curtain was raised on cost figures for a short glance by the Canadian government's report on Dominion Magnesium Co., Ltd., Haley's Station, Ontario, which, during March produced an average of 8½ tons of magnesium daily at an average cost of 39.7c. per lb. This compared with a cost of 41c. per lb. during the operating period, October, 1942, to March 31, 1943.

Labor shortages cut a broad swath in magnesium field, but far more spectacular was the battle between AFL and CIO to gain control of the Basic Magnesium plant. Following a long period of disturbance, the CIO finally won an election as bargaining agent by a close margin. Ordinarily such an election is of small importance in the national scene, but the Basic plant by so far the largest concentration of inhabitants in Nevada, that its working force, voting as a block, would be sufficient to swing state elections. The possibility of electing two United States Senators is not one to be overlooked.

The Federal government is still deeper financially with magnesium than with aluminum, owning 94 per cent of production facilities. Defense Plant Corp. contemplates that the high cost plants will be shut down following the war or diverted to other uses.

The post-war future of magnesium appears less well defined than that of aluminum. Beyond the ready acceptance caused by the metal's light weight, the favorable strength-weight relationship of its alloys and its ready workability, more prominence in discussions is being given to such disadvantages as high coefficient of expansion, susceptibility to stress, corrosion and high cost.

Crusoe Can't Eat Steak

Like the shipwrecked sailor rescued after months on a hardtack and water diet who finds his stomach capacity severely shrunken when offered a square meal for the first time, the alloy steel industry by the end of 1943 had pulled in its belt so tightly that the sudden appearance of a nearly normal quantity of alloying elements appeared an unconsumable surplus.

In mid-year, Climax Molybdenum Co., which accounts for about 75 per cent of our molybdenum production, had achieved an altitude on the labor priority list comparable to that of its mine near the Rocky Mountains summit. Molybdenum, which had been drafted early in the war to replace tungsten no longer available from China, was being replaced in melting ratios by tungsten from unexpectedly fecund domestic mines. Unable to stand the altitude, about the only workers to buck an amazing turnover rate were released soldiers assigned to plug a threatening hole in the production dyke.

Then, the heat of demand dropped more sharply than a Chicago thermometer hit by the breeze from Lake Michigan. By November and December, production efforts had ceased entirely, and

development work was the order of the day.

The most significant factor in the drop-off was reduced foreign demand. The United Kingdom, which normally had been getting about 2,000,000 lb. of molybdenum a quarter, reduced its original request for the fourth quarter by 1,500,000 lb. Total fourth quarter requirements, to meet both foreign and domestic demand, are estimated at 11,212,000 lb. of virgin molybdenum, including the Russian protocol but not providing for a special Russian allocation of approximately 1,350,000 lb. of contained molybdenum in "ferro."

Consumption in July and August showed a decrease of about 17 per cent from the first six months average. That put an entirely different complexion on the picture, and by the end of October WPB estimated overall use at 52,400,000 lb. for the full year or about 10,000,000 lb. less than the projected production figure.

Consumers Mollified

While consumption was falling off, the frantic mining efforts began to show results. In the first six months of the year, molybdenum output in usable form totalled 31,200,000 lb., or 5,200,000 lb. monthly, made up approximately 93 per cent of domestic production and seven per cent imports. In July and August, output amounted to 10,700,000 lb., or 5,300,000 lb. a month, representing a gain of about 2.7 per cent. If the production line for the year were allowed to run off the chart on this basis, 1943 production would be about 62,800,000 lb.

But the requirements trend, projected into 1944, appears to be definitely on a lower plateau, with an estimated figure for the year of 44,561,000 lb. of contained molybdenum comprising 11,093,000 lb. for the first quarter; 11,122,000 lb. for the second quarter; 11,123,000 for the third quarter; and 11,223,000 lb. for the fourth quarter.

The story of how the molybdenum stock pile grew is graphically told in allocation and consumption figures for a 12-month period (See Table I).

In the third quarter of 1942, allocations for lend-lease and Canada were 4,386,000 lb., as compared with 3,445,000 lb. in the third quarter of 1943. In the first and second quarters of 1943, 4,147,000 and 3,777,000 lb., respectively were allocated. Russia is getting about 340,000 lb. monthly, and the rest is going to Britain and Canada, with a small proportion to Australia.

By the end of August, stocks had nearly reached what the WPB ferro-alloys branch felt should be a minimum stockpile objective, 24,000,000 lb.—about the equivalent of a six months stockpile of virgin molybdenum at the current consumption rate. Total industry and government-held stocks of concentrates and products, as of Aug. 31, was 23,791,000 lb., made up of 12,315,000 lb. of molybdenum concentrates, and 11,476,000 lb. of products. Because such a large proportion of molybdenum is mined domestically, and water borne concentrates are a minor factor, the necessity of a larger inventory was felt to be questionable. By the end of October, there was no doubt whether molybdenum should be removed from allocation insofar as the WPB ferro-alloys branch was concerned. The only question was what method to use. Removal from allocation, in itself, represents only loosening of the belt a notch or two. Restrictions on allowable uses prevent industry from regaining its normal appetite.

High Speed Slowdown

Vanadium production exceeded consumption all year, the fat going to the stockpile. Again, reduced requirements were the key to the situation. Between November 1942 and Sepember 1943 allocations dropped 40 per cent. This shadows closely high speed tool steel melting, which in November 1942 totaled 11,857 tons, but which had dropped to 5,815 tons in August 1943. During the 12 months through October 1943, vanadium allocations totalled 3,366,000 lb.; consumption, 3,550,000 lb. During the first six months of 1943, consumption was at a monthly rate of 296,000 lb.; during July and August, the monthly rate dropped 12 per cent to 258,500 lb.

With two months yet to go, 1943 production was estimated at 5,700,000 lb. of contained vanadium. September production, the most recent figure available, was 475,000 lb.

The drop in consumption probably surprised no one more than those who figured requirements. Tentative pencil jottings in June anticipated requirements during the first and second quarters of 1944 at 1,154,000 lb. per quarter. By September, the figure was whittled down to 948,000 lb. for the first quarter, 941,000 lb. for the second quarter. No one would publicly estimate a requirement for the second half of the year, probably in light of the fact that the tentative figures for the first half represented a rate of consumption larger than the current one. On Oct. 8, the WPB ferro-alloys branch wrote the armed services that it anticipated an excess of 2,500,000 lb. of vanadium in 1944, requesting the services to indicate what quantities should be reserved for their consumption and pointed out that if current requirements could not absorb production curtailment of production would have to be considered.

By Oct. 15, Metals Reserve Co. had received deliveries of 2,562,776 lb. of ferro-vanadium towards the three million lb. stockpile which WPB had asked it to assemble, and there were indications that the undelivered balance merely represented a matter of transfer from producers' stocks.

The WPB ferro-alloys branch regards 2,000,000 lb. of contained vanadium in products (ferro-vanadium) or vanadium pentoxide) as a minimum stock which should be maintained above ground at all times for the sake of security. On the basis of new consumption figures, this stock approximates a six months' supply, and represents the total of both in-

TABLE I

Domestic Molybdenum Allocation and Consumption

Month	Allocation	Consumption
November, 1942	4,500,000 lb.	4,500,000 lb.
December	5,150,000 lb.	4,450,000 lb.
January, 1943	4,000,000 lb.	4,460,000 lb.
February	3,700,000 lb.	4,200,000 lb.
March	4,000,000 lb.	4,200,000 lb.
April	4,100,000 lb.	3,800,000 lb.
May	3,600,000 lb.	3,600,000 lb.
June	3,100,000 lb.	3,100,000 lb.
July	3,100,000 lb.	2,830,000 lb.
August	2,850,000 lb.	3,000,000 lb.
September	3,070,000 lb.	2,810,000 lb.
October	*	*

*Allocation and consumption in October were expected to remain at the September rate.

dustry's stocks and the government stockpile. This minimum represents a milestone rather than a goal, for total stocks as far back as Aug. 31 were 2,062,000 lb., of which the government held 948,000 lb. and industry (producers and consumers) 1,114,000 lb. During the six months through October, consumers' stocks averaged 415,000 lb.

Rah! Rah! Tungsten

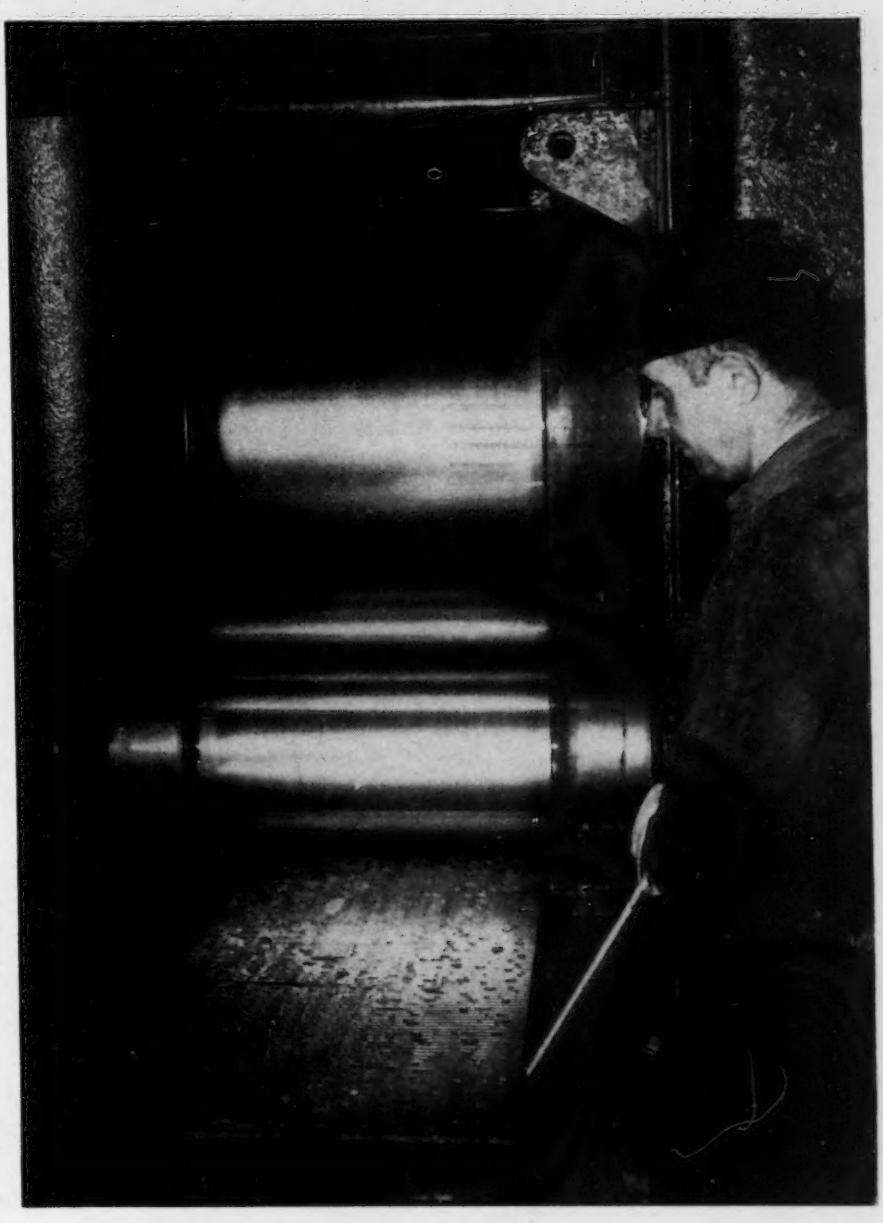
The story of tungsten is as similar to that of vanadium as the plot of one Hollywood movie romance to another. There was the terrific struggle against insurmountable odds when the war cut off all imports of wolframite from China. But all the time our production heroes had been working behind the scenes—without much success—to perfect extraction methods which would make local ores suitable for commercial use in large quantities. Came the crucial test, and bingo! As prettily timed as a last minute touchdown pass, the new processes reached maturity and the extra point was kicked with discovery of the largest deposit of high grade ore ever made in this country.

The production program was well laid out at the beginning of 1943 to balance nicely with requirements, and progress was according to plan. Nevada-Massachusetts Co., although hampered severely by labor shortage, continued to produce substantially from northern Nevada ores, using its concentration process which had reached maturity in 1941 and 1942. United States Vanadium Corp., which in 1941 had solved the problem of extracting tungsten from a large low grade deposit of refractory ore near the summit of the Sierra Nevada mountains in southeastern California, continued large scale production from this deposit. This company also completed and commenced operation, as agents of Metals Reserve Co., of a chemical treatment plant at Salt Lake City to produce high grade concentrates. Low grade scheelite deposits in northern Nevada provided considerable tonnages milled by Getchell Mines, Inc. Many smaller deposits principally in the southern Sierra Nevada mountains of California, in Nevada, and individual mines in Utah, western Arizona, southern Idaho, and Colorado, all chipped in on domestic production. But the role of the glamorpuss, the star halfback who kicked the winning point, was played by the Yellow Pine mine deep in the wilderness of central Idaho, which variously has been estimated to have produced from one quarter to one third of the entire domestic production. During development as a gold mine, samples taken by the Bureau of Mines and Geological Survey, when put under the ultra violet lamp, clearly revealed by their fluorescent glow the presence of rich tungsten ore. In the flurry of exploration following this discovery, a large antimony ore body was found, and the mine this year undoubtedly led in domestic antimony production as well as tungsten.

It may be assumed that domestic tungsten production was approximately matched by imports from Bolivia, Peru, Canada, Argentina and Mexico.

The cut in high speed steel production changed sufficiently to surfeit. By the end of the year, Metals Reserve Co. has cut its Canadian commitments at the ears, and the four leading domestic producers were pulling their punches in order not to knock the pins from under the restricted market. Metals Reserves Co. was stuck with a pledge to buy the output of the smaller producers through 1944, or else refuse further receipts from them and settle in cash at 10 per cent of the contract rate on the basis of their average production rate over the past six months.

Although production is being reined in, WPB's automotive division secured an amendment to order L-158 designed to cut by 20 per cent the amount of tungsten used in ignition contact



● Brass strip is cold rolled to gage on a steel strip mill by Weirton Steel Co. following hot rolling of slabs on a structural mill. Weirton lays claim to being the sixth largest brass roller in the country, but, because of ammunition cut-backs, will likely cease rolling next month.

points. This undoubtedly reflected a shortage of rod, rather than tungsten.

Over the Waves

The story of how we achieved chrome and manganese sufficiently is one from which many interesting chapters will be missing until European phase of the war is concluded. At the outbreak of the war, mineral economists raised their hands in horror when they discovered that nearly our entire consumption by both ores had been imported by water. For chrome, particularly, there was a squeal of terror when the Philippines, which had supplied about 25 per cent of our needs in the immediate prewar years, were lost, and Turkey, which had been a substantial contributor of ferro-grade ore, apparently was bound up in a trade agreement with the Nazis. On manganese, the Bureau of Mines, whose experimental work with low grade domestic ores theretofore had been unappreciated, stepped forward with chemical treatment processes which could tug substantially upward the grade of concentrates from ores with almost undiscernable manganese content. If industry would stretch hard, and lower its grade requirements until blue in the face, it was felt we could encompass our bulging manganese demands in the girdle of self-sufficiency. As for chrome, a comely lady miner flew in from Alaska with a tale of a large undeveloped deposit, California bulldozer operators began gouging out kidneys of a few tons each over a large portion of the state, two rugged Montana projects were tackled with a blood-and-guts enthusiasm and the whole country sighed dolefully as ore boats were sunk in the Caribbean.

While industry was holding its breath sucked in and the Bureau of Mines was bracing itself to tug on the corset string of technological innovation, manganese began to appear, not from the marginal domestic deposits, but, lo and behold, from across the ocean. No one ever said anything officially, but it was recalled that African, Cuban and Brazilian deposits were by no means exhausted before the war, and it was further pointed out that, with the Mediterranean closed, a direct route to Russian lend-lease ports in the Red Sea involved a trip through the South Atlantic. On April 1, 1943, Donald Nelson answered the arguments of domestic miners who were pressing for sky high purchase prices by stating that our stockpile had nearly a two year supply, and that we were able to bring in practically our full needs, thank you, in the form of return cargoes in ships that would otherwise return in ballast. One fair sized, high grade rhodochrosite deposit in Montana which, of course, required a calcining plant, was pushed through to completion, and produced substantial tonnages this year. Likewise, Manganese Ore Co., a M. A. Hanna subsidiary, finally got into operation a beneficiation plant near Las Vegas, Nev., to treat a low grade southern Nevada deposit. Homestake has been probing in Lower California. And, battery grade ore, which is particularly rich, was mined in surprisingly large quantities near Livermore, Calif.

It may be surmised that the solution of the chrome problem also predominantly involved continued imports. South Africa and Rhodesia never were occupied by the Nazis. Whether the Allies bought up a good chunk of Turkish production despite the Nazi trade agreement, and carried it away when the Mediterranean was reopened, is not known. It may be significant that Germany was reported to have complained early this year, when her agreement came up for renewal, that the Turks were far behind on their deliveries. In any event, domestic production consists of regular production by a Rustless Steel Co. subsidiary in Glenn County, Calif., an independent mine near San Luis Obispo, Calif., two new and novel plants on the Oregon Coast, and more or less seasonal and irregular production from several score northern California and Oregon "kidney" deposits. WPB for many months has refused to sponsor any beneficiation projects which would not produce a concentrate of better than 45 per cent Cr_2O_3 and 2.5 to 1 chrome-iron ratio. Early this year the sights were raised allegedly to a 3.0 for 1-chrome-iron ratio, but no one stepped forward with any proposals along this line to really find out. By spring, the Alaskan project was indefinitely suspended, and one of the large Montana projects was deferred, and a little later the second Montana low grade project was ordered put in stand-by condition.

Metals Reserve Co. has committed itself to a purchase of small lots of chrome and manganese ores from all comers through 1944. In fact on May 15, at the recommendation of the WPB ferroalloys branch, Metals Reserve smoothed out its manganese ore purchase price schedule, raising the prices somewhat on lower grades and took the bumps out of its paying price for chrome ore. At last count, purchases were being made at 21 depots in ten western states, but most of the ore purchased never has gotten any nearer to industry, and still stands piled up along the railroad sidings. For some inexplicable reason, Metals Reserve also removed its provision that manganese ore purchased must be the soot-black pyrolusite, and agreed to accept at an equal price carbonate ores which are of no use to anyone in their present condition. So far as can be determined, no provision has been made for converting these carbonate purchases to usable form. In mitigation, it must be acknowledged that the federal government has been badgered more by small chrome and manganese operators, would-be operators, and nebulous promoters with alleged manganese and chrome deposits in the far west than from actual producing mines of all the rest of the minerals put together. If these concessions were the price of an orderly minerals policy, the cost was cheap.

On Dec. 1, WPB upped the permitted use of chromium in the manufacture of stainless steel.

Next Door Neighbor

Nickel is the only major member of the ferroalloy group whose supplies now are listed as "insufficient for war plus essential industrial demands under existing administrative control." (Tantalum and columbium are the other ferroalloys in this category.) It is hard to get anyone in official Washington, except possibly the anti-trust division of the Department of Justice, very steamed up over this alleged paucity. When questioned, officials merely point out that Canada, the principal source of supply, is always close at hand, and that the supply-demand relationship is sort of a shrink-fit proposition rather than an absolute no-go.

So far supplies have from time to time expanded or contracted to almost the exact amount necessary to meet absolute requirements. Imports from New Caledonia and Cuba, it seems reasonable to believe, have been sufficient to pad out the Canadian supply. Moreover, the romance between many former nickel steel users and heat treated carbon steels seems likely to blossom into permanent connubial bliss.

Colbalt supplies are ample, and the zirconium stockpile, much of it imported from Australia, reached ample

proportions when the war was still young.

Baby Wants Candy

In March, 1943, the United States produced somewhat in excess of 1,250,000 ingot tons of alloy steel. By the end of October, production was at the rate of 1,050,000 ingot tons, and going downhill fast. Adding particular momentum to the slide was Class A and B high speed steel production. Contributing to the general indigestion of alloying elements was the production, by October, of 109,000 tons of alloy steel scrap per month more than was being consumed. This trols are removed. About 4,250,000 tons, or about one third of America's 1943 production of alloy steels, will consist of the low alloy NE steels, the American Iron and Steel Institute estimates. Conversion to the NE series is expected to save the nation 24,000 tons of nickel. This saving will be accomplished at the cost of no increase in the use of chromium and with rises of only 3000 tons for molybdenum and 8000 tons for manganese. On typical grades of NE steel made either in the open hearth or electric furnaces as much as 30 per cent of the chromium content, 25 per cent of the molybdenum, and 50 accommodated himself to the change. in metallurgy, the committee member stated, he will be reluctant to make another change. And users who have found a satisfactory alternate for vanadium steels will see little reason to specify the former grade, particularly if its use entails obtaining permission from WPB."

Battle of Washington, S.W.

Although the armed services are reported to consider that, in general, a stockpile of raw materials averaging at least one year's requirements is desirable, WPB ferroalloys branch recommendations so far made public

•Kennecott copper mine, Bingham Canyon, Utah, the largest open-cut copper development in North America. The concentrating mills of the company is at Garfield, 18 miles away.

led the WPB steel division industry advisory committee on conservation and operation to recommend increased use of nickel-chromium-molybdenum alloy steels to the extent of at least 60 per cent of total alloy steel produced for engineering and construction purposes. Particularly mentioned were NE 9400 and NE 8600, RBEC 4700, and the SAE 4300 series. Attempts to force NE 9400 and NE 8600 down the throat of industry were about as successful as getting a candy-minded infant to eat Pablum, particularly when it became known that the basic alloying elements were available in quantity.

Some of the other NE steels apparently tasted sweeter, however, and a currently acceptable question for any open forum involves the exact extent to which the diet of leaner alloys will be abandoned when con- per cent of the nickel requirements are obtained from scrap. Even with this consumption, alloy scrap is going begging and so far represents the only serious price break below OPA ceilings.

Troubled most is the ferroalloy trade itself. An official summary of a recent WPB vanadium industry advisory committee meeting, contains the following paragraphs, concerning remarks by an industry member:

"With government stocks approaching the goal set, producers will have no market for the excess vanadium, it was pointed out, and they cannot afford to accumulate excessive stocks themselves. They are faced with a tremendous selling job to restore vanadium to its former level of use, since war dictated changes in melting practice and end-use will be difficult to alter. Once the steel melter has regard a six months' supply as the necessary minimum. As above outlined, supplies in this amount have been assembled for most ferroalloys. Reports of industry committee meetings show that the ferroalloys branch and industry members have agreed that restrictions on consumption such as allocation control should be lifted wherever possible. Apparently, however, the production executive committee, which represents the white collar or front office class at WPB, feels differently. For, in the offhand manner of a man turning off the hot water faucet, WPB officially announced on Oct. 27, the committee's decision that "after stockpiles of ferroalloys reach recommended levels, domestic production and imports will be kept in balance with the then current consumption. This will insure a

(CONTINUED ON PAGE 202)

Renegotiation

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By S. H. BARMASEL
Associate Editor, THE IRON AGE

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PERHAPS more words have been spoken and printed and more tempers lost over the issue of renegotiation than any other controversy industry was faced with in 1943.

Renegotiation did not have its beginning on April 28, 1942, government officials concerned with renegotiation invariably emphasize. Some will go as far back as the Revolutionary War when Washington, the man, not the concept of government, damned the war profiteer. Others will go back only as far as the Spanish-American War when the first law limiting war profits on armor plate was passed. All quote the American Legion resolution to "take the profit out of war."

Maurice Karker, then chairman of the War Department Price Adjustment Board, reminded the House Naval Affairs Committee on June 30, 1943, that about 170 bills and resolutions to reduce, limit or eliminate war profits were introduced in Congress between February, 1919, and April 28, 1942. Those that finally became law were the Vinson-Trammell Act of 1934 and the Merchant Marine Act of 1936, setting a ceiling of 10 per cent on the profits from the building of ships for the Navy and Maritime Commission and on Naval aircraft. They were later modified.

From the very nature of their procurement policies at the start of the national defense program, the War and Navy Departments early recognized that huge profits could be made by some contractors. Armed with Executive Order 9217, even before renegotiation became public law, contracts entered into by these two departments were reviewed and prices considered out of line reduced. Several large contractors voluntarily submitted to renegotiation before April 28.

The first Congressional proposal to eliminate inconscionable profits in this war was adopted on March 28, 1942, and has become known as the Case Amendment. It would have set a flat six per cent limit on war contract profits. However the objections of the War and Navy Departments and the War Production Board to a fixed profit limitation as being unfair to some and unduly generous to others, brought out at the March, 1942, hearings of the House Naval Affairs Committee, apparently carried enough weight to overide the six per cent limit and substitute for it the now famous Section 403 of the Sixth Supplemental National Defense Appropriation Act which was approved and became law on April 28 of that year. The proposed method of preventing excessive profits recommended at that time by the War and Navy Departments and Donald M. Nelson was rejected.

Over-All Review

The intent of Section 403 as passed in April was that individual contracts and subcontracts for the War and Navy Departments and the Maritime Commission be subject to renegotiation. The disadvantages of such an arrangement were obvious at once. The blast from Gabriel's horn would probably have signaled the termination of renegotiation. And since renegotiation does not provide for upward readjustments no contractor could offset any losses on some contracts with gains on others. The various price adjustment boards, therefore, decided very quickly to renegotiate on an over-all basis.

Subsequent amendments to the act extended renegotiation to the Treasury Department and later to four corporations under the Reconstruction Finance Corp., namely Metals Reserve Corp., Rubber Reserve Corp., Defense Plant Corp., and Defense Supplies Corp. Under the terms of the directive establishing the War Shipping Administration, renegotiation was extended to this agency as well. In each case, renegotiation was made retroactive to April 28, 1942, the cut-off date.

All contracts which were completed and final payment made before April 28 were excluded from renegotiation. However, if final payment was not made prior to that date, the entire contract became renegotiable. In cases where relatively small sums were outstanding or contracts provided for escalator clauses or performance bonuses the agencies involved have considered payment completed and the contract exempt.

Complexities arose in transactions with any of the eight agencies which provided for continuing contracts with specified delivery dates. If deliveries were not completed by the cut-off date, the entire contract has been considered subject to renegotiation. If, however, the transaction constituted separate contracts, then only those contracts not paid in full were to be reviewed.

Entirely exempted from renegotiation are contractors and subcontractors whose total war contracts for their fiscal year are less than $100,000.

The Joint Statement by the War, Navy and Treasury Departments and the Maritime Commission on Purposes, Principles, Policies and Interpretations issued March 31, 1943, listed additional exemptions. Of primary interest are the raw materials excluded from renegotiation because they have not been "processed, refined or treated beyond the first form or state suitable for industrial use." These exempted products are:

Aggregates consisting of washed or screened sand, gravel or crushed stone.

Aluminum ingots and pigs; alumina; calcined or dried bauxite, and crude bauxite.

Antimony ore, both crude and concentrated; antimony metal, and antimony oxide.

Arsenic powder, and arsenious oxide (white arsenic).

Asbestos fiber.

While wrestling with material controls, production and manpower problems, industry dealt valiantly with two new uncertainties in 1943—renegotiation and contract termination. While industry favors taking much of the profit out of war, still there are some very legitimate objections to existing renegotiation practices.

Bismuth.

Cement.

Chromium ore and ferrochrome not processed beyond the form or state suitable for use as an alloy or refractory in the manufacture of steel; bichromates and chromic acid.

China clay; kaolin clay; fire clay; brick and tile made from clays other than kaolin, china or fire clay.

Copper ore, both crude and concentrated; copper billets, cathodes, cakes, ingots, ingot bars, powder, slabs and wirebars.

Fluorspar ore; fluorspar fluxing gravel; lump ceramic ground fluorspar; acid grades.

Crude iron ore and pig iron.

Natural gas not processed or treated further than that customarily occurring at or near the well.

Gypsum, crude; calcined gypsum.

Lead ore; refined lead bars, ingot and pigs; antimonial lead bars, ingots and pigs.

Lime.

Magnesite; dead burned magnesite.

Metallic magnesium, pigs and ingots.

Crude oil not processed or treated further than that customarily occuring at or near the well.

Phosphate rock; superphosphate.

Ferromolybdenum; calcium molybdate; molybdenum oxide.

Rock salt and common salt of all grades.

Refined silver bars, shot, powder and grains.

Stone, rough dimension.

Sulphur, crude.

Standing timber, logs, logs sawed in lengths, and logs with or without bark.

Refined pig tin.

Tungsten ore and concentrates; ferrotungsten and tungsten powder.

Vanadium ore and concentrates; ferrovanadium; vanadium pentoxide.

Zinc anodes, balls, oxides, powder and slabs.

The heads of the various departments and agencies are endowed by the statute with discretionary power to exempt from renegotiation contracts for personal services, real estate, perishable goods and products for which a minimum price has been established by a public body and where the profit can be determined with reasonable certainty when the contract price is established. Under these powers fresh and frozen foods are exempt while canned goods are renegotiable. Contracts performed outside the territorial limits of the United States and in Alaska can also be excluded under this power as can contracts taking less than 30 days to complete.

Price adjustment boards were first set up three days before renegotiation was approved. Executive Order 9217 issued by the President on April 10, 1942, gave the War, Navy and Treasury Departments, WPB, the Reconstruction Finance Corp. and the Maritime Commission the authority to inspect defense plants and audit their books in order to prevent excessive profits. The boards were to get voluntary downward price revisions or refunds where profits were judged to be excessive.

PAB Personnel

At present there are five main price adjustment boards and a fairly recent joint board comprising the five chairmen and the War Production Board's representative on all boards, Carman G. Blough.

The War Department Price Adjustment Board is mainly a policy-setting body having delegated its power to renegotiate to the services and the Army Air Force. These divisions in turn set up regional sections so that at present there are 48 individual price adjustment boards for the Army Engineers, Air Forces, Quartermaster, Signal Corps, Surgeon General, Chemical Warfare, Transportation and Ordnance. These regional boards have full power to renegotiate contractors whose total sales do not exceed five million dollars. Where total sales are between five and 10 million dollars, tentative agreements reached in the field must be reviewed by the Service chief and in cases over 10 million dollars, approval of the Washington board is necessary before agreements become final. The Washington board also reviews cases where no agreement or definite disagreement was reached in the field offices.

Chairman of the main War Department Price Adjustment Board is Joseph M. Dodge, president of the Detroit Bank since 1933. The other four members of this board are Attorney Maurice Hirsch who is senior partner in the Houston, Tex., firm, Hirsch, Susman & Westheimer, corporate lawyers; Lt. Col. Paul B. Boyd who is on leave as executive vice-president of the Jewel Tea Co., Inc., Barrington, Ill., since 1942 when he became a major in the Quartermaster Corps; Counsel W. James MacIntosh who since 1931 has been a member of the law firm of Morgan, Lewis & Bockrus, Philadelphia, and Carman G. Blough, WPB's representative on all boards, who resigned as partner in the accounting firm of Arthur Anderson & Co.

The Navy's PAB in Washington is headed by Kenneth H. Rockey who resigned in 1939 as president and chairman of the Chilean Nitrate Sales Corp., and had also been president and director of the Rio Blanco Copper Corp. and director of Philip Morris & Co., Ltd., Inc. Its members are Sylvan C. Coleman, member of the investment firm of E. F. Hutton & Co. in charge of corporate activities and director of United Carbide & Carbon Co.; W. John Kenney, vice-president and director of KPH Royalty Co. engaged in the purchasing of oil properties and interests therein; Sidney A. Mitchell, executive vice-chairman of the board, was until 1942, when he joined the Navy Department to organize its finance section, president of Bonbright & Co., New York investment bankers; Auguste Richard, vice-president and director of Pacific Mills; Clarence H. Ross of the law firm of Ross & Watts, and Capt. L. L. Strauss.

In addition to this Washington set-up, the Navy has established a branch of its main board in New York for

• Handling the largest volume of all ordnance districts, the Chicago Ordnance District Price Adjustment Section reviewed approximately 650 renegotiation cases. Shown here in the usual order are James M. Barker, director and former vice-president, Sears, Roebuck & Co.; Herbert P. Zimmermann, vice-president, R. R. Donnelly & Sons Co.; John W. Leslie, president, Signode Steel Strapping Co.; Max H. Hurd, chairman and former vice-president, Link-Belt Co.; Clay Judson, partner Wilson S. McIlvaine, and George W. Rossetter, partner, George Rossetter & Co. Only Mr. Hurd serves the board full time.

the convenience of the North Atlantic suppliers and to relieve the pressure on the Washington board. Headed by Comdr. N. Loyall MacLaren who is also on the Washington board, this body exists as a branch of the main board in that it can make proposals to contractors. Cases handled by the two regional boards in Chicago and San Francisco, however, are reviewed in Washington before settlement is determined.

All members of the Treasury Department PAB have been long time employees of that department. Capt. Harry C. Maull had been assistant director of its procurement division; Raymond Eberly was executive officer of the lend-lease control division; Miss G. A. Parkhurst was formerly assistant chief of the purchasing division, and L. J. MacIsaacs had been special assistant to the assistant to the director of procurement.

Lt. Comdr. Arthur G. Rydstrom, operating chairman of the Price Adjustment Board for the Maritime Commission, gave up his position as vice-president of the Bankers Trust Co., New York. Chairman of the board is Commissioner Thomas N. Woodward of the Maritime Commission. Attorney John R. Paull is its third member.

Officers of the four agencies under the Reconstruction Finance Corp. make up its price adjustment board. Chairman is Charles T. Fisher, director of RFC and on leave as president of the National Bank of Detroit. Charles B. Henderson, chairman of the board of the RFC and president of Metals Reserve, Sam H. Husbands, president of Defense Plant Corp., Howard J. Klossner, president of Rubber Reserve, and Henry A. Mulligan, president of Defense Supplies complete the body.

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Chairman for the War Shipping Administration PAB is Dr. James L. Murphy, who in the last war headed the Buchan-Murphy Mfg. Co., fabricators of silk powder bags and heavy leather goods for the Army. He is currently on leave as professor of corporate law of the Brooklyn Law School, St. Lawrence University. Other board members are Joseph Carr, formerly tax expert for New York's Corporation Counsel; Howell Smith, president of Smith & Johnson, steamship operators, and Paul Sullivan.

Work of this board is departmentalized with Charles Williams of the Bethlehem-Fairfield shipyards head of maintenance and repairs; William Deverall of United Fruit Lines in charge of ship operations; Palmer A. Paddock, chief of the charting division; Capt. W. C. Lush for open market purchases; Major F. X. Conlon for stevedoring and tugboat division, and Robert A. Lamberton, assistant accounting professor, Rutgers University, in charge of terminal facilities.

The majority making up these and the regional boards have been drawn from the field of finance with law second and industry third. Accountants follow with engineers close on their heels. Government careerists and college professors are at the very bottom. The agencies have tried in most cases to enlist men prominent in business to serve on the various boards and their staffs. That so many have had no actual industrial experience that would give them an appreciation of the special problems and complexities confronting contractors has been cause for much criticism.

Renegotiators are insistent in pointing out that their work is not a taxing procedure but one of repricing. Their job is to keep prices down.

The necessity for renegotiation, they say, originated in the 10-year lag in the national defense program. Having to reach and overtake Axis munitions output, contracts were placed at a furious rate. Industry inexperienced in the specialized production for war and confronted with tomes of specifications and inspection proceedings asked for intuitive prices. War spending in the beginning was of no appreciable importance to the equally inexperienced procurement officers. All emphasis was on getting these urgent items into production—and getting them fast. As industry became geared to war, procurement agencies became aware that excessive profits were being accumulated by some.

They were certain that taxation was no cure and they quoted Bernard M. Baruch.

"Excess profits (taxes)," he said, "standing alone have no effect to check inflation. Their only effect is to increase it. Thus 20 per cent of $500,000 is $100,000 and 20 per cent of $1,000,000 is $200,000. One way to increase $500,000 profit to $1,000,000 without increased risk or effort is to

• The House Ways and Means Committee held renegotiation hearings and listened to government and industry speak their minds. Many of the House proposals may be negated by Senate action.

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double the price. . . . The main result of such a system (80 per cent excess profits tax) is to induce rapid price increase to absorb the tax. . . . It aggravates (inflation)."

Renegotiation in its swaddling clothes had not developed coordination. Each board was separate and distinct.

The first step to some semblance of order was the delegation of final agreement to one price adjustment board conducting hearings for all agencies. Thus if a company held contracts with the Signal Corps, Navy and Treasury Department for lend-lease equipment, one board would review the case for the fiscal year and after an agreement was reached the contractor knew that renegotiation was over for that period. Neither the Navy nor the Treasury Department would hound him and renegotiate him all over again.

Other steps toward coordination were the establishment in the fall of 1943 of the policy-making Joint Price Adjustment Board and bi-monthly meetings of delegates of the various regional sections.

Central Assignment Agency

All cases to be renegotiated are assigned to the boards by the War Department Assignments Branch under Major W. Howard Dilks. The agency getting the bulk of the material produced by the war contractor determines the board to handle the case.

No two groups agreed during the year as to the number of 1942 cases to be assigned. The Truman Committee spoke about 85,000; the renegotiators of 20,000 to 25,000. The percentage of assignments to the various boards were not debated. The War Department PAB reviewed approximately 80 per cent while 15 per cent went to the Navy and the remaining 5 per cent was divided among the Treasury, Maritime, War Shipping Administration and RFC boards.

Before a case is assigned, a preliminary letter is sent to the company to determine whether it is subject to renegotiation. From the information returned, the case is assigned.

One contractor answered the preliminary inquiry saying, "We are not considering renegotiation of any contracts at this time, but we are pleased to have had you make the offer." Whether he has considered it or not, he will, if subject, be renegotiated.

When the board gets a case, financial and operating data going back to 1936 where possible, are first obtained from standard financial publications, like Moody's and Standard Statistics, from the files of the Internal Revenue Bureau, the Securities Exchange Commission and the procurement agencies, before the information is sought from the contractor. The manufacturing problems facing the company and its performance are also obtained from the procurement officers.

The contractor must supply regular financial reports including balance sheets and income and surplus statements for 1936 to 1942 as well as the latest interim balance sheet and income statement. Stockholders reports have been said to be adequate, although in actual practice, detailed auditors' reports are generally required.

If from a breakdown of renegotiable and non-renegotiable business, it is evident that no excessive profits have and will be earned, the company is released for that period. If such positive evidence does not exist more detailed information must be supplied.

The most difficult task jn preparing this information is the separation of renegotiable from non-renegotiable business. This is especially true for manufacturers of standard products where the end use of some will be in war materiel and others will go into civilian or exempt production. In such cases a sampling of several months' sales will be accepted by the renegotiators. Cost plus fixed fee contracts must also be separated from fixed price contracts since they are considered independently. Difference in risk is the reason given for this procedure.

Accompanying the financial data is a statement by a company executive relating the history of the company, its contribution to the war effort and any other factors that are pertinent in determining whether excessive profits exist. In preparing this statement modesty is no asset. In fact several companies have turned this task over to public relations firms that have prepared elaborate statements, in some cases running well over 2500 pages, with charts, tables and photographs.

Although the virtue of renegotiation to the renegotiators is its flexibility, certain factors have been set in considering the profit to which a contractor is entitled. These are:

(1) Price reductions and comparative prices.

(2) Efficiency in reducing costs.

(3) Economy in the use of raw materials.

(4) Efficiency in the use of facilities and in the conservation of manpower.

(5) Character and extent of subcontracting.

(6) Quality or production.

(7) Complexity of manufacturing technique.

(8) Rate of delivery and turnover.

(9) Inventive and developmental contribution with respect to important war products.

(10) Cooperation with the government and with other contractors in developing and supplying technical assistance to alternative or competitive sources of supply and the effect of such cooperation on the contractor's future peacetime business.

These are not the only considerations. The extent of conversion to war production, government financing, government supplied equipment and buildings, and accelerated depreciation are some of the other factors weighed by the boards. There are even intangibles to be studied.

A low cost manufacturer of a standard product, for example, had refused the offer of a new plant to be supplied by the government. Instead, he volunteered to teach his competitors how to increase production and reduce prices. Not only did he supply them with his designs but had sent them his experienced men to demonstrate his efficient methods. He was certainly in the most favorable position during renegotiation hearings. However, during the excitement of the review, he inadvertently confessed that he had already acquired new patents that would increase production efficiency and lower prices still further. He certainly did not want the burden of an additional plant when his present techniques would become obsolete as soon as the war was over. Nor did he care whether his competitors learned his current methods. He would still be the low-cost producer. As far as renegotiation was concerned, he would have done better had he "not considered renegotiation at this time."

Losses incurred in 1941 when contractors were still inexperienced or having foreseen that civilian production would be curtailed accepted contracts at a loss cannot be offset by gains in 1942. However, the boards claim to have made it their practice to be more lenient in their allowances in such cases.

No company is considered as a thing in itself. Its position with regard to competitors is part of the total picture contemplated. Reports from other boards handling similar cases can be obtained for comparison. An attempt to have one board handle all companies engaged in one industry has been made for oil refineries and contractors working on a commission basis, which have been assigned to the Navy board.

Percentage of profits allowed before taxes—all profits considered during renegotiation are before taxes—has ranged from about 1.5 to 22 per cent. The greatest bulk falls between 7 and 13 per cent. The highest figures were allowed in cases involving outstanding scientific contributions having a revolutionary effect on the war.

If the amount of refund decided upon by the board is not accepted by the company, the entire case can be sent to the Under Secretaries of the departments or heads of the agencies to be reviewed again. The decisions reached by the Under Secretaries are in all cases unilateral. If the contractor feels that the decision cannot be accepted, the Under Secretaries can stop all payments to him until the amount due has been reached and can order the prime contractor, if the company is a subcontractor, to withhold payment to the set amount.

A machine tool builder who refused to accept the stipulated refund because it was unduly high was threatened to be black-listed from all subcontracts by Under Secretary Patterson unless the company accepted the decision.

Where can the contractor go from here? Is the decision of one board acting as judge, jury and prosecutor or one man handing down a take-it-or-leave-it order to be accepted as final?

Every law passed by the Congress of the United States can theoretically be taken into the courts. When John Marshall decided for the first time to declare an Act of Congress unconstitutional the mechanism for testing laws in the courts was established.

The decision of the Under Secretaries can be appealed. The contractor can sue in the Court of Claims.

However, the freedom to sue if the contractor so desires is but a glittering generality. Only the academician can be pleased with its existence. In practice many companies could not exist while waiting for the protracted court procedures if all payments on war contracts were halted during that period. The question is not can the contractor appeal. It is can he afford to appeal. Also, the wording of the original act was so broad that it negated any legal action. Excessive profits were not defined so that any recaptured amount could be considered equitable.

Settlements Gain Momentum

The end of 1943 saw about 70 per cent of its cases completed by the price adjustment boards. Renegotiation started with the larger companies and is catching up with the smaller ones.

The most recent figures show that price adjustment operations have resulted in saving the government $5,300,000,000 — $2,500,000,000 in cash which procuring agencies have recovered or will recover for delivery to the Treasury Department and $2,800,000,000 in price reductions for future deliveries under existing contracts. Under Secretary Patterson estimated that over one billion of this would not have been returned through the excess profits tax.

Refunds are not the only direct result of renegotiation. Price adjustment boards are careful to point out that because of the information they have obtained procurement officers have been able to reduce the cost of contracts. In fact, both voluntary price reductions on the part of the contractor and more efficient procurement have contributed more than the refunds obtained.

These refunds are returned to the Treasury Department as miscellaneous receipts. Some of it may be credited to the company if it has outstanding contracts with the agency. The board, if it sees fit, may allow installment payment but final payment should be made not later than the fiscal year following the renegotiated period. In special hardship cases a six-month extension will be allowed with further extensions made if the board considers payment to hinder war production.

If the company disposed of what the board considers excessive profits by reinvesting it in equipment, paying salaries or dividends and therefore does not have the amount for refund, an RFC or V-loan can be arranged.

In cases where taxes have already been paid on the profits deemed excessive, the amount paid to the Internal Revenue Bureau is credited and the difference alone is refunded.

At no time do the boards make allowances for post-war reserves. Since the inauguration of the boards they have been attacked for this short-sighted policy. By now they answer the question by rote. The sum necessary for reconversion is conjectural. No one knows how long the war will last. Reconversion for some may be unnecessary. The 10 per cent carry-back and carry-over provision of the excess-profits tax can take care of reconversion costs. The law does not provide for the boards consideration of such reserves.

Because of extensive hearings conducted by the House Ways and Means and Naval Affairs Committee and the Senate Finance Committee as well as the experience gained by a year and

a half of renegotiation certain changes will apparently be made.

To reduce the number of cases to be reviewed the $100,000 limit will probably be raised to $500,000. The right to judicial appeal of a contractor who has had a unilateral agreement *will* be written into the law. The bill as it passed the House specified the Tax Court for this appeal. Indications at the time of writing are that the Senate will change this to the Court of Claims.

Proposed Changes

Another administrative change will be the creation of the War Contracts Price Adjustment Board. Some confusion as to personnel was caused by the omission in the House proposal of a War Production Board member. Membership would be limited, according to the House Bill, to the five price adjustment chairmen. The Senate Finance Committee, however, recommended the appointment of a WPB representative. Full power will rest in this new over-all board. Under the old law full power was given to the Secretaries of the Departments and the heads of the Maritime Commission, the Reconstruction Finance Committee and the War Shipping Administration which delegated power to the Under Secretaries and in turn to the respective price adjustment boards.

This new body will have the right to exempt from renegotiation standard commercial articles if in its opinion normal competitive conditions exist to affect the sale of these products. Were they not excluded, the government would discover great difficulty in getting this material when non-renegotiable business increased. The machine tool industry for fiscal years after June 30, 1943, will probably not be subject to renegotiation. Special consideration has been given here, it is said, because this industry is the first in and the first out of war production.

The definition of subcontracts has been rewritten to include only subcontracts for the article, work, services, building, structure, improvement or facility contracted for under the prime contract or for articles to be incorporated in the item contracted for under the prime contract.

Industry's judgment of renegotiation after 14 months' experience is not unanimous. But all industrialists agree wholeheartedly that legislative measures to prevent soaring war profits are imperative. How to limit these easily earned profits is still a moot question *but the opinion leans heavily toward excess-profits taxation.*

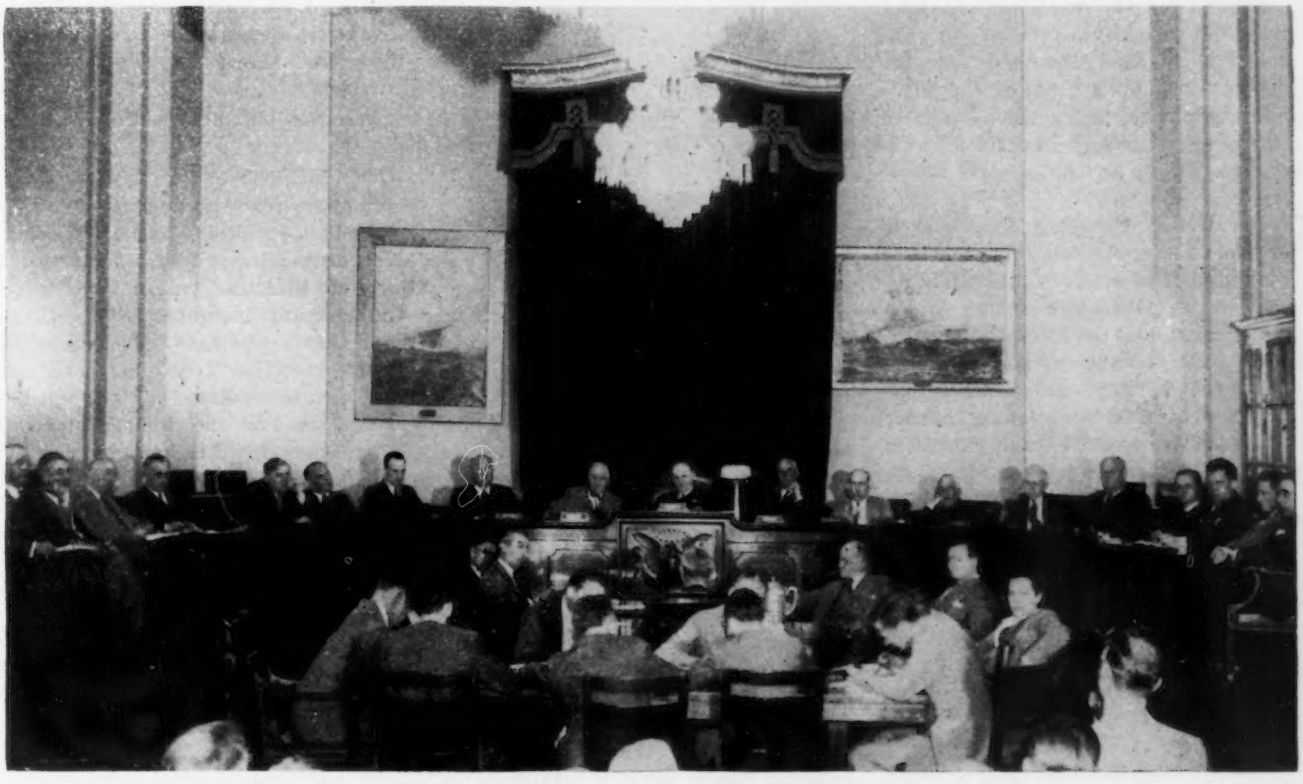
The very large, long established companies have either approved or remained neutral of the renegotiation procedure. Their peacetime profits and capital investment have been sufficiently substantial so that after review they have emerged with either no refund or one that made little inroad into their profits.

Many of these corporations recalling the bogey of the war profiteer directed at them after the last year voluntarily reduced prices to the government before the renegotiation act was passed.

General Motors, for example, returned approximately $295,000,000 on deliveries made up to March 31, 1943, and through price reductions applied $255,000,000 on subsequent deliveries. These figures do not include the sum returned after renegotiation hearings which amounted to about $48,000,000.

The Westinghouse Electric & Mfg. Co. refunded $53,000,000 at the request of the Navy Price Adjustment Board and voluntarily reduced its prices by $6,000,000.

As a result of the policy adopted by its board of directors the International Harvester Co. voluntarily refunded about $20,000,000 on three or four contracts. On some items, the orig-



● As part of the investigation into the progress of defense preparations, the House Naval Affairs Committee looked into renegotiation. In disagreement with the majority opinion were Representatives Mass, Cole, Hess, Wolfenden, Blackney and Grant. They recommended that recapture provisions be repealed on contracts made after Dec. 31, 1943.

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inal price was then cut in about half.

But most companies do not face as bright a post-war world as do these and other large corporations. Because of the proportionately heavier burden, many small companies feel that renegotiation will prevent their existing alongside their larger competitors in the post-war era.

Companies opposing to renegotiation are beset with many problems.

The aircraft industry is bitter in its attitude toward renegotiation since they find themselves in a unique position. They are responsible for the designs and development of America's fighting planes, which when the need for aircraft became insatiable were turned over to the automotive industry.

Because of its high prewar margin of profit and more favorable tax base the automotive industry ultimately receives more government money for its planes than does the aircraft industry. In addition, because of its lean years prior to the war, renegotiation has hit the aircraft companies harder than the automotive manufacturers so that the aircraft industry is penalized twice for its efforts to design, develop and build new planes.

The case of Consolidated-Vultee has been much publicized. Its working capital reduced after the rigors of excess profits taxes and renegotiation to nine million dollars would just about meet the company's payroll for two weeks were all contracts suddenly terminated.

Another industrial group faced with distinctive problems is the machine tool builders. The profits made by that industry have been accumulated at the expense of the 10 to 20-year period following the war. Its domestic market and England and the Soviet Union through lend-lease activities will have sufficient capital equipment to last, according to the industry's estimates, at least 10 years for precision machinery and 20 years for less accurate requirements.

The cyclical nature of the machine tool industry has always made large reserves imperative for a company's survival. These reserves are not now allowed.

The industry has painted its future as a long serious, post-war depression. Estimates show that at the end of the year there were four billion dollars worth of machine tools of which 75 per cent were not over three years old. In contrast, at the end of 1929 there were $550,000,000 worth of machine tools 13 years old or less.

In recognition of its problems the price adjustment boards have supposedly allowed earnings to machine tool builders 25 per cent higher than those permitted to all others, but since the industry has practically sold itself out of business this favored treatment is still insufficient guarantee for its survival in the lean years to come.

Extending renegotiation to Defense Plant contracts compelled most of the industry to be subjected to renegotiation twice during the year. When at first equipment to DPC plants was exempt from renegotiation, the renegotiators pointed out that the profits made on these contracts would supplement the finances of the industry. Now that recapture of excessive profit from these contracts is ensuing the hardship has multiplied.

Small Companies Fear Ruin

The small companies have also raised their voices against renegotiation. The sums recaptured leaves them facing an uncertain future. Many will be unable to return to peacetime production. Here, the nation faces a serious economic problem. As a result of renegotiation, the country may emerge after the war with its production centralized in big business. The recognition of this possibility at the start of the war program led to setting up of the Smaller War Plants Corp. Renegotiation may erase any efforts to save the small company.

Various aspects of renegotiation have been attacked. Many have expressed themselves against the consideration of profits before taxation, pointing out that the only money the company has is what it retains after taxes. The boards have refuted this, saying that it would take years before profits after taxes would be precisely determined and would in many cases subsidize contractors having a high tax base. To allow a contractor the same profit after taxes during the war period that he accrued in prewar years would in fact nullify taxes. The Senate Finance Committee has suggested that excessive profits be determined after income and excess-profits taxes.

One of the chief complaints against renegotiation is that profits cannot be determined until after the refund has been announced. To remedy this, it has been suggested that contracts be renegotiated forwards rather than backwards. New contracts should be placed at prices based on previous cost experience.

Ignoring the need for postwar reserves is a major grievance against renegotiation. The boards have recognized its importance but say that they are powerless to allow its deduction since the tax laws do not provide for such a reserve. Relief exists, they say, in the two year carry-over and carry-back provision, special amortization, accelerated depreciation and the postwar refund of taxes. Without a ready reserve for quick conversion to peacetime production, however, many companies will be forced to inaugurate wholesale layoffs. Coupled with the returning army, the unemployment figures of this extended transition period will without doubt reach staggering proportions. Many foresee the return of the WPA and suggest that reserves at least be held in escrow by the contractor or the Treasury Department.

Postwar planning can be just an illusion if the funds for converting theory to practice do not exist.

Industry has also suggested the exemption from renegotiation of standard commercial products since prices have not increased from prewar levels and in many instances OPA ceilings have been established. The excessive profits resulting from increased volume can be absorbed by the excess-profits tax and the number of cases to be renegotiated thereby reduced.

This reduction in cases to be handled is looked forward to by many executives who have objected not to the recapture of profits but to the caliber of the district price adjustment sections.

Many company executives who were in agreement with the principles of renegotiation have become vociferous opponents after contact with members of the local boards. They have accused some of these district renegotiators and auditors of being ignorant, unintelligent and high-handed. Since they will have to face these men again in 1944, they have reserved these opinions to cloakroom conversations.

In spite of the refunds and price reductions publicized by the price adjustment boards, many feel that the gains cannot be offset by the losses. Much of what has been recaptured was through the excess-profits tax already in the coffers of the Treasury Department. The increased dividends to stockholders, are also subject to tax and the expense of renegotiation to the company will be deducted from taxes and renegotiation in 1944. The cost of administering renegotiation was in the neighborhood of five million dollars.

Some have even wondered whether the warnings of government officials of the slump in war production because of over optimism was not actually a result of renegotiation.

Contract Cancellations

Before any concrete plans for peacetime operation can be crystallized, in-

dustry will also have to be assured of quick and equitable settlements of terminated contracts.

After a year of talk, investigation and projected plans, no uniform policy has yet been formulated. Still the Army has terminated over eight million dollars in contracts while cutbacks on destroyer escort construction by the Navy totaled about one and a half million.

During the year the War Department issued three significant documents: The basic standard termination article; the termination accounting manual, and Procurement Regulation No. 15.

The termination article sets the legal basis for all termination settlements and was intended to encourage uniformity of procedure and prompt settlement. Under this article the government may at any time cancel a contract, either in whole or in part, by a written notice from the contracting officer to the contractor. Upon receipt the contractor must discontinue all work, cancel all existing orders and terminate all subcontracts chargeable to the contract.

The contracting officer may reduce the amount payable to the contractor by ordering the sale at an approved price of any work in progress, supplies, materials, fabricated parts, etc. Most important is the provision authorizing the negotiated settlement of uncompleted portions of the contract. Should negotiation fail an alternative is provided. A fixed formula would reimburse the contractor for all actual expenditures and costs as well as outstanding commitments incurred with respect to the uncompleted portion of the contract. The profit accruing from the uncompleted work is estimated by the contracting officer on the basis of prevailing labor and material costs and the percentage of completion.

Procurements Regulation No. 15 issued by the War Department on Aug. 14 is a guide to all contracting officers on policies, organization, responsibilities and procedures. Under this regulation proposed agreements over $5,000 are examined by settlement advisory sections. Payments either partial or in full over one million dollars must after review by the settlement advisory section be re-examined by the appropriate settlement review committee.

Expenses incurred because of failure to cease work on contract after receipt of termination notice and losses on other contracts are excluded as items of cost. Allowable costs include among other depreciation and obsolescence, development and tooling, research and experiment, engineering and institutional advertising.

• Under Secretary of the Navy James V. Forrestal testified in favor of renegotiation before every Congressional group studying contract review. When the new War Contracts Price Adjustment Board is established, his power to renegotiate will be stripped.

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Procurement officers can exempt profits on terminated contracts from renegotiation.

Prime contractors examine the claims of their subcontractors in a manner similar to that of government auditors. The War Department, however, seems to prefer having their officers settle subcontractors' claims saying that they have effected speedier agreements than have the prime contractors.

Although having no overall policy, the heads of the various procurement agencies have declared themselves unconditionally in favor of speed in settling terminated contracts. They will sacrifice detailed auditing for that objective.

This stand has brought them in sharp conflict with Comptroller General Lindsay C. Warren. He insists that termination be removed from the sphere of the war contracting agencies, accusing them of "extreme generosity, collusion and fraud." Mr. Warren proposed that all claims be reviewed by the General Accounting Office. He would grant loans only in cases of financial need. The procurement agencies state that the purpose of these loans is to finance contractors in the period between contract cancellation and final settlement.

Allied with the War and Navy Department are industry, the WPB and the Maritime Commission. Detailed auditing especially where large investments were made in inventories and machinery would be a long, tedious process. Many companies would be ruined financially, being unable to pay their subcontractors and suppliers while waiting for a settlement. As cancellations became more frequent, this delay would become increasingly extended, making reconversion an impossibility.

The General Accounting Office may be worrying about the taxpayers' money. A more efficient safeguard for the taxpayer would undoubtedly be widespread employment when the war ends.

Industry in addition favors a cash advance prior to settlement. Seventy-five per cent has been the figure recommended. Under Secretary Patterson opposes this as no substitute for prompt final determination of the contractors' claims. But Donald M. Nelson favors such mandatory advance payments up to 75 per cent of the claim.

Industry's Recommendations

The United States Chamber of Commerce would like to see following settlement provisions:

(1) Subject to a 30-day preliminary review, a 75 per cent mandatory advance payment should be made to each war contractor on his certification, including subcontractors and suppliers.

(2) Withholding the advance if review calls for it—contractors would be given notice to post bond for the amount of the advance, submit certificates or other evidence that amount claimed is correct.

(3) Additional amount should be provided above the advance, guaranteed or loaned directly by the government at 4 per cent interest.

(4) Allowable costs and profits should be fixed as settlement guides.

(5) When advances exceed final settlements, advances should be treated as loans, repayable at 6 per cent interest, except that a prime contractor should not be financially responsible for advances made through him to his subcontractors.

(6) The contracting officer should not be personally liable for excessive advance payments.

(7) If Congress permits the General Accounting Office to review pay-

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Labor

By DON JAMES
News and Markets Editor
and
DONALD C. MacDONALD
Associate Editor, THE IRON AGE

RECENT weeks have brought valuable and realistic glimpses showing what the United States is going to face in its inevitable readjustment away from high pressure war production.

Attempts to curtail unneeded production facilities have been fought by unionists who at the same time demanded higher wages, shorter hours and lush post-war guarantees. Industrialists have been forced to sit on the sidelines while deals were made between labor and government.

The high school kids, housewives, regular line workers and government bureaucrats intent on resisting downgrading or geographical transfers are only a part of the general problem, obviously. But their attitudes reflect a national mental condition more clearly than the other pieces of the difficult picture. The U. S. has a lot to unlearn before it gets back to a realistic basis. The days when the government pays the whole freight and pays well, out of taxes, are numbered.

Yet in the inevitable readjustment, machines can be junked or stored, materials gradually disposed of, and war plants dismantled, but the men cannot be left to starve. Executives thinking about post-war personnel in terms of the 1930's had best shift into another gear immediately. The coming personnel problem is the biggest hurdle ever faced, one that can make or break industries, companies and individual executives.

Somehow, higher production and sales than ever before must be achieved by management, and in view of industry's impressive war record, the odds favor success by private enterprise, providing it gets a fair break from the Administration. Sure, we are going to have ample men, materials, equipment, purchasing power and new products at the start. But we are going to have plenty of dissension, much of it created by national policies, plus a difficult international situation and scores of controversial domestic issues bearing directly upon the operations of industry.

Recognizing the magnitude of the task, industrial executives have attempted to perfect their plans as far as possible in recent months, and have been so eager for information that often they have incurred the displeasure of officials conducting the war. So obvious is the need for definite plans by every firm and individual that the secrecy and lack of cooperation encountered in high places at Washington cannot be justified. One step alone—the providing of full assistance for the making of tools, dies, jigs and fixtures for the inevitable day when they will be needed—would telescope future problems immensely.

Management is prepared to rebuild departments skeletonized by the war, to assist in the resumption by industries such as construction hard hit by the war, to keep many of the progressive practices which have heightened efficiency and morale, to work out with returning service men the problem of making use of their new knowledge and skills, and to take up the slack equitably wherever possible.

Glib talk and unrealistic thinking about post-war personnel problems must be outlawed. There has been far too much of it in recent months. Some has come from well meaning industrialists who fail to realize that they are putting themselves and the whole system of private enterprise "on the spot."

One example of a problem not completely thought through is that pertaining to the use of persons with physical defects. A large number of these persons are now at work under the high pressure demand for manpower, but the question of their permanent use is as far from solved as it was during the depression, when industry was being condemned for "heartlessly" refusing to hire persons of unsound health or those physically disabled. The fact remains now, as it did then, that employers are required to conform to a multiplicity of local, state and national laws, including workmen's compensation laws which were not written by industry. Drawn up years ago, these laws need a thorough going over today, with the idea of bringing them into line with present needs. Instead of placing the sole risk upon the employer, the interests of the employee and the state might well be broadened, thus helping provide a realistic answer to this one problem.

Management can be depended upon to do more than its share in the transition period. Management is beginning to realize that it faces a supreme test. Human nature being what it is, we can expect that the return to a realistic picture will only be achieved through difficulty in the United States.

Both labor and industry have achieved the commendable goal of weathering a passive revolution, instigated by war conditions, which approximated a social reform within the capitalistic system, without seriously impeding the nation's effort to outproduce the world in materiel.

Among the firsts recorded for labor and manpower during the year, one of the most important was the shrinkage

As the busiest and most prodigiously productive year the nation has ever known, 1943 was also a banner year in the spheres of labor and manpower. More "firsts" in favor of the legions that are labor and realms that are manpower were recorded than at any time during the nation's industrial history.

of unemployment to the lowest level in our industrial history. For the first time, America's labor force was actually short of industrial demand. This fact alone brought about numerous changes, destined to have a lasting effect upon both labor and industry.

Tracing the course of the manpower shortage back somewhat, the year 1939 recorded an available work force of about 54 million with at least 10 million unemployed or engaged by WPA, CCC and other public works projects. By December of 1942, immediately before U. S. entry into the war, the labor force still stood at about 53½ million but in addition nearly 6½ million men were in the armed forces and unemployment had dropped to a scant 1½ million. Employee rolls had jumped from about 44 to 52 million and the WPA and CCC were abandoned. At year end actual employment stood at above 54 million in all industries, a total of nearly 10 million in the armed forces and a pool of unemployed of just less than a million made up entirely of unemployables.

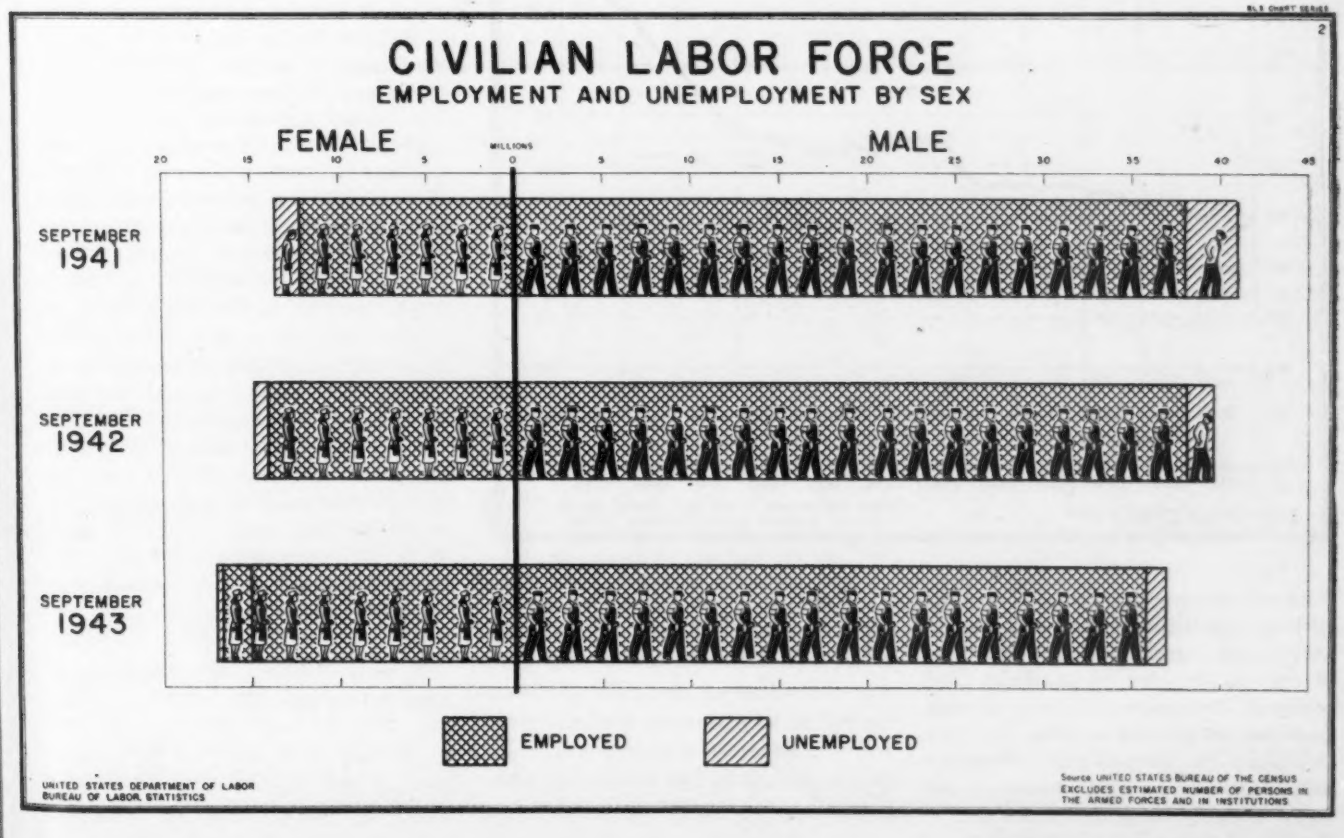
Even a casual summary of these figures reveals that at present 64 million total instead of 54 million people, accustomed to employment, are now involved. The difference between the 1939 employment total and the present one would seem to call for the absorption by industry in peacetime of about 20 million additional workers. This figure included 10 million workers now serving in the armed forces and 10 million growth in the labor force. As such, it is plain that unemployment constitutes one of the major post-war threats to our economy.

However, a number of alleviating factors enter into the depreciation of the 20 million estimate of the labor pool requiring employment. One of the most promising factors involves the return to interests other than work of countless thousands of women, school-age children, over-aged and retired persons, some physically handicapped and the white collar "commandos" who have held office or professional positions and worked a war plant swing shift.

Likewise small retail businesses which have suffered or closed due to war conditions will again utilize thousands now recorded on plant employment rolls and in service. Domestic workers and professional people will return to their previous occupations, thus taking some of the load off of industry.

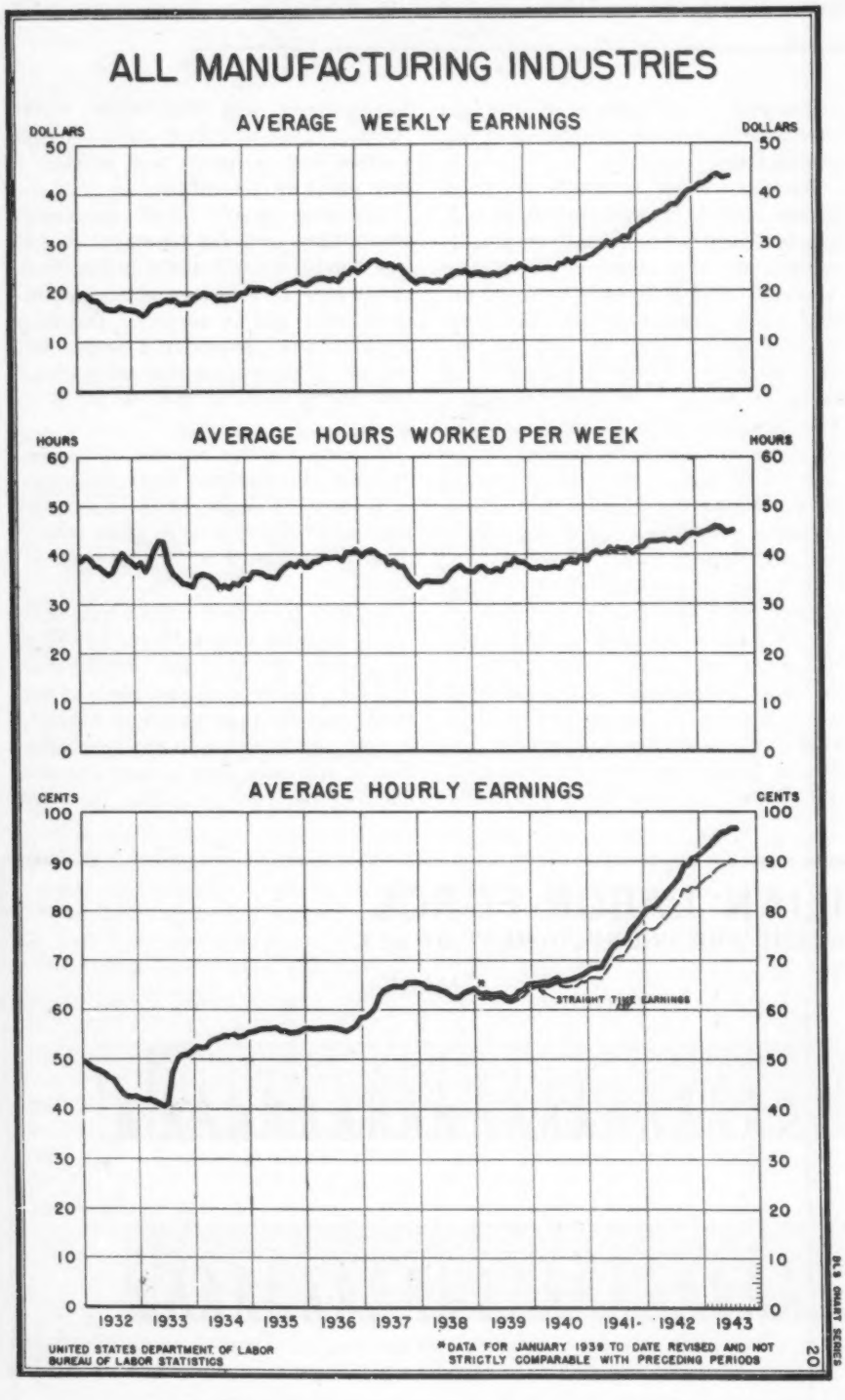
A much smaller number of persons will also be removed from the quota of those to be employed through debilitations of one type or another whether they be result of age or war injuries.

Greatly increased output by industry is another major factor looked to in solving the post-war employment problem. The immense amounts of material and finished products required by our participation in the rehabilitation of war-torn Europe and the production required to slake the vast



drought of civilian articles in this nation are expected to provide a high volume of employment for a considerable period after the war. In addition, the scope of post-war planning by both industry and the communities of America contemplates the utilization of huge quantities of construction materials and large blocks of manpower. Every major city in America and many of the minor ones have already gone on record with specific construction plans for the post-war period and many have earmarked funds to set aside to carry forth this endeavor.

Paul G. Hoffman, president of Studebaker Corp. and chairman of the Committee of Economic Development, estimated in an address given in late November of 1943 that production would be required to be increased approximately 35 per cent over normal peacetime levels in the post-war period. Mr. Hoffman and Philip Murray, president of the CIO, also concurred on an estimated post-war work force of about 55 million and set nine to ten million as the number of additional persons requiring employment as compared with the nation's 1939 levels.



Another movement anticipated in the post-war period will be further activities on the part of labor unions to institute a spread-the-work policy through shortened hours. Drives in this direction several years ago resulted in the Fair Labor Standards Act which established the 40-hr. week in industry. Throughout 1943 the average work week in most industries struck a minimum of 44 hr.; many war industries adopted a 48-hr. week and others worked as long as 60 to 70 hr. per week. The machine tool industry, for instance, averaged 55 hr. per week. Competent observers are predicting a drop to as low as 35 to 38 hr. per week as a measure to spread work in the post-war era.

The employment and wage trends of the steel industry during 1943 parallel the experiences of many industries. Due to manpower shortages and the Selective Service calls, total employment dropped, man-hours increased and total wages climbed steeply under the impetus of overtime payment for long hours and long weeks. In January of 1943, steel employment stood at 553,000 and thereafter registered a steady decline to a low for the year of 529,787 in October, the last month reported, according to American Iron and Steel Institute figures.

While employment declined during this period, production rose to an all-time high in the history of the industry and total man-hours rose from 97,582,686 hr. in January to an all-time high of 104,569,788 hr. in October, many of these representing overtime hours demanding time and one half and double time pay rates. The average work week also rose from 39.8 hr. to 44.6 hr. Reflecting the added costs of overtime resulting from longer hours the average earnings in the industry rose from 110.7c. per hr. to 115.8c. per hr. in October.

The efficiency of the industry and improved manpower utilization is indicated by comparison with the prewar, high employment period. In August of 1941, before America's entry into the war, Lend-Lease production had swollen steel employment to an all-time high of 582,359 men. With this tremendous roll call only 95,899,974 manhours per month were being utilized and the average work week was only 37.2 hr.

A truly revolutionary change occurring during the year, which will have a prolonged social effect, has been the about-face of industry in its attitude toward the employment of women. Their acceptance was, of course, a

forced issue resulting from the manpower shortage. However, women's response to employment has been so satisfactory in many fields that a permanent place for women seems to have been created in many positions not heretofore open to the sex.

The Women's Advisory Committee of the War Manpower Commission recognizes that some women will leave their jobs of their own accord at the close of hostilities but adds that "any easy assumption that a great number of women will return to their homes is to be seriously questioned." The committee states that almost 14,000,000 working women are not newcomers to the labor force and that the number of women who want and need work has increased enormously during the war. The committee estimates that there will be a much higher proportion of unmarried women and that many of them will require employment to maintain their present economic status. Likewise many more women will become breadwinners through loss of husbands in the war.

What is probably one of the most drastic and lasting technical advances of the year, one which may permanently affect the entire policy of industrial engineering, has been the direct result of the employment of women and unskilled workers. This is the new technique of breaking-down involved and difficult manufacturing, fabricating and assembly operations which formerly required a highly skilled person of long experience, into a number of relatively simple component operations that could be taught to a number of untrained workers in a period of a few weeks. In this way thousands of skilled jobs and trades were successfully invaded by women and the places they have made for themselves appear relatively safe unless unionism forces a return to the tradesman's principle.

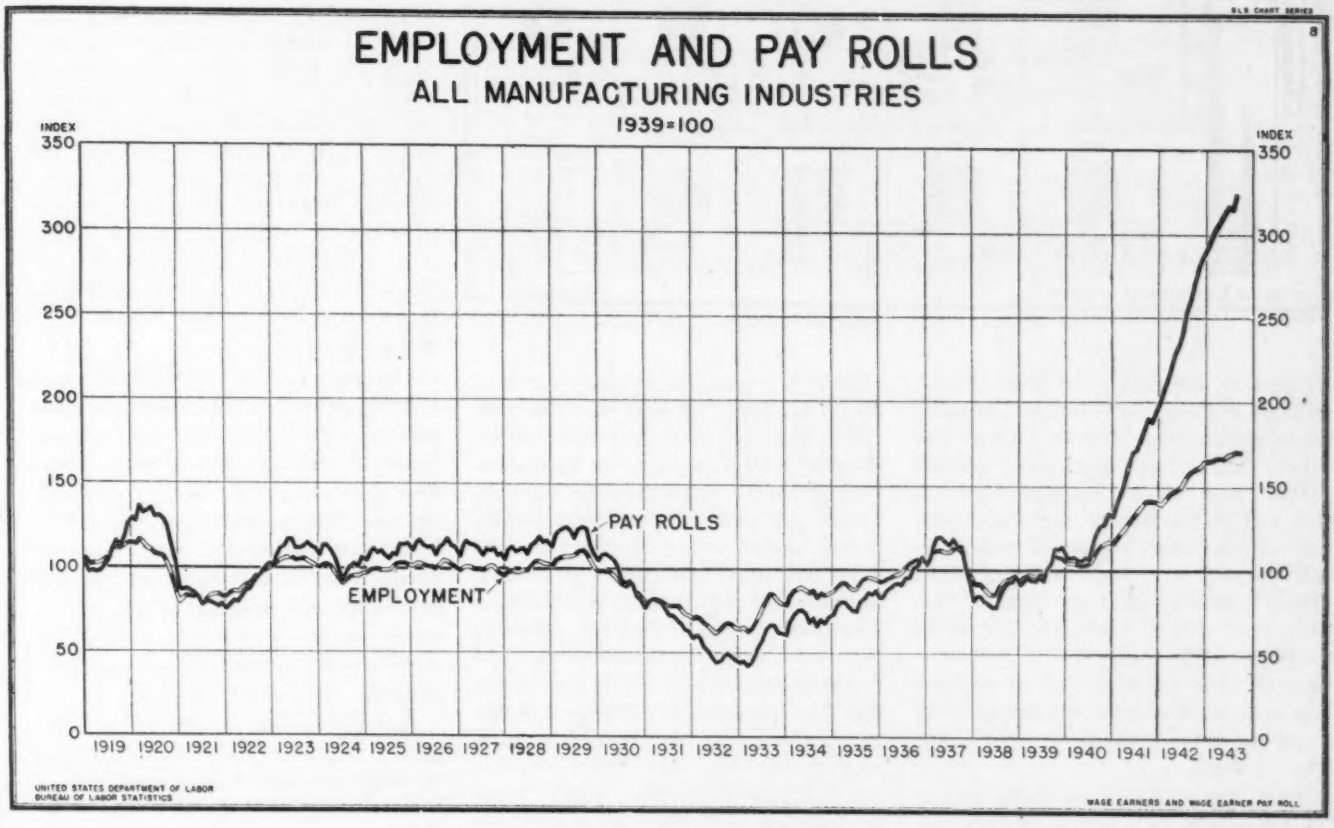
Another first for the year was the national recognition of the importance of labor utilization. With the exception of Henry Ford, followed by the other automotive manufacturers and mass producers, complete utilization of man's time and capabilities was previously given a minimum of thought by most industries. When labor shortages set in, vast programs partly sponsored by experts of the War Manpower Commission set out to teach industry how to achieve best results with fewest men. Many plants analyzed were producing at rates as low as from 10 to 30 per cent of actual capacity. Revised floor layouts, material handling, working hours, job analyses and other means were used to raise productivity per man. While reflecting an improvement, a great many war plants have been reported by observers to be operating at only about 60 per cent efficiency.

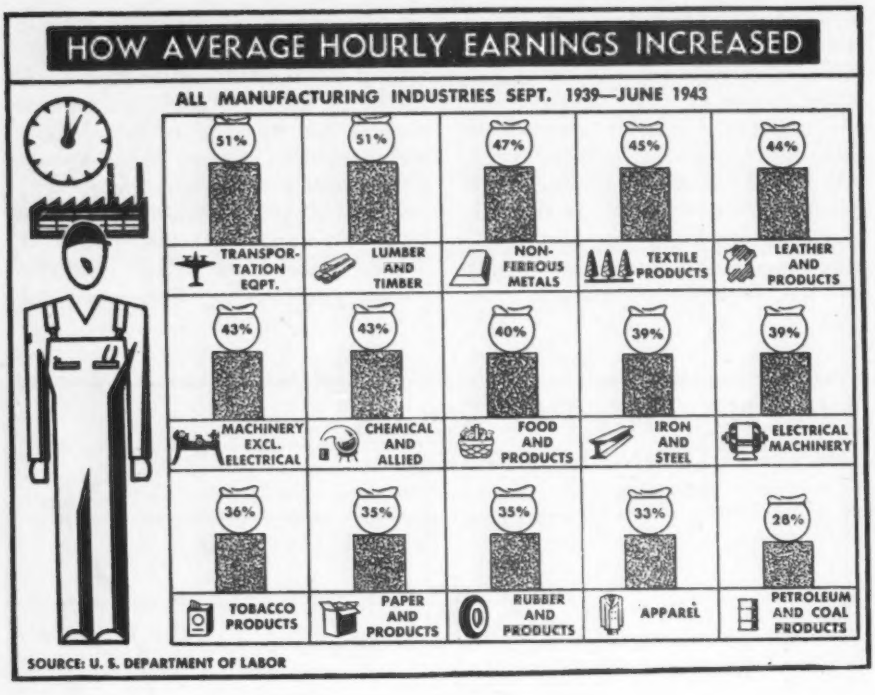
1943 did not witness the first regulation of labor through government control but was the period of most stringent labor control in the history of unionism. Previous years had brought about the passage of many labor laws and the establishment of several labor negotiation agencies within government. These included laws such as the Fair Labor Standards Act and the National Labor Relations Act and agencies such as the President's Fair Employment Practice Committee and the National Labor Relation Board which is now being eclipsed by the National War Labor Board; also the War Manpower Commission itself.

The year was notable for its lack of effective labor control and relative success of its manpower control.

Labor, which in this usage means unionism and collective bargaining power, was decidedly unruly and troublesome. Despite no-strike pledges on the part of William Green for the AFL and Philip Murray for the CIO in addition to minor and perfunctory pledges by other groups, strikes were rampant during the year and as in the case of the four major coal strikes, seriously endangered the war effort.

Most strikes throughout the year, tying up war production in steel mills,





shipyards, aircraft and rubber plants, transit systems, stevedoring and automotive-munitions plants were not union authorized and were termed "flash" and "wildcat" strikes. Irritating and obstructive as they were, little actual production compared with overall output was lost through them. This, however, was not true of the four coal strikes which threatened to paralyze all industry and transportation on each occasion and so reduced the coal stockpiles of the nation that reserves cannot again be rebuilt for the duration.

Steel loss alone during these strikes is estimated by THE IRON AGE to amount to at least 350,000 tons . . . enough to build 10 huge battleships. Again despite the calamitous appearance of the strike record of the nation, statistics show that the lost manhours involved amounted to only a few hundredths of one per cent of total productive hours worked. These figures, however small, overlook the fact that the lost hours concentrated closely within those industries where time and production could least be spared.

The underlying causes of the year's strikes appear to have centered around a demand for higher wages to meet rising living costs and the furtherance of strictly mercenary union aims having to do with increasing membership or gaining individual advantages within certain plants and industries.

At year end, the nation was confronted with a labor picture which places certain power of John L. Lewis, through his 600,000 strategic coal miners, above those of the President, showed the railroad workers mollified by an 8c. raise but with a strike vote ready to use, a concerted drive on by 900,000 CIO members to break the "Little Steel" wage formula and the forces of a number of pressure groups being applied to banish subsidies, the Administration's only hope of thwarting inflation and thereby maintaining a moderate wage level. That the wage and salary dam was breaking was perfectly evidenced late in the year when the WLB granted the miners a wage increase through the subterfuge of a lengthened work day with overtime and a shortened lunch period. Thus an increase amounting to more than permitted by the "Little Steel" formula, so-called yardstick of the WLB, was rammed through to send recalcitrant miners back to the pits and the doors were opened for every other union in the nation to seek like treatment. 1943 ended with inflation a definite possibility.

Incentive Movement Still Alive

An age old dragon of the unions reared its ugly head with renewed vigor last year—incentive pay. Pushed aggressively by the Navy and later reinforced by other procurement agencies and the production experts of the WPB and WMC, incentive pay plans gained some impetus during the year. Individual production increases were reported throughout the country resulting from incentive pay methods but union obstructionism worked to offset general acceptance. The old union plaint of jacked-up production quotas arbitrarily raised to offset wage gains of incentive piece work plans proved too often true. The effects of incentive piece work plans for the year were considered small. Likewise, continuance of the drive after the war is believed unlikely. The movement, however, is still not dead and at year end was the subject of intensive thought on the part of the WPB Management Consultant Division.

Unionism also climaxed in 1943 a series of advances under the kindly Roosevelt Administration which served to place it among the leading powers of the nation. Between 1933 and 1943 union membership rose from about three million to more than 12 million with the CIO and AFL claiming over five million each, the United Mine Workers about 600,000 and the balance represented by independent unions. 1943 saw the conclusive end of so-called "company" unions. Collective bargaining, the checkoff and maintenance of membership became terms that automatically went with being an employer.

The year also saw the beginning of a union drive to corner political power. The CIO openly distributed pamphlets describing in one easy lesson how members could become ward heelers and local political bosses in the hope that eventually some Congressional talent would be developed and thus start the political power of the union in the Legislative Branch of government as well as at the polls through "instructed" voting.

Another lasting institution, started during the war period but climaxing in 1943, was the Labor-Management Shop Committee. These committees, over 3500 of which have been formed in war plants and representing over 6,000,000 workers throughout the nation, now are a decisive factor in how production and personnel management is conducted and due to their success in sharing both the responsibilities and the profits of efficient production methods, are expected to become permanent adjuncts of manufacturing.

Labor, more commonly termed manpower, took a leading place last year as one of the nation's most strategic and scarcest commodities. Like unionism, manpower was troublesome and required more government control than at any time in the history of industry. Taking its place among the year's firsts, 1943 was the first year that manpower was ever recognized as the equivalent of a raw material which must be produced, controlled and distributed. Common labor proved to be one of the scarcest varieties.

An outstanding event of the year

from a manpower standpoint was the emergence of the controlled referral hiring plan, a plan originated by the New York regional office of the War Manpower Commission under the guidance of Ann Rosenberg and first instituted in the Buffalo-Niagara (N. Y.) area. Through the terms of this plan manpower was forced to channel through the United States Employment Office where individuals were referred to essential jobs in companies having labor priority due to the nature and urgency of their war contracts.

Out of this master plan grew localized plans known as area stabilization plans aimed at controlling the flow and utilization of manpower in specific areas according to the local needs. Most prominent example of such control was the plan instituted on the West Coast governing the vast numbers of aircraft and shipyard workers there. The WMC by means of classifying war production centers into areas of critical labor shortage and other less stringent classifications was enabled to apply corrective "area plans" exactly suited to the needs of the area.

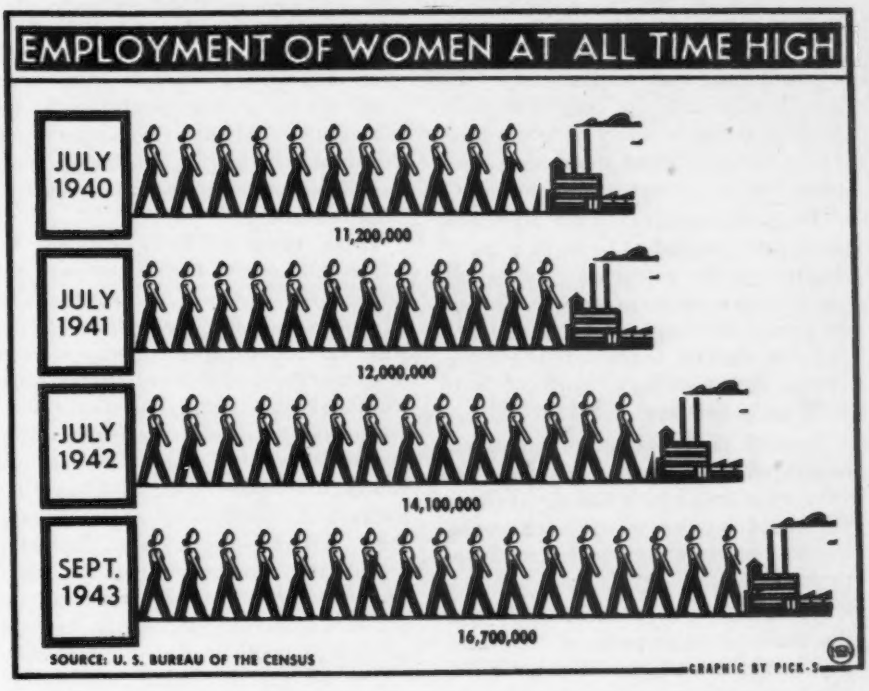
It is notable that while a steady flow of manpower controls and directives were issued as each new manpower crisis appeared, none of the plans or orders was actually carried through to exhaustion and no one or several plans or directives entirely served the overall purpose.

It can be safely said that 1943 was a period of "muddling through" so far as manpower controls were concerned but also that despite these policies of muddling rather than clarity, the necessity for a National Service Act was avoided and sufficient results were attained. At year end, the fears of a National Service Act were completely banished but the problem of manpower had not been solved and threatened to become more serious.

Freezing of Workers

Other "firsts" in the manpower kaleidoscope for the year include the first government controls over the free movement of labor, termed migration by the government. First freezing of essential workers in their jobs came in with the year. First placements of government business according to the manpower potentials of an area occurred within the year. For the first time the use of a non-deferrable list to drive men into essential employment in lieu of the armed services was used.

Also for the first time wages and salaries, presumably in the name of economic stabilization, were frozen. By Presidential order all salaries were limited to $25,000 net after taxes, raises without special consent of the WLB were denied salaried workers making over $5 000 per year and wages with few exceptions were ordered held at a given level except through collective bargaining and WLB approval.



Another first, of lesser importance but promising to grow in importance after the war, was the government sponsorship of worker training programs throughout the nation. Training-Within-Plant programs conducted in plants and through the facilities of the National Youth Administration prepared thousands of otherwise "green" help for useful employment. The aspects of a broadened program of this nature after the war for the rehabilitation of returning soldiers holds great promise in the future.

The activities of the United States Employment Office in the channeling of labor to essential positions recorded an all-time high of 909,000 replacements for the month of September, the last month reported. This high in placements for the year brought the nine months' total placements to 6,980,000, an increase of 39 per cent over the same period in 1942.

Despite this increase the usefulness of the USES appeared to be dwindling toward the year end as new applications for work were falling rapidly. September applications fell to 754,000, a drop of 16 per cent under the previous month and was the record low for the year.

"SHUCKS, SI, IT WAS SIMPLE SOLVING MY MANPOWER SHORTAGE. JUST CROSSED MY CORN WITH MEXICAN JUMPING BEAN AND POPCORN."

With a manpower shortage still definitely evident and acute at the end of the year the trend toward specialized help was emphasized by the drop in placements of colored workers. Women workers, many of whom train easily for specialized work, were being placed at an unprecedented rate.

Long range planning for additional manpower seemed to be waning as recruitments for refresher courses and pre-employment training was in a rapid period of decline. In September, reports showed a low of 13,000 recruits for training compared with 58,000 for January of 1943.

Two of the greatest problems encountered with manpower during the year were ones which had always been presented but never of much consequence before, absenteeism and labor turnover.

Absenteeism on a large scale was the natural outgrowth of displaced population and the use of persons unfamiliar with factory working conditions. Women, it was learned, were the greatest offenders mainly due to the complications of attempting to engage in household operation and at the same time hold a war plant job. The plant job suffered when personal obligations became too pressing. Other contributing factors effecting both men and women workers were overlong hours, exceptionally high incomes, new living environment which required acclimation, sickness, overconfidence in victory and a host of other causes.

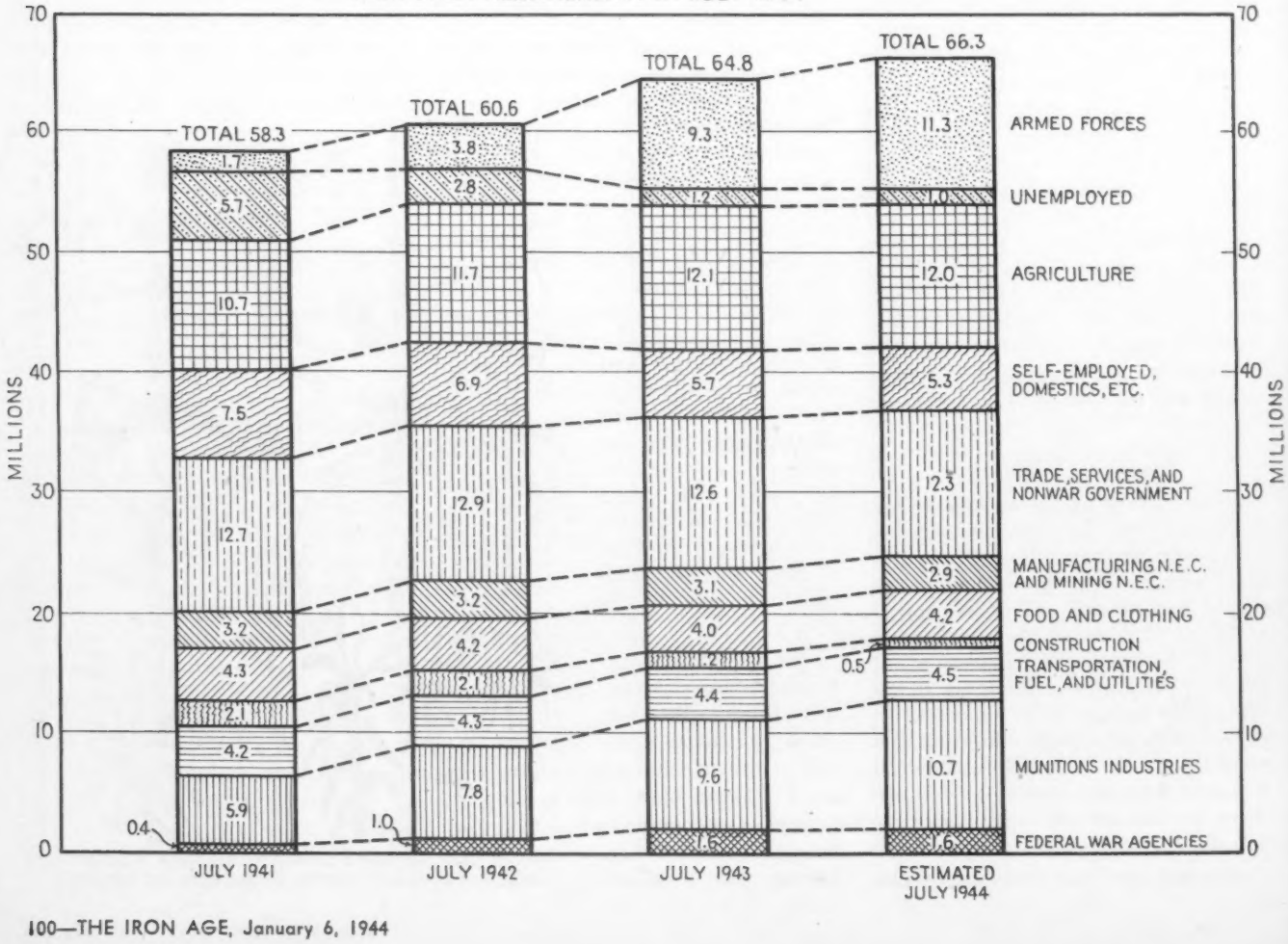
Labor turnover, likewise, grew by leaps and bounds during the year despite WMC efforts to control the flow of manpower and freeze jobs. This also was found highest among women workers. Most prominent causes were the temptations of higher wages elsewhere, lighter or more desirable work, lack of working incentive due to faulty management or contract cutbacks and hundreds of personal reasons. Effects were so great that hiring in many plants required the addition of from 17 to 35 workers per hundred employed, per month, to keep abreast of manpower requirements.

One of the by-product effects of both absenteeism and high turnover rates was the hoarding of labor. A reserve pool of workers kept on the payrolls at unimportant or make-work jobs served to provide a cushion against the inroads of both scourges. Near the year end a WMC practice of setting maximum employment totals for individual companies was beginning to clear excess labor pools and enlarge the labor supply slightly.

A summary of the manpower supply situation at the close of the year reflected little hope that an easing market was in sight. The Selective Service quota for January, 1944, had already been set at 300,000, about double the December quota, with many of these expected to come from industrial deferment cancellations and from among fathers heretofore considered relatively safe by their employers. Despite large cutbacks in numerous armament and munitions contracts the WMC estimated that immediate demand for workers would equal 500,000 while the released workers from closing contracts would approximate 150,000. WMC also listed 69 acute labor shortage areas in the nation in December and 124 others in the labor stringency classification. At this time the armed forces were said to be discharging about 70,000 men per month back into civilian life . . . mostly from hospital beds.

To summarize what may develop in the post-war period as regards labor

CHANGES IN THE SIZE AND DEPLOYMENT OF THE LABOR FORCE FROM JULY 1941 TO JULY 1943 AND ESTIMATED MANPOWER REQUIREMENTS IN JULY 1944



and manpower, consider the following:

• The nation's average work-week will decline to a maximum of 35 to 38 hr. or less.

• Discontent among workers will be prevalent due to deflated take-home pay and union agitation.

• The Smith-Connally Bill and the War Labor Board will likely be eliminated. However, substitute legislation and a new labor dispute board are considered a necessity.

• Inter-union jurisdictional disputes will grow in frequency and intensity when workers are again allowed to migrate from industries and localities thus creating fluxing union memberships.

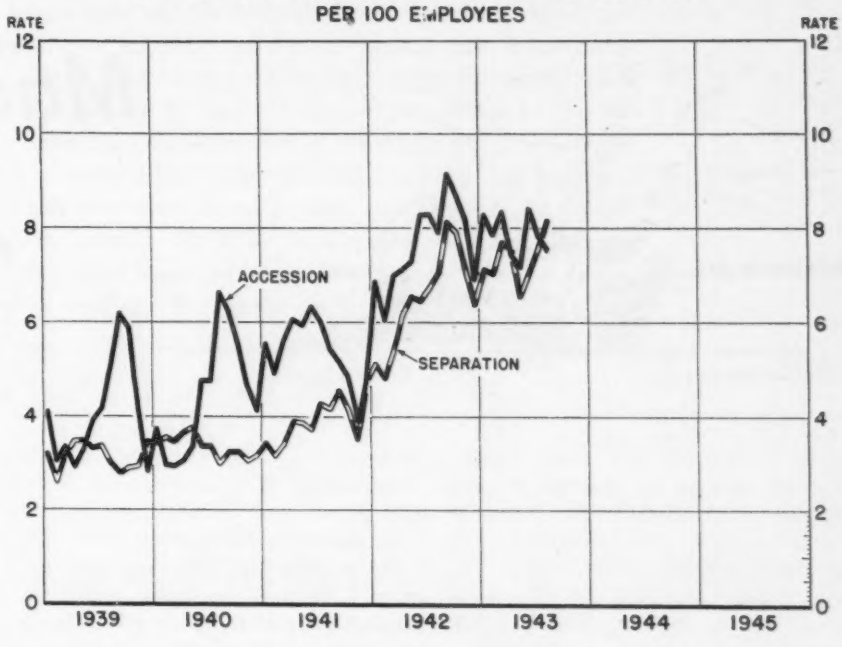
• Labor is expected to demand guaranteed minimum weekly and annual wages based on flexible wage scales sponsored by the cost of living index.

• The greatest union membership drive in the history of industry, palling even the wartime drive, will follow the war. This is expected to be successful as all workers will seek the security of union wage and bargaining advantages in the face of uncertain business conditions.

• Dismissal pay is almost a certain demand of the unions when post-war contract termination layoffs occur.

• Shortened working hours will not aid manufacturing overhead much as a greater take-home pay through increased wages will be sought by the unions.

SEPARATION AND ACCESSION RATES IN MANUFACTURING INDUSTRIES



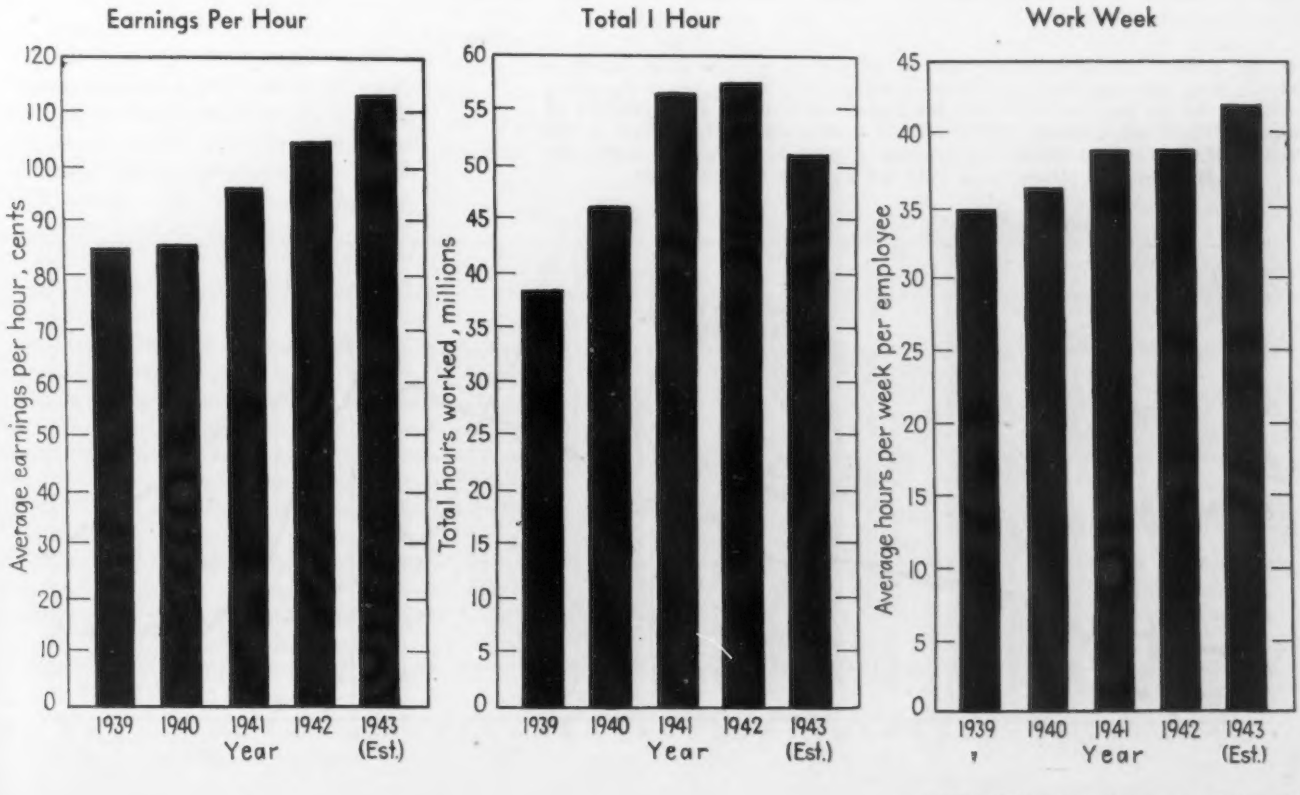
• Incentive pay plans, distrusted by the unions, will fade out as union make-work rules are reinstated to spread the work.

• Labor-Management Committees, labor's first chance at controlling production methods and having a working bond with management, will prosper with union sponsorship after the war.

• Unions, some of which are already teaching politics to ambitious members, can be expected to enter politics much more thoroughly through union controlled offices. Congressional timber is an aim now.

• Government training programs even though faltering at year's end will be strengthened by the demand for rehabilitation of veterans.

The courtesies and assistance of the Twentieth Century Fund, the Research Institute of America, War Manpower Commission, Office of War Information and U. S. Department of Labor, Bureau of Labor Statistics are gratefully acknowledged.



Machine Tools

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By MILTON D. THALBERG

Advertising Manager, Cosa Corp., New York

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ABOUT six months ago I was privileged to enter the machine tool industry in the capacity of advertising manager of a company importing and exporting machinery as well as operating a manufacturing gear shop. All my contacts with this industry prior to my new connection had been indirect since I have always dealt with merchandise or commodities which ultimately find their way into the hands of the consumer.

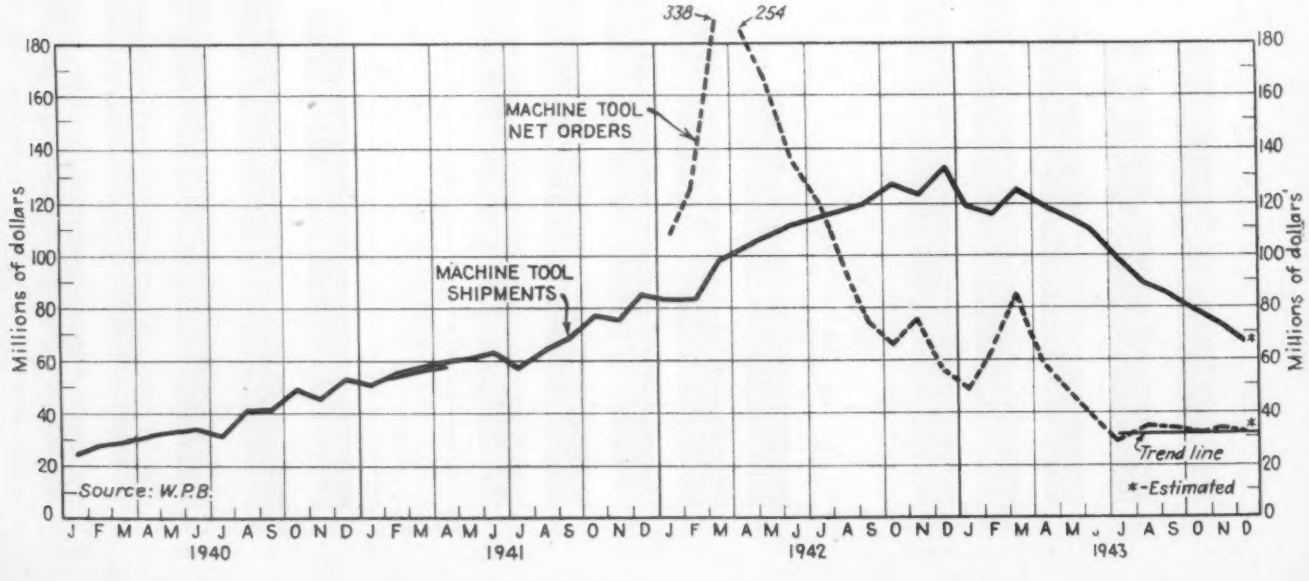
Upon embarking upon my new venture, I resolved to build from the ground up and to store up as much knowledge of the machine tool industry as possible since I was now dealing in a basic industry that can be considered the daddy of them all. In order to gain this education I began reading all types of manufacturers' literature as well as trade papers and text books, and being of a roving disposition, I was not satisfied with "book learning" alone, so I went and talked with people. Soon I found myself deeply concerned with the wave of pessimism that was sweeping the entire machine tool industry.

It has always been my opinion that sales representatives in any industry have their finger on the pulse of all activity and I therefore made it my business to contact and discuss the situation with sales representatives of various organizations in the machine tool field. Much to my distress I found that these men were anything but optimistic about the postwar future of the machine tool industry. In most cases their arguments were sound and one could hardly blame them for their attitude. After devoting more time and thought to the entire subject, I decided to make a complete survey of the situation which would influence our own plans for the immediate future as well as the postwar era.

A Survey Made

Without any reservation, I can say that this survey was a complete revelation. I found that there is a clear line of demarkation between the thinking of the majority of the machine

● Net orders for machine tools reached an alltime high of $338,348,000 in March, 1942, and thereafter have declined, except for a short climb in the spring of 1943. For the past several months the order level seems to have stabilized at around $30,000,000 a month or $360,000,000 a year, about 27 per cent of the $1,325,000,000 worth of machine tools shipped in 1942, but almost double the 1929 volume. Shipments in 1943 will be close to $1.2 billion.



. . . With billions of dollars worth of brand new machine tools installed in war industries in the last three years, the machinery builders as a group face what appears to be a glutted market and a gloomy future. The author of this article—a neophyte in the industry with a merchandising background in a totally unrelated field —takes a much more optimistic view. He belives that the builders of machines that make machines have a vital role to play in reconstructing the postwar world, but that it is going to take a sound merchandising policy and a less discouraged attitude to put a sound sales and service program across.

tool builders and the manufacturers who are making products for the war effort now but who later will produce consumer goods. I believe that in many cases the pessimistic attitude of the machine tool builders is well founded but in many other instances the old saying holds true: "They are sitting so close to the forest that they can't see the trees."

After talking with many of the machine tool builders, their sales representatives and their agents, I found that the majority of them gave me the same arguments:

1—Sure, the machine tool industry is the basic industry but, after all, what changes can be made to improve the standard general purpose machines we now have?

2—What is going to happen to the billions of dollars' worth of equipment that was recently purchased by various plants and is now being used for war work?

3—Is there a real *need* for any improvement, assuming it could be made, in the machines that have just recently been sold?

Of course, these questions are the condensed version of many conversations but all of these conversations practically boil themselves down to these three stock questions.

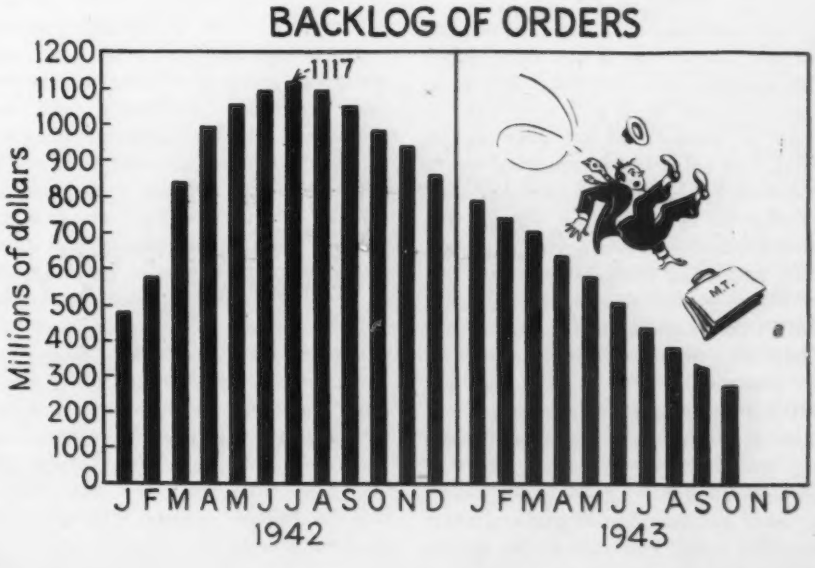
Unfortunately this feeling of pessimism has spread over many organizations and sometimes the sales representatives feel themselves in a state of almost complete helplessness. Some salesmen are in a complete state of funk. One man told me he had sat in his car for 10 min. outside a big eastern plant debating with himself whether he should make the call he had planned or whether he would skip it until the next month. After all, he argued, this company had 50 or more of the latest model radial drills he sold. It would be a farce to talk about buying any additional equipment. Or would it? Another salesman found it difficult to get himself in a frame of mind where he could even leave his office. He was licked before he started.

What Another Industry Does

In comparison with other industries with which I have had direct contact, this state of affairs was really shocking. I could recite several instances where manufacturers have sold their sales organization on one fundamental principle and that is the principle of service. One example will suffice.

A clothing manufacturer of my acquaintance who has made a phenomenal success in the quality field not only does a complete educational job with his sales representatives but will go to almost any extreme regarding service to obtain a retail account that he would like to have on the books. He will equip his salesmen with a complete breakdown and analysis concerning the prospective customer and when the salesman makes the call he will sometimes know as much about the retailer's business as the retailer does himself. The salesman's job is not only to sell the retailer the line of merchandise that he represents but also is to show the retailer how he can obtain better results, render a better service and build more good will by handling his particular line of merchandise. This clothing manufacturer will sometimes spend three months making this analysis and when this presentation is made it is usually very effective since he shows his prospective client how vitally interested he is in his welfare as well as his own.

The above example may seem farfetched as applied to the machine tool industry but it has always been my contention that the fundamentals of good business and selling are practically the same in every field of activity. Why can't machine tools be sold on the basis of service to the customer? You may say they *are* and this is probably true in some instances. On the other hand, recently I have been out with machine tool salesmen making calls on plants about whose product they had only a hazy



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● In the past few boom years, selling largely degenerated into order taking. In the postwar competitive market, some "peddlers" will have to be taught the art of selling all over again.

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notion. How could they be of service unless they knew what the customer's manufacturing problems were? I have even bought machinery from manufacturers who didn't exhibit the slightest interest as to what use I might be putting their product. Perhaps I should have ordered an entirely different model better suited to my purpose.

Upon looking at the charts of the machine tool industry, I find that they went from one extreme to the other over short periods of time. Of course all of these highs and lows can easily be explained but for the past four years the machine tool salesman has found himself in a position that he was never in before. The market was a seller's market and orders were usually far in excess of delivery. Salesmen suddenly found it very easy to sell machines and it was merely a question of "Can you deliver it, and when?"

Future in Doubt

Upon looking into the future one can easily understand why these salesmen should feel anything but optimistic because they will now have to begin to really sell all over again. What the sales representative needs now more than ever before is the feeling that he is getting or will get the wholehearted cooperation of management and that management will develop equipment and machines that will fill the place in our postwar world.

Let us look at the buying end of the picture. When I visited plants that are now manufacturing war material I found a feeling of optimism that was indeed wonderful. Most of these manufacturers are well known for their consumer products and their foresight and enthusiasm is something to be admired and praised. When I asked them about their plans for the postwar period, their eyes would shine and they all told me that their new products would be so far superior to what they had produced before the war that there would hardly be a comparison. When I asked them about the machine tool situation they all admitted that they had bought a great deal of new equipment in the past three years. *However, they expected to buy new equipment after the war for several very important reasons.*

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● Some salesmen hesitate to make calls these days on plants where they have sold large quantities of machine tools for war work. Getting in the right frame of mind to make a solicitation is half the battle.

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These manufacturers all went into the great story of successful business and American ingenuity and explained to me that genuine progress is based on one fact and that is "to produce better products at cheaper prices." These new products that are now on the drawing boards will affect the lives of every one of us and there is no doubt but that new equipment will be needed to produce these new products for which Mr. and Mrs. American Public are anxiously waiting. They told me that there are two things that will enter into these new products and these two things are why they will need new equipment: One is higher speeds; the other is greater precision.

Manufacturers are planning to run their machine tools at higher speeds than ever before. Some of the speeds that they talked about made my head swim. One manufacturer told me that they are experimentally running some milling cutters at close to 20,000 ft. per min. in the machining of aluminum. He told me it was his understanding that peripheral speeds from 10,000 to 15,000 ft. per min. are regularly being used in the aircraft industry today and when these speeds will be applied to consumer products, we will get merchandise that will be better and cheaper than ever before.

The automotive industry has always been famous for its progress. I have been told that in 1936, for instance, Chevrolet Motor Car Co. spent upwards of $25 million for retooling the engine, transmission and rear axle for the 1937 model car. Hardly a bolt or nut was left unchanged from the previous job and brand new equipment was installed to produce the component parts. Of course, after this retooling job was done, mechanical changes made in the next few years were minor ones and the chief innovations were in body styling. On the other hand, considering the circumstances, this type of radical retooling is likely to be done on an industry-wide scale after the war. Already, the automobile manufacturers have begun to place conditional orders with the machine tool builders on an if, as and when basis.

Only a few weeks ago, Alfred P. Sloan, Jr., chairman of General Motors, made some statements regarding that giant's postwar plans. He told

industry that General Motors could be producing cars within three months after the close of the war and they could be in volume production within six months. He also stated that General Motors was prepared to spend $400 to $500 million for retooling and plant conversion to peace time production. This report is only one of several that have recently been presented to American business. If reports of this nature are an indication of what we can expect the moment peace comes, the future of America is certainly a bright one.

Undoubtedly we are facing a new world which will be practically retooled from start to finish and there will be a need for greatly improved machine tools. This is not only my personal opinion but it is the opinion of the great majority of manufacturers with whom I have talked.

More Precision

The second highlight in my conversation with these manufacturers was the great demand for finer precision than ever before. The word "precision" has been creeping into the vocabulary of everyone in the past few years and there is no doubt that almost all types of products will be promoted and sold on the merits that they are "precision-made."

We can soon expect that advertising and copy men will start to sell the consumer on products that are precision-made. A few years ago the sales appeal was "handmade," which was supposed to designate superior products. Anything that was handmade was palmed off as an exclusive or quality product. The same thing will undoubtedly happen to precision-made products and there is no reason why the machine tool builders should not shout from the house tops that precision machine tools are the granddaddy of all good consumer products.

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● Helping the buyer in his production problems and showing him how your latest equipment can reduce his costs and improve quality is the soundest basis on which machine tools can be sold in the postwar market.

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Who Is Mr. Thalberg?

• • • The author of this stimulating and bullish article on the future outlook of the machine tool market is a newcomer to the industry. Through his background of advertising and selling in the apparel field, he brings a fresh viewpoint to a gloomy situation. For six years he handled advertising and marketing activities of the United-Carr Fastener Co. and was at one time a part owner of an advertising agency handling accounts in the apparel field. He first had contact with the metal working industry as vice-president of Lee Metal Products Co., since dissolved. The Cosa Corp., with whom he is now connected, is an importer of some of the finest Swiss machine tools, notably the Société Genevoise (SIP) Swiss jig borers, Maag gear grinders, Mikron bench gear hobbers, Vaumard internal grinders, Bechler Swiss type automatics and several types of precision measuring instruments. Locally the company operates a gear shop where precision gears are manufactured for the aircraft industry. Cosa also represents many well known American machine tool builders on export sales.

A few years ago a thousandth of an inch was considered the ultimate but today ten-thousandths are considered commonplace. This high precision will not only lead to new speeds and production that was never dreamed of before but it will necessitate skill being built into the machines instead of depending upon the skill of the operators.

American industry has always looked for better equipment and it is up to every sales representative to consider himself a sales engineer in every sense of the word. A bond of the closest type must be established between management and sales and now is the time for the sales representatives to find out what industry intends to do after the war. Some manufacturers of special purpose production equipment are very optimistic and rightly so, but by careful planning and analysis, the entire machine tool industry as well can become just as optimistic.

Of course, if we are all going to sit back and have visions of billions of dollars' worth of idle machine tools, there is nothing left for us to do but to give up and go down for the proverbial third time. On the other hand, we would have a different viewpoint if every machine tool builder were to work up a basic merchandising plan with but one fundamental principle and that is: "How can I make my product fit into this postwar picture?"

The Cosa Corp., whose advertising and promotion I handle, deals only in high precision and high speed equipment. We are spending a tremendous amount of time and effort on our postwar plans. It is our basic belief that the application of our equipment is as important as the equipment itself and we are attempting to set up a service organization and are working more closely with our clients than ever before. We are preparing literature and information that we believe will be of great assistance to industry and our job at the present moment is to determine how our equipment will fit into the postwar planning of our customers as well as our prospective customers. We are fully aware that in many cases it is going to mean a great deal of effort to sell equipment, compared to what it took a few years ago. However, we do believe that equipment can and will be sold if it

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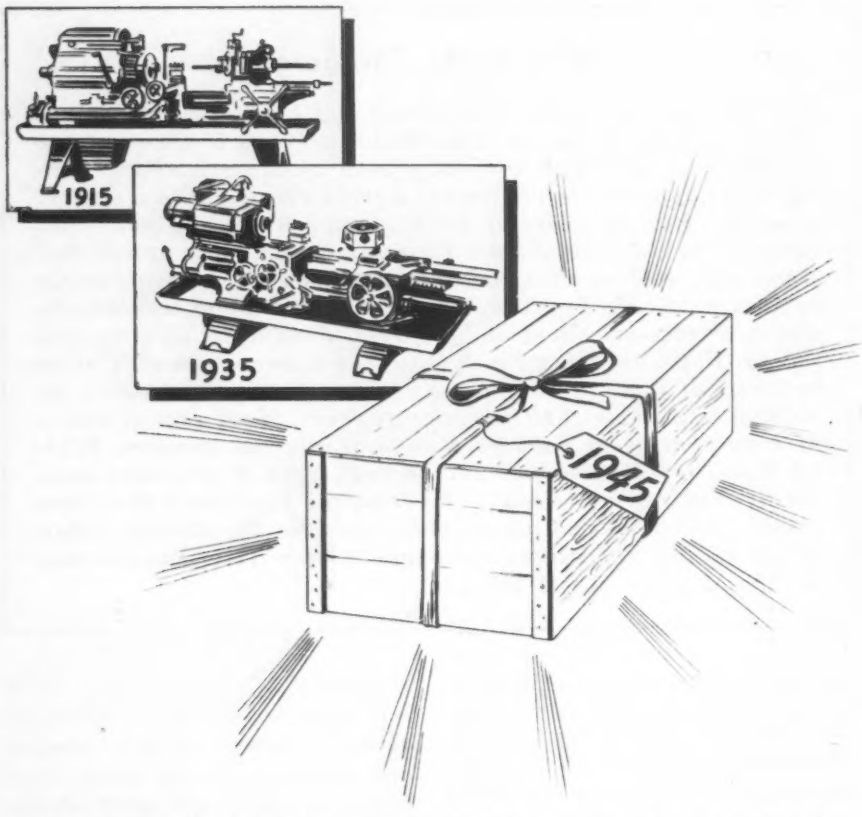

● In 1935, the selling price of a typical turret lathe was more than three times the corresponding 1915 model, but the average productivity was over 4½ times as much. Index of dollar of investment per piece produced dropped 37 per cent. Corresponding gains should be registered in postwar machine tools as a result of the developments in machining techniques made during the war period. In some instances, notably milling, advance in technique has outstripped that of the machines.

will out-perform previous equipment and the results will enable manufacturers to turn out products that are superior to anything they ever offered before.

We believe in a complete reporting job from our sales representatives since the basic duty of the sales representative is for him to understand and help solve the customers' problems. By this system of reporting we hope to constantly improve our equipment and build the good will of our company.

We can all look forward to the postwar era as the golden era of American industry, and improvements will be made in machine tools that were thought impossible a few years ago. This war has brought forth changes that were thought impossible and it is my opinion that in many instances we have merely scratched the surface.

Big Improvements Coming

By improvements in equipment I do not mean the rounding of corners, streamlining or using a new type of paint. What I am thinking of is putting to work some of the revolutionary changes that have been brought about by the war and these changes can and will make better machines that will turn out better products.

Several salesmen in the machine tool industry have adopted a stock method of selling and in many cases this has been successful but they must rid themselves of the mental hazard that they now have regarding the postwar era. Management must rid itself of any thoughts it might entertain that no more changes can be made. Competition is the life blood of any industry and this present war has a far broader scope than many of us realize. Political and economic writers are now talking about radical changes throughout the world. There is no doubt but that people throughout the world will want and need machine tools as well as consumer products. However, I do not pretend to be an economist and I leave that field alone, but I do know that there is hardly a manufacturer who will not listen to a story concerning a new machine tool that will allow him to turn out better products at less money. That appeal is fundamental.

The machine tool industry is a *great* industry. It has always been honest and can always hold up its head with the pride of its accomplishments. However, it must adopt the attitude of a service organization and fit its products to the needs of industry. The representatives of the machine tool industry must be endowed with a spirit of progress and research and every man connected with the machine tool industry must realize how important a part he will play in the postwar world.

Consumers are hungry for new and better goods and it is up to the machine tool industry to make the consumer realize that machine tools are

● Some advertisers of machine tools and machine tool accessories are already beginIndex of dollar of investment per piece produced dropped 37 per cent. Corresponding some answers to this question.

What will users want in POSTWAR Machine Tools?

1. VERSATILITY will be a primary requirement of many machine tools sold in the postwar period . . . but versatility achieved without sacrificing high production rates and low production costs. Following every war, old products become obsolete and new products are developed with startling speed. Manufacturers must have machines which can be quickly and easily adapted to new purposes.

the axis around which modern civilization revolves.

Many machine tool builders will resent my remarks since they believe that they have been very progressive and have formulated sound merchandising, promotional and advertising plans. True enough, many of these machine tool builders have started to advertise the products they are manufacturing but let them really search their souls and find out what they are doing toward planning the improvement of their equipment and toward creating a demand for their product in the postwar world. Right now, of course, we are concerned with first winning the war and second with tomorrow, but with the current trend in machine tool orders and shipments, more time is going to be available to set up certain fundamental selling and merchandising policies applicable to postwar markets.

Every man in business believes he owes an obligation not only to himself but to his fellowman and one thing we are sure of is that the machine tool business has always been basic to our economy in every respect. The obligations of the future are greater than ever and it is up to all of us to determine our place in the postwar era.

Philosophers have said that there is an answer to every problem and the postwar machine tool situation is no exception. The machine tool builders can pull themselves up by their boot straps, and machines will be designed that will out-perform anything we ever dreamed of but it is up to every machine tool manufacturer to find out *now* what is expected of him later on. This is the greatest task we have ever faced but it can and will be worked out for the mutual benefit of all concerned.

Steel Industry Insures for Future

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By ERIC N. SIMONS
Consulting Engineer, Great Britain

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THE war and the increased demand for technological skill and experience has made Britain's steel industry realize the need to provide for the future. The steel trade has survived acute depression and uncertainty, but one result has been a tendency, paralleled on a much vaster scale in less popular industries, for parents to discourage their children from making their careers in it.

This tendency has not been marked enough to be noticeable, but it was definitely there, and those who saw it growing became seriously concerned about it. They saw the banks, and accounting profession, the insurance offices, the teaching and medical professions absorbing more and more of the bright young men who should have been planning for the steel industry of tomorrow.

Not that this has been the fault of the steel industry itself, which has always sought to encourage its young men to train and fit themselves for higher posts. But in the years before World War II there was a disposition everywhere among parents to "play safe," and avoid committing their children to the adventure of a steel works career.

Whether enough was done to attract the young, even by the steel industry, is a controversial point that need not concern us. The point of interest is that the planners have been at work continuously since the outbreak of war, to ensure that Britain's steel will be in the forefront of technical development tomorrow, as it was a hundred years ago and is today.

As an example, the scheme developed by one of Britain's large steel manufacturers to encourage further education may be studied. Where students are taking a recognized study course—of two, three, or more subjects—which, in the opinion of the Works Education Committee is designed to improve their efficiency, this Corporation encourages them to greater efforts by paying flat weekly allowances.

These are arranged:

(a) for students of 14-17 inclusive recording 85 per cent possible attendances and students of 18-20 inclusive who do a course of either two or three evenings study a week, and
(b) extra allowances are given for passing examinations in both age groups, again depending on the hours of study put in.

With regard to the first group of allowances, attendance cards are issued to students, and the extra weekly allowance begins in January each year for students who have registered 85 per cent possible attendances in the fall session, and will continue for four months. The payment continues for a further four months in respect of attendances registered during the New Year session, and if the necessary attendances have been registered throughout the course, payment continues for another four months to complete the year.

In respect of the extra examination allowances, payment begins as soon as the examination results are known, and continues for twelve months. The allowance is paid monthly. All the payments are purely ex gratia, and are discontinued either, where it is shown that the student is not satisfactorily applying himself to his work or his studies; or, where service with the Corporation is terminated or the student is drafted to the Forces; or, when the student reaches the age of twenty-one.

Fees for the study courses are reimbursed by the Corporation in those instances where 85 per cent of attendances are registered. Where employees of any age are attending approved special lecture courses, for example on foremanship, steel manufacture, foundry practice and others, the fee for the course is returned where 75 per cent attendance is registered. Provisions for additional weekly allowances specified earlier do not extend to these lecture courses, however.

In special instances the cost of fees may be, and sometimes is, advanced on loan by the Corporation, and this concession is also extended to cover the provision of instruments where this is necessary.

Shift workers who are unable to transfer to permanent day-shift and are employed on afternoon or long night shifts are paid at time rates for

(CONTINUED ON PAGE 218)

Metallurgy

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By THOMAS E. LLOYD
Cleveland Regional Editor, THE IRON AGE

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FACED by the war needs for greater production with fewer standard materials, metallurgical developments during the past year were preponderantly along lines of more efficient use of substitute materials. Noteworthy was the advance made as the result of widespread and rather exhaustive investigations as to the proper uses and effects of boron additions to steel. This research with its consequent developments is destined to result in the regular utilization of boron-bearing addition agents in the production of steels of low alloy content with a high factor of hardenability and excellent mechanical properties and is one of the remarkable developments of this past decade.

Boron containing additions yield an increase in hardenability in the treated steel regardless of analysis or brand, provided correct quantities are used and the addition is made properly. The increase in hardenability of the finished steel varies with the type of steel being produced. Briefly summarized, the effect of boron containing additions on various types of steel are as follows:

Carburizing grades, up to about 0.25 per cent carbon:

In plain carbon steels the effects are mild.

In higher manganese and alloy grades, effects are more pronounced.

Medium carbon steels, ranging from 0.30 to 0.60 per cent carbon:

Depending upon the manganese content, the effect on plain carbon steels is marked but varying.

As indicated by the increase in hardenability and improvement in the tensile properties, the proper boron addition through the special commercial alloys is beneficial. The improved hardenability is accompanied by greater strength in critical sections either with an increase in ductility and toughness or at least without normal corresponding loss in these factors, depending upon the magnitude of the strength increase. While the addition of boron coarsens the grain structure slightly, this is usually counteracted by an increase in the added aluminum.

The improvement of the ratio of yield to ultimate strength is greater at higher tempering temperatures, but the improvement in ductility is greater when low tempering temperatures are used to produce high hardness values.

The use of special alloy addition agents with boron will, with varying effect, increase the hardenability of all grades of steel that have been examined thus far. The range of increase in hardenability, however, depends mainly on the base composition. The most beneficial effect on the mechanical properties of a given steel is in steels heat treated to high hardness levels. To get the maximum benefits from any property, the steels thus treated must be quenched and tempered.

The effect of boron, an excellent deoxidizer, when present in a steel in the form in which it can act, presumably in solid solution with the metal, is limited by the amount that the steel can effectively hold. The effect of too much boron is disastrous to hot ductility. About 0.002 per cent seems to be the most effective amount, and more than 0.003 per cent increases the difficulties in hot working until 0.007 per cent is reached and the steel becomes almost unworkable. The boron addition must be in such a manner that it is protected from oxidation or other chemical combinations and must be uniformly distributed through the molten metal. Thus, ladle additions are recommended, while mold additions appear to be quite impractical. Since the addition readily oxidizes, it must be added only to a completely deoxidized bath or be accompanied by enough strong deoxidizers to protect it until it is dissolved and dispersed through the steel.

Boron cannot be considered a cure-all for all difficulties encountered in steel production and may cause some secondary effects not yet observed. This, however, has not so far been noticeable. Boron steels can be forged, rolled and machined at least as readily as conventional alloy steels of the same carbon content and hardenability.

Some specific effect of boron additions are apparent. The addition of 0.007 per cent boron to the common types of steel makes the material hot short, resulting in broken billets and blooms when rolled. Addition of 0.003 per cent gives excellent hardenability, elasticity and strength qualities. As a substitute for nickel, chromium, manganese, molybdenum and vanadium within certain limits, this agent has proved quite satisfactory. In steels over 0.60 per cent carbon, there is sufficient inherent hardenability in smaller sections that boron is not required, but in steels ranging from 0.20 to 0.60 per cent carbon, the addition of boron is most beneficial.

In an examination of two grades of National Emergency steels, NE 9420 and NE 9440, an addition agent containing 0.5 per cent boron, 20 per cent titanium, 13 per cent aluminum, 8 per cent manganese and 4 per cent zirconium was made. The resultant increase in hardenability in both instances was quite noteworthy. The NE 9420 heat had an austenitic grain size of No. 7 after carburizing at 1700 deg. F. for 8 hr., and slow cooling. Test specimens, obtained by forging 3⅞ in. square billets into 1⅛ in. rounds, were annealed at 1650 deg. F.

1944 brought forth important developments that will not only materially advance the science and economics of the metal-working industries for years to come, but have laid the groundwork for more progressive and creative thinking in the future.

Hardenability was determined by end-quench tests on 1-in. round by 3-in. long specimens, normalized from 1650 deg. F. A Rockwell C hardness of 50 was evidenced at the point of quench contact for both treated and untreated bars, but the hardness pattern for the boron treated bar remained higher than for the untreated bar as readings progressed away from the quenched end. At 1 in. from the quench end, the treated bar had a hardness of 19 Rockwell C, while the hardness of the other bar was only 13 Rockwell C.

Similar investigations revealed the effects of temperature, holding time, reheating and other factors on the hardenability of both boron treated and untreated steels. There were indications from the examinations that treated steel has a higher yield point to tensile strength ratio with a higher reduction of area value than untreated steel. Also, within certain reasonable limits, the holding time at 1550 deg. F. does not effect the hardenability of NE 9440. However, the boron addition had a very marked effect in increasing the hardenability of NE 9440, at 0.42 per cent carbon steel, the increase being considerably greater than that obtained by the same addition to NE 9420, a 20 per cent carbon grade.

The major problem confronting the use of boron in steel production is in the analytical phase. No successful routine analysis procedure has been developed as yet and laboratory analytical methods have not been entirely satisfactory. Spectroscopic analysis at present seems to hold the lead, but there are some definite limitations to this. There are only three boron lines available for spectroscopic determination of boron in steel and all are close to iron lines. For low concentrations of boron, the 2497.73 A° line, which is close to the iron line of 2495.7 A°, is used. This boron line is superimposed on this weak iron line, and a boron-free sample is used in conjunction with the boron containing sample and allowances have to be made.

It is the belief of some leading authorities that the problem of analysis is different if the boron is added as part of a complex alloy rather than as a separate alloy. Thus, methods of testing the difference between 0.002 and 0.003 per cent boron may not be useful for percentages a tenth as great.

In such instances as these some authorities believe that tests for more minute amounts can be made only by examination of mechanical properties of the steel under certain methods of thermal treatment.

National Emergency Steels

If there were ever any doubts that the National Emergency grades of steel had come to stay, these inhibitions were completely dissipated during the past year. While NE steel post-war applications probably will

● Centrifugal casting in the foundry of the Ford Motor Co. of Canada.

not remain in the same categories as their present uses, forced by the exigencies of a war-time economy that has been pressed for steel alloying agents, the basic NE grades of steel will find many uses after the war and become standard types or grades.

This prediction is made if for no other reason than the fact that an immeasurable amount of time and energy has been put into the manufacture, treatment and application of these steels. Furthermore, however, many of these grades have proved to be excellent steels for specific purposes when handled right. After the possible initial swing-back to a rather promiscuous use of alloys after the close of hostilities, as witnessed in pre-war years, it is quite likely that the long range picture for the steel industry might be a settling down to a conservative alloy consumption and steel manufacture based on properties required for specific purposes rather than for wide safety margins, appearance or other reasons of the past.

The investigations of NE steels have dipped into every field in which they have been employed, including machining, forging, rolling and stamping, and into their manufacture and preparation for fabrication.

In a study of the heat treating characteristics of NE steels, considerable interesting data have been accumulated. NE grades from 8615 to 8749 have been found to respond readily to normalizing treatments machining in a manner similar to the regular SAE grades, except that for equivalent carbon contents the cycles for the NE grades can be faster. Carburizing grades can be annealed faster, with less tendency to form martensite as a result of too early withdrawal from the furnace at temperatures under 1000 deg. F. NE 8620, 8720 and 8817 carburize very similarly, with these grades being slightly more reactive to gaseous carburizing media rather than coke-charcoal type media. The carburized cases of these grades have some degree of malleability.

From a machinability standpoint, the NE grades seem to compare favorably with A.I.S.I. and SAE standard grades. The following substitutions have been made in various plants with little distinction in machinability between the standard and the NE grades: NE 8024 (manganese-molybdenum) for SAE 3115 (nickel-chromium); NE 8620 for SAE 4620 and SAE 4615; and NE 8720 for SAE 4820. An improvement in machinability was found in the substitution of NE 8720 for SAE 4815 and SAE 4620; and of NE 8724 for SAE 4820, a high nickel molybdenum grade.

High speed steel, cemented carbide and standard drills and milling cutters have all been used satisfactorily in machining NE steels. For high cutting speeds, emulsions of soluble oils are satisfactory for turning, milling and drilling. For low speeds as in broaching, reaming and threading, sulphurized mineral oils and mineral oil plus from 10 to 15 per cent fatty oil have been used. Cutting fluids should be at low temperature, applied in large quantities and at high velocities.

Possibilities and limitations of forging NE steels can be predicted with reasonable accuracy from experience in forging other steels. Because the alloy content of NE steels is lower than that of the steels they replace, forging properties are generally improved, while forging quality does not suffer to any great extent. Easier forgeability and readier flow to desired shapes of NE steels in the plastic state permit an increased variety of shapes in forged parts and because of these properties, modifications in shape without increases in weight and size often enhance structural strength of parts forged from NE steels. On the whole, better die life from NE steels permits closer adherence to tolerances and permits longer production runs.

Manganese-molybdenum structural steels in the NE 8000 series have been found to have forging characteristics similar to those in the T-1300 alloy series. They handle readily for various forging operations, with properties not unlike those of many chromium-nickel structural steels. The chromium-nickel-molybdenum structural steels in the NE 8000 series are the strongest NE steels, suitable where conditions of extreme service are encountered. Proper temperature control and careful handling, coupled with good design and proper fiber direction of these steels permit a favorable comparison in most cases with parts made from the original steels.

Likewise, fabricators and manufacturers delved deeply into applying the NE steels in the manufacture of various commodities. For example, an automobile manufacturer studied the application of these steels for use in the manufacture of truck parts. NE 8744 was used to replace SAE 3140 in the manufacture of spring cross shafts and to replace SAE 3120 and 3125 for spring clips and bolts. NE 8749 replaced SAE 4340 in a trial lot of rear-drive axle shafts, while NE 8620 was substituted for SAE 2512 in the manufacture of ball bolts. This latter product was copper plated to stop carbon penetration at the neck section during carburizing. The details of heat treating, carburizing, and handling of the new substitute steels were worked out completely so that the transition was without undue loss of strength or without a sacrifice of safety in the products.

Centrifugal Casting

The eyes of the foundrymen of the United States scanned again the broad principles of centrifugal casting that were outlined in 1809 in a British patent, as well as the subsequent developments in this field. This field has been a source of remarkable development during the very recent past, with more and more foundries attempting to solve the inherent problems of this metal forming process. The Watertown, Mass., arsenal for several years has been centrifugally casting molybdenum-vanadium steel into gun barrels in horizontal cast iron molds; railway car wheels have been centrifugally cast for many years; and more recently gears have been cast in sand molds.

There are three general types of centrifugally cast products, namely: (1) true centrifugal castings, made by pouring metal into a rotating metal die; (2) semi-centrifugal or profiled castings, made in dies, sand or core assembly molds where the inner surfaces of the castings are formed by cores; and (3) pressure castings, in which centrifugal action is used to force molten metal into the molds. The yields by such methods, due to the elimination of feed heads, risers, etc., are greatly increased, thus making the process attractive.

Centrifugal casting is currently finding widespread application in ordnance and aircraft manufacturing plants and the future promises continued expansion of this technique. Both ferrous and non-ferrous metals are cast in this manner. In addition to the greater yield, manufacturers have found that centrifugal casting gives sounder, denser, cleaner castings, it eliminates the use of cores and greatly simplifies inspection. However, alined to the advantages are several disadvantages to the process. There are limitations as to sizes and shapes adaptable to the process; the installation and maintenance of the machinery is high; and there is difficulty in changing the equipment to make a variety of castings as in jobbing work.

All centrifugal casting is in effect pressure casting, since the molten metal is forced against the mold wall under relatively high pressure by the

spinning mold. This gives better feeding, reduces shrinkage cavities and gas pockets and yields a denser metal. Also, as the centrifugal action tends to throw the denser, heavier components outward with greater force than the lighter particles, light non-metallics are eliminated by flotation inward toward the axis of rotation where they are easily removed.

The use of permanent molds, especially in non-ferrous castings, seems to offer the greatest advantages economically, with graphite, purchased in the form of electrodes for electric furnaces, being the cheapest material for this use. Graphite can be easily machined or bored to any shape, and graphite molds are the only ones that can be used with some non-ferrous metals containing high amounts of phosphorus, since these alloys burn into iron and steel molds.

Graphite does not change shape too much from heat shocks and its low co-efficient of expansion restricts change in size due to change in temperature. Semi-permanent molds, made from patterns, from which a very few castings can be obtained, is desirable when there are short runs. In non-ferrous work, fire clay has been used in place of sand. Baked core sand molds make good castings but increased costs result from the difficulty of removing the casting and sand, more time is required because of slower solidification, and it is necessary to clean the finished casting.

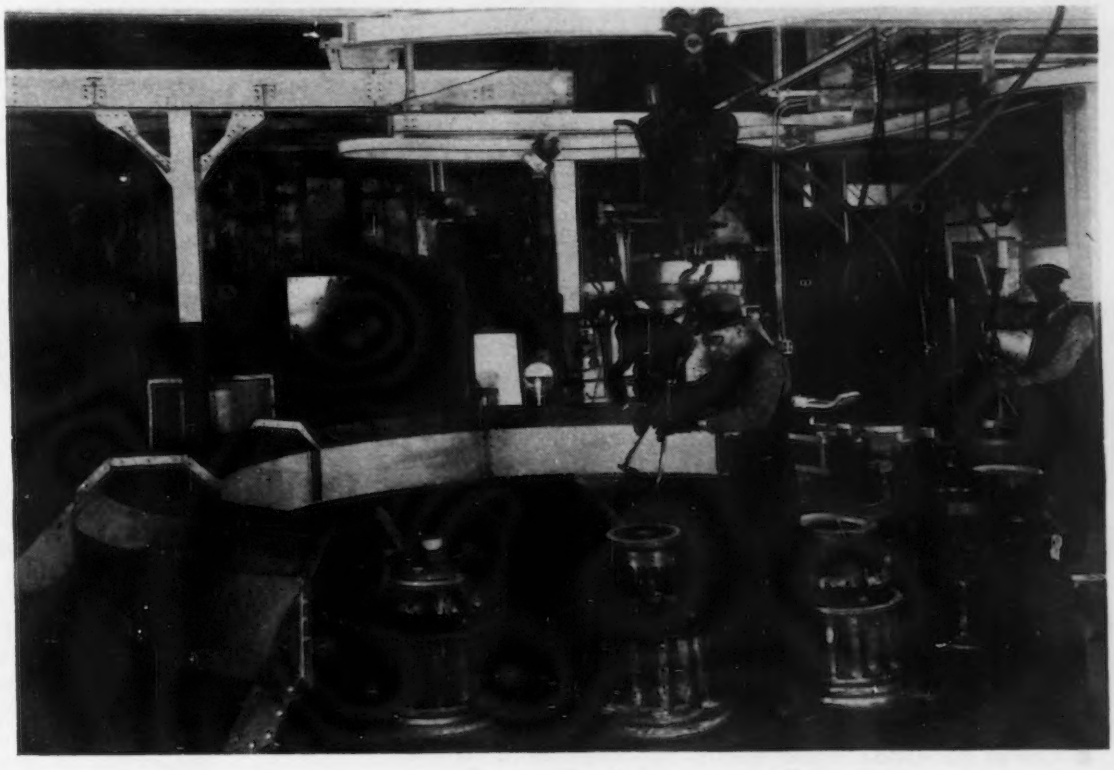
In a Canadian plant of an American motor car manufacturer, there is a centrifugal steel casting foundry that was designed from the floor up with the sole purpose of providing efficient auxiliaries to the spinning line rather than simply adopting spinning operations to equipment and facilities at hand. It is now being expanded, but upon completion will produce some 450 tons of steel castings a day, 175 tons of which will be spun castings. Technical and operating problems have been worked out at this plant quite satisfactorily, and the variety of types of products poured centrifugally is quite extensive. Vertical and horizontal dry sand molds are employed, as well as metal permanent molds. Runs on the permanent molds in several instances have been as high as 5000 casts without mold deterioration. Bren carrier sprockets are cast 13 deep in a vertical mold, aircraft cylinders are spun in horizontal permanent molds, universal carrier track pins spun in a dry sand core, gear clusters have been cast in dry sand cores centrifugally in an unsymetrical arrangement; brake shoes have been similarly cast; and a type of towing clevis bracket has been cast, several to a cast.

All told, the advances in centrifugal casting have been great during the past 12-month period, and the future for this method seems more promising daily. As experience is gained in the industry and techniques developed to the point where some of the smaller foundries can attempt the process with a fair assurance for success, the process will become more widespread and more generally used. Up to the present, only the larger and more economically stable businesses could withstand the expenses of research and development in this field.

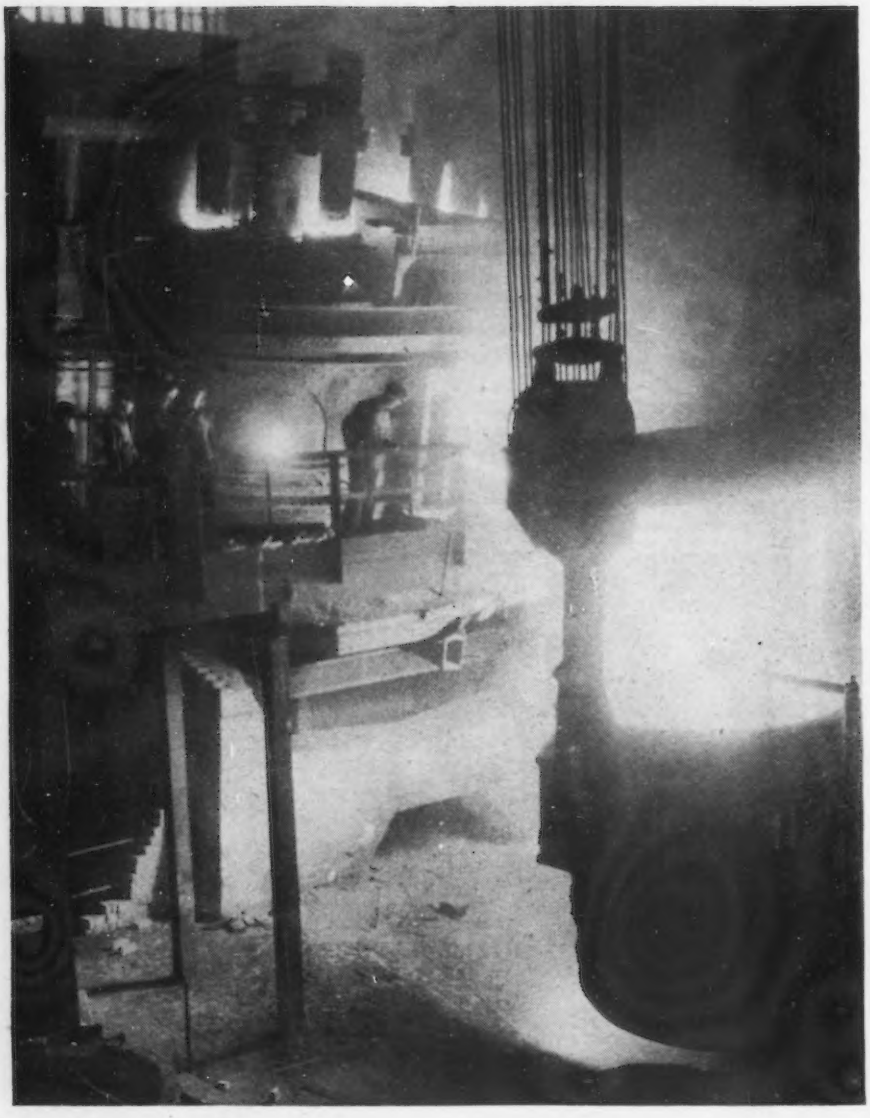
Powder Metallurgy

Powder metallurgy, a rapidly growing and comparatively new metal-working technique, has grown in stature during the past few years as a means for manufacturing finished and semi-finished products. The method of compressing metallic powders in dies and heating the resulting compacts to temperature below their melting point to obtain products of desired shapes offers raw material savings, the elimination of scrap or excess metal, savings of machine tool and labor costs, and certain definite inherent advantages in the composition of the finished physical product.

The types of metallic powders that are pressable are extensive, but the powders used on a large scale are almost invariably the product of the reduction of metal salts by gases, electrolysis, or by atomization. The powders must show definite physical and chemical characteristics in order to be suitable to powder metallurgy, the main characteristic being purity. Impure powders cause problems that cannot be readily solved by the users



● Centrifugal casting of gear blanks.



● One of the world's largest electric furnaces pours a 100-ton heat of steel at the plant of Timken Roller Bearing Co.

of metal powders and some metal powders require an absolute clean surface of the particles in order to get ductility and tensile and sheer strength in the finished part. Generally, metal purity is above 99 per cent in powder metallurgy, with such powders as tungsten running 99.99 per cent pure.

Compressibility of powders is also important, as is the apparent density of the powders. The density is usually the deciding factor in establishing whether or not powder metallurgy can be applied in the manufacture of a given product.

Many types of small parts are now being made by this powder metallurgy technique, and tolerances can be held as close as 0.001 in. Various combinations of metals, non-metals and non-miscible metals are possible. Among the powder metallurgy parts now being made are gears, bearings, screens, filters, contact points, copper-carbon brushes, radio parts and various brass, steel and aluminum parts.

As powder metallurgy is still an art in which science lags behind the practice and application, there are still many problems in manufacturing technique that are unsolved. However, the research that is being carried on by various manufacturers, technical organizations, research institutes and colleges promises some major if not startling developments along these lines.

Different methods of molding powders to solid parts are: Cold pressing and sintering, frequently followed by sizing operations; hot pressing into final shape by pressing and sintering; and metal working old cold pressed and sintered blanks.

In deciding whether or not it is economically feasible to make given parts by powder metallurgical processes, there are certain basic requirements or conditions to be met. The part must be one that is widely used, because dies for molding powder parts are costly and the full die life must be realized in production if low costs are to be obtained. Parts should be simple in design and free of re-enterant angles. Parts must be small so that high unit pressures can be attained without exceeding capacity of available presses. Dimensions in the direction of pressing should be kept thin, held, if possible, to ½ in. in thickness or less. Thicker parts may introduce pressure differentials through the piece with warpage occurring during sintering. Wide variations in section of any one piece may cause warpages in sintering because of the differences in shrinkage. Metals with oxides difficult to reduce should be avoided.

Some of the developments during the past year covered the use of iron and aluminum powder molding techniques, as well as the process of alloying that takes place during sintering and annealing of pressed metal powder. In one group of experiments, sponge iron and iron powders of two grades, a coarse and a fine, were processed in three different ways. Sintered sponge iron showed a density of 75 per cent of normal for low pressed compacts, but this was improved by second pressing. Coarse compacts reached densities of about 98 per cent, being twice pressed at 50 lb. per sq. in. and twice sintered 2192 deg. F. for 1 hr. Hardness values for singly pressed materials were very low, but after twice processed, yielded Brinell figures between 65 and 80. Materials after second pressing showed Brinell hardnesses over 100. Tensile data for single process material was 4000 to 5000 lb. per sq. in. and double processing could better this only a little. Strained re-pressed electrolytic powder showed substantially higher values. Sponge iron twice sintered showed a superiority both in yield and ultimate strength. Tensile data of 38,000 lb. per sq. in. for hydrogen reduced sponge iron approached standard values for fused and annealed electrolytically produced iron. Average tensile values of 56,000 lb. per sq. in. for sponge iron compared with 48,000 and 43,000 lb. per sq. in., for fine and coarse electrolytic powder compacts, respectively.

Aluminum powder has not been employed extensively in pressed powder art because (1) it oxidizes readily, forming a film of highly refractory oxides that is likely to interfere in powder metallurgical work; (2) during compression, aluminum and alu-

minum-alloy powders tend to adhere or cold-weld to die walls; and (3) aluminum-alloy powders are harder than elemental aluminum and have some susceptibility to age-hardening. Atomization is considered the best method of making the powders, permitting wide ranges of particle sizes and is adaptable to safe, large scale, and economical production.

To prevent cold-welding to the die, some success has been achieved in lining the dies with flat-lying, overlapping metal flakes of bronzing powders, suspended in a volatile carrier such as carbon tetrachloride, applied to the walls by spraying. Fatty acids or a soap added to the carrier has been found to reduce the ejection pressure considerably and eliminate lamination.

Aluminum and aluminum-alloy pressed specimens produced were found inferior to analogous wrought or cast material, being low in ductility. However, several grades of atomized elemental aluminum powders pressed at high pressures yielded specimens with properties approaching those of wrought annealed commercial alumimum. By mixing alloying elements in the powder, the desired alloys were formed during the sintering operations.

Specimens examined were sintered for 30 min. at 1150 deg. F. in air. The furnace time required an additional 14 min. heat-up and 15 min. cooling period, permitting the temperature to drop to 950 deg. F. Cold water quenched specimens showed that particle size had slight effect on tensile strength, but fine powders showed poor flow characteristics, abraded the die and tended to be forced between the die wall and the punch forming fins. Commercial results can be attained with pressures between 50 and 60 tons per sq. in.

Various combinations of aluminum with copper, magnesium, manganese and other alloying elements were tried, under various conditions. Sintering in nitrogen and air as well as in hydrogen showed that the applicable sintering atmosphere depended largely on the alloy combination. On the whole, the development of powder metallurgy of aluminum is not yet as far advanced as the powder metallurgy of other metallics but work is progressing in this field.

Electric Furnace Steel

Electric furnace steel production came up for organized discussion by the American Institute of Mining and Metallurgical Engineers for the first time on Oct. 1 and 2, 1943, when the first annual conference of the Electric Furnace Steel Committee of the association met in Pittsburgh. One of the main points of discussion of the meeting was the progressive growth of the size of the electric furnace during the past 25 years, averaging 6 tons per furnace in 1918, while today the standard furnace is of 70 tons capacity. This has been possible by developments in design and construction, improved electrical equipment and better furnace controls. However, such experts in the field as Samuel Arnold, of American Bridge Co., and N. C. Stansel, of General Electric Co., expressed the belief that electric furnace size would continue to increase, with important advances being made in design, improved feeding and charging systems, better circuit breakers and power swings, more satisfactory power surge control and finer regulation equipment. Furthermore, many operations in electric furnace practice will be made standard, and, in some instances, automatic by the development of all around better electrical equipment.

Operating techniques in electric furnace steel production likewise will come under better control and, as a result, become more standardized. Instead of each electric furnace plant handling production in a manner that is believed best suited to circumstances, standard techniques that will vary only minutely to accommodate a given set of circumstances will become possible.

The electric steel industry has had more than its share of headaches resulting from the many problems in its increased dependence upon war industries to properly handle and seggregate scrap. First, for many months it was difficult to keep a sufficient supply of any kind of scrap on hand, but as time went on the available scrap quality continued to deteriorate. Scrap allocations by WPB were not at all unusual during the

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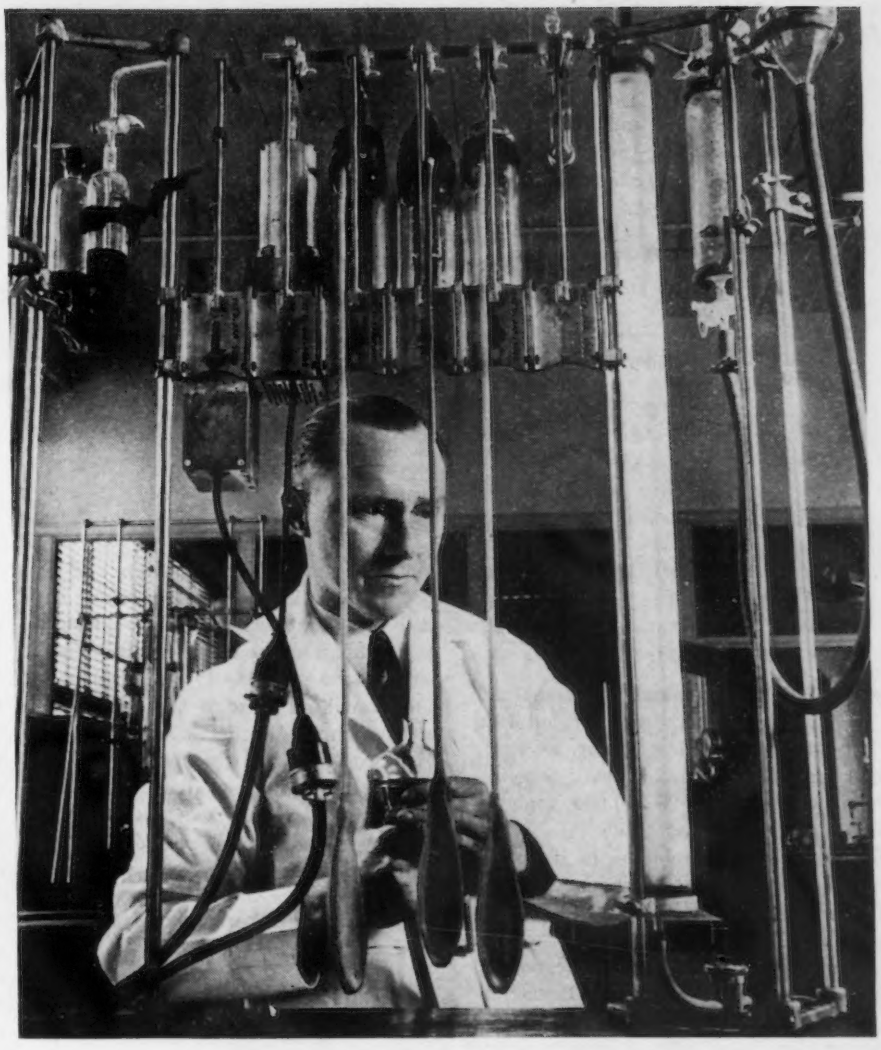

● Analyzing gas taken from a carburizing furnace to assure proper balance in order to secure optimum physical properties during heat treatment.

Welding

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By FRANK J. OLIVER
Technical Editor, THE IRON AGE

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THE tremendous amount of welding done in shipbuilding during the last year, while it has undoubtedly made the achievement of building 20,000,000 tons of merchant shipping possible, has brought serious problems in its wake under the stress of emergency conditions. On the fateful night of January 16, 1943, the "jacknifing" of the tanker Schenectady as she rested at the outfitting dock at Portland, dramatized the problem of residual stresses in large welded structures, a problem far from solved at year's end. In fact, additional failures since the Schenectady, though less widely publicized, have tended to confuse the causes and practical measures of solution.

In its report on this failure, the subcommittee of the American Bureau of Shipping laid most emphasis on what it believed to be an accumulation of internal stress locked into the structures by the processes used in construction. It immediately recommended close adherence to proper established procedure, particularly as to welding sequence. Of course, there were many other factors involved. The tear actually started at a badly undercut manual weld at the abrupt (square) end of the curved bridge fashion plate—a perfect stress raiser. This was augmented by the hogging stress due to a poorly ballasted condition which set up a stress of 9000 lb. per sq. in. in plate that was proved to be substandard quality. Add to these adverse conditions a sudden drop in temperature from 38 to 23 deg., aggravated by relatively warm (40 deg.) river water and have that cold wind hit the weak side of the ship and all that was needed was a slight shock to start a tear and propagate it across the deck and down both sides, touching none of the transverse butt welds. An earth tremor supplied that shock at the stroke of 11 p. m. It all happened so fast that not a drop of water was taken in the split open tank since the shell bottom plates knuckled above the river level.

Two Tanker Failures

The Schenectady was the first tanker to be built at Kaiser's new Swan Island shipyard at Portland and it is not surprising that the committee found that "for the laudable purpose of speeding up construction the yard had departed from the fundamentals of good welded construction" and that, like other West Coast yards, there was an insufficient number of trained personnel and of skilled welding supervisors. The design was identical to that of tankers built by a well-established eastern yard which up to that time had built 23 such vessels without a failure. Yet before the year was out, the tanker Esso Manhattan, a product of that yard, broke smack in two in New York harbor, proving, if nothing else, that even in an experienced yard the know-how which undoubtedly exists at the top simply cannot be spread down the line fast enough to newly upgraded supervisors and the newest welder on the ways. Like as not that welder may conceal a shock of curls under her helmet and probably took over, after short training, a job vacated by Joe Gilch, lately inducted into the armed forces.

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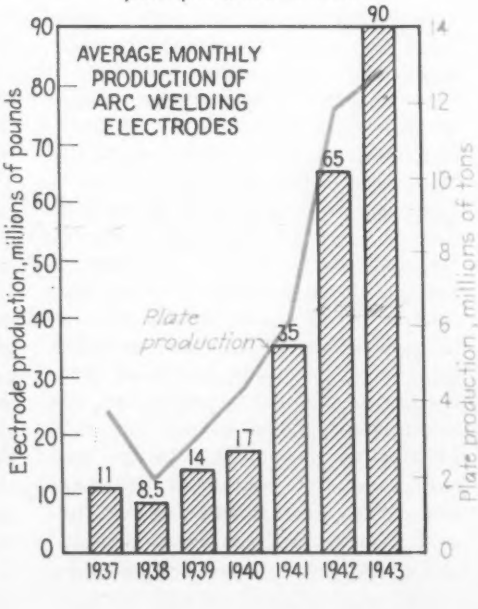
ELECTRODE production got in step with plate production in 1943.



Automatic fillet welds were put on the spot too by the Schenectady failure and have since then been ruled out for gunwale connections by the A.B.S., the Maritime Commission and the Navy Bureau of Ships. Meanwhile, the amount of footage of automatic butt welds made in subassemblies and in connecting bottom tank assemblies on the ways has not been curtailed but has increased through the year in the interests of both speed and quality. There was no doubt that the automatic weld joining the deck stringer plate and the sheer strake (upper side plate) of the Schenectady was defective, probably due to an inexperienced operator. Aside from the longitudinal crack it had in its center, there were minute transverse cracks in the weld, a fairly certain sign of the presence of excess sulphur in the plate.

In fact, there was a general complaint in West Coast yards at that time of poor plate, particularly laminated plate, and the criticism has

. . . Although the number of structural failures has been low percentagewise, there have been enough in the past year to cause considerable concern to the entire welding industry. Because the effects of thermal stress in large welded structures are as yet unpredictable, a number of research projects have been started with the idea of exploring basic metallurgical and physical phenomena occurring in arc welding as well as more direct attacks on the problem in the shipyards themselves.. To the controversy between the merits of a.c. versus d.c. arc welding, labor has added its voice. New phases of gas cutting and resistance welding are also noted in this review.

not yet died. Discovery of occasional plates with sulphur and alloy segregations has been reported in many yards. Usually such defects show up at the cutting tables. Heat of the torches has opened up laminated plate like a sandwich and in one case resulted in a fracture transverse to the line of gas cutting, for no apparent reason. Some welding engineers maintain that plate rolled on strip mills does not come up to the quality of material rolled on conventional plate mills. They say that often too great a reduction is made in a pass, not only helping to build up terrific internal strains in the plate but also overstressing the roll stands. A rapid rise in the number of roll stand fractures (repaired by welding) seems to bear out this contention. Shipbuilders in general and the A.B.S. report on the Schenectady in particular stress the low impact values of structural plate, which is accentuated at low temperatures. The breakage of a Liberty ship in Alaskan waters a little over a month ago could well be attributed to decrease in impact values of steel at temperatures below 25 deg. F.

Here again, working against time under emergency conditions has chiefly been to blame for reduction in quality of steel plate. Plate production rose 93 per cent in 1942 over 1941 and registered an additional gain of 7½ per cent in 1943. There was a time when the Maritime Commission was asking for practically the entire plate output of the country. When the extreme pressure on plate deliveries is off, it can be presumed that complaints as to plate quality will subside and welding difficulties may be ironed out also.

Many troubles result from welding in cold weather. The temperature gradient is higher and the notch sensitivity of the plate itself increases. Charpy impact values are often one-quarter those prevailing at summer temperatures, yet oddly enough, the record of southern yards is no better than northern yards. In fact, the yard with the highest percentage of failures is one on the Gulf Coast. Ships made in southern waters may fail in cold water before the locked-in stresses can be worked out by mechanical weaving of the ship in a seaway. In fact, in the 20 to 30 instances where ships have failed, it was almost invariably in the early days of their careers. After a month or two at sea, a welded ship can take a torpedo or two in the belly and still get home.

Fortunately, all but two of the ships that have had structural failures have been rewelded and put back into service. The J. L. M. Curry, built by the Alabama Drydock & Shipbuilding Co., Mobile, encountered structural difficulties at sea last March and was sunk by gunfire to keep it out of enemy hands. The Thomas Hooker, built by the South Portland (Me.) Shipbuilding Corp., was lost in the same month when she came apart and was abandoned at sea.

Proper Welding Sequences

Meanwhile, every effort is being made to solve the perplexing basic problem of residual stresses in large welded structures. From a practical point of view, the first point of attack is through welding procedures

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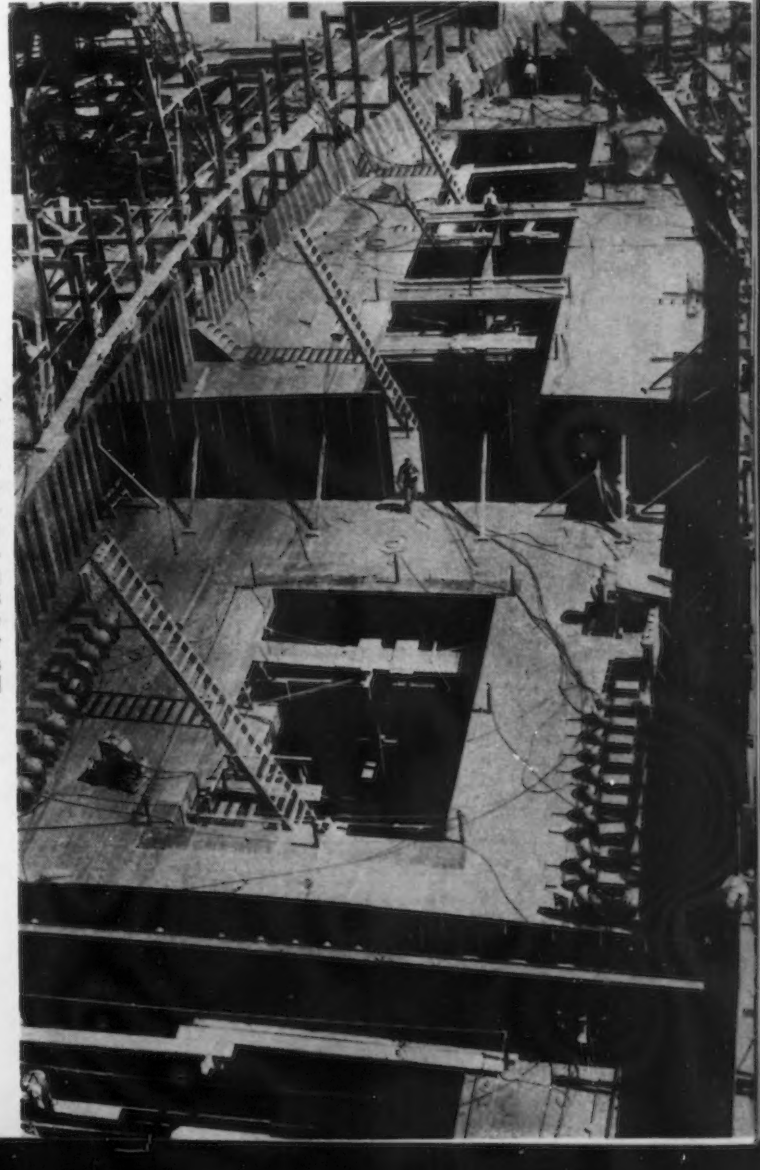

LINED up like suckling pigs are two batteries of single operator d.c. welding machines on the deck of a cargo ship under construction at the Seattle-Tacoma Shipbuilding Corp. yards. This company has gone far in working out welding sequences to minimize residual stresses.

Lincoln Electric Co. photo

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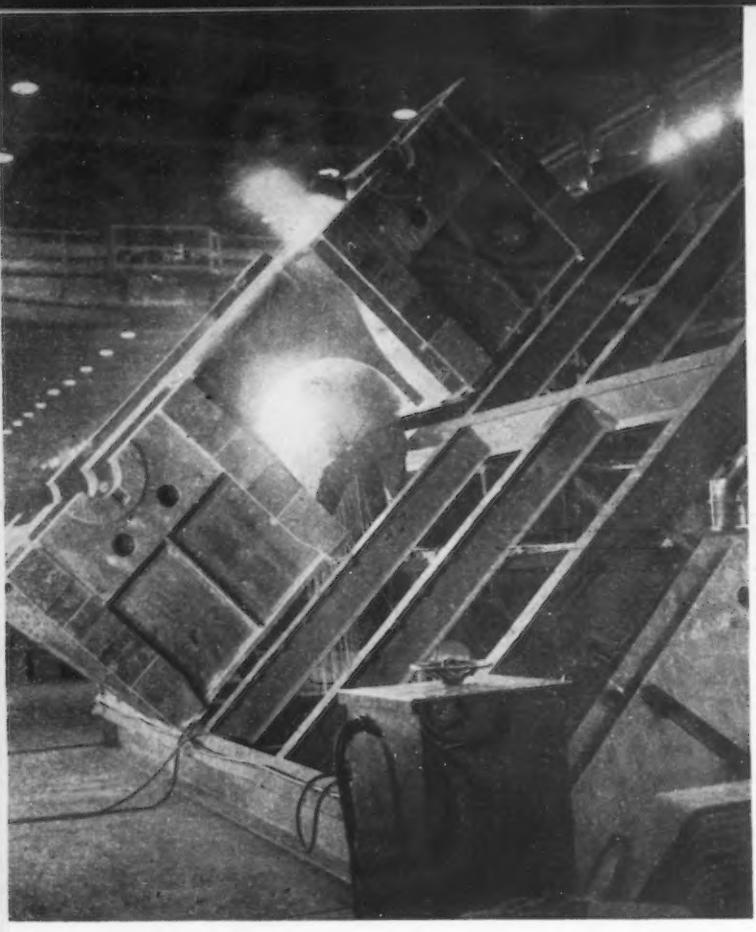

ON heavy structures like this marine gear reduction case, a.c. arc welding is favored since it facilitates getting the arc down into deep corners. The jig shown provides for positioned fillet welds.

and sequences planned to minimize shrinkage stresses as much as possible. In the main, the principle involved is to permit freedom of movement of at least one unit of plates or assemblies being butt welded together. If both members are constrained, sufficient stress may be set up to fracture the weld upon cooling. Carrying out this principle 100 per cent is difficult of achievement in a structure as complicated as a ship but M. Q. Cellers, in his article, "Control of Residual Stresses Through Welding Sequence," THE IRON AGE, Sept. 2, 1943, has come as close to meeting the basic conditions of stress-free welding as can be met in practice. The Maritime Commission has also issued a set of instructions on welding procedure.

The most serious cause of locked-up stresses occurs when closing welds are made on big assemblies that are not free to move. In making the final closing butts, the use of small electrodes and low heat in order to keep down the contraction effect has been suggested. Cascade, skip and similar procedures are also used, followed by peening. Another factor is residual stresses left by thermal differences within the plate. Most investigations made in recent years have added up to the fact that major stresses are obtained near the weld, regardless of the procedure. As has been mentioned, heavy rolled shapes and plates have a terrific amount of residual stress in them, right up to the ultimate strength.

Stress Relieving

In welded machine bases, artillery gun mounts and similar units that can be handled by crane, stress relieving in a furnace at 1200 deg., followed by a slow cool, practically removes all internal stresses. Of course, this procedure is not applicable to ship hulls, although it may be used on stern posts. Preheating is another method of reducing the internal stresses, since the heat differentials are minimized. This procedure is widely used in welding hardenable steels in power plant pipe work. Improper preheating, on the other hand, can also generate large stresses on its own account and is hardly to be recommended in shipbuilding. By the same token, improper use of flame straightening techniques, involving local heating and quenching, can also set up shrinkage stresses if overdone. Parenthetically, it should be noted that the consumption of acetylene for this purpose increased in the past year.

Probably the most widely used tool for stress relieving welded vessels is mechanical peening. Although the final stress is indeterminate and the manhours required adds to the cost, it is contended by some that in the long run the overall cost is lower.

Basic Research Planned

Meanwhile, an elaborate research program has been outlined on the general subject of residual stresses. The Welding Stress Committee of the Welding Research Council, composed of 28 top ranking welding engineers and metallurgists, has divided the basic problem into four interrelated stages of investigation, the first dealing with phenomena causing thermal stresses, including the effect of plastic deformation against cold restraints and a study of heating and cooling phenomena, both above and below the the transformation range. The second phase deals with measurement and evaluation of thermal stress patterns. A third investigation will attempt to determine what are the usable physical properties of a structure preloaded by thermal residual stresses, while the fourth phase will cover the behavior of steel and other metals under multiaxial stress fields. Some failures have occurred when nonplastic deformation (brittle fracture) is present, indicating triaxial tension with no opportunity for concurrent compression to take place at right angles to the principal stress.

The committee believes that it is useless simply to weld a piece of steel and measure the stresses because so many variables are involved in each weldment that the knowledge obtained on one piece cannot be extended to general cases. Hence a concerted attack on all the different pieces of the problem is planned, although this approach is so involved and so lengthy that the emergency may be past before a full report of results is available.

In the meantime the War Department has started a big research project at a West Coast university out of which they hope to get some quick answers by a frontal attack on the practical aspects of welding. The Army is more interested in locked-up stresses in armor. Massachusetts Institute of Technology is also making some investigations on its own of a more fundamental nature.

Controlling Weld Ductility

Meanwhile some of the groundwork mentioned above has already been laid, particularly with relation to the problem of heat flow from the arc and the resultant hardness obtained in the heat affected zone of the plate. Two separate approaches have been made on this problem, one by a group

of Lehigh University and the other at Rensselaer Polytechnic Institute, and while each tackled the problem from a different angle, the end data check very closely. The Lehigh group has worked out a tentative system for predicting and thus controlling ductility in weldments by relating the ductility to the Vickers hardness number in the heat affected zone. The hardening response of any given analysis of steel is measured by a modified Jominy test and the ductility is determined by slow notch bend tests made on specimens treated over a wide range of hardness.

With a 3-in. test bar heated to 2100 deg. F. and drastically water quenched at one end and air cooled at the other, there will be a complete range of hardness from maximum to minimum along that bar. If the maximum hardness obtained experimentally with hundreds of welds is matched with the corresponding hardness on the Jominy bar, then for any given hardness the cooling rate in the weld corresponds with the cooling rate in the bar at the same point. Actually, each combination of welding conditions corresponds with a position on the Jominy bar, measured in fractions of an inch from the end.

It follows therefore that any combination of welding conditions (joint thickness and design, initial temperature of metal, current voltage and are travel) corresponds to a single Jominy position. For example, a butt weld between 1-in. plates, welded at 75 deg. F. with 175 amp. at 28 volts at the rate of 6 in. per min. corresponds with a Jominy position 7/32 in. from the quenched end, regardless of the type of steel being welded. Tabular data relating volt-ampere factors, welding speed, plate temperature and "geometry" factor have been published by the American Welding Society so that it is possible for any welding engineer to apply this system, the only laboratory equipment necessary being a simple Jominy end-quench fixture and a hardness tester.

At Rensselaer, arc voltage, current and travel speed are grouped into a single factor, namely energy input in joules per inch of weld, as a factor in determining cooling rates. The other factors involved are plate thickness, plate temperature and joint geometry (butt or fillet weld, etc.). In these tests, the actual cooling rates were measured by thermocouples placed in the heat affected zone of the weld, then mathematical formulas were devised for predicting cooling rates in some new material after tests are made at only two temperatures. In applying the Rensselaer system, it is necessary to have Jominy test bar data on the particular steel available and also an isothermal transformation diagram, commonly known as an S-curve, from which the desired type of microstructure can be selected.

In order to determine the resultant ductility, it is necessary either to test a sample weld, using welding conditions selected to give a particular microstructure or to make use of hardness-ductility relationships involving notch bend tests already established by the Lehigh University program. Of the two systems, the R.P.I. one is the more complicated and is likely to appeal more to the metallurgist who is interested in digging deep into basic phenomena. As has been indicated, however, the professors and the researchers have grabbed the ball on this welding stress problem and the fruits of their work should eventually be translated into practice in terms of welding procedures.

One of the fundamental principles for the avoidance of cracks in welds in hardenable steel is to temper the structure before the heat-affected zone has dropped much below the martensite forming range. It is well known that with a cascade system, the heat of the succeeding pass can temper the preceding pass and help prevent cracking. The Rensselaer group has worked out an equation for calculating the maximum allowable time between passes but in its present form the solution is beyond the mathematical ability of most practical welding men. Some general principles have been deduced from these laboratory tests, such as the fact that larger electrodes produce lower cooling rates, probably due to the difference in the amount of metal deposited. Incidentally, the cooling rate data obtained in the R.P.I. tests have been found to be equally applicable to a.c. and d.c. welding.

Appropos of studies in hardenability of welds, an Ordnance Department official recently revealed that the Army has been experimenting with the use of ferritic electrodes on armor plate welding due to the shortages of molybdenum, nickel and chromium ordinarily used in austenitic rods. It is too early to say what results will be under actual service conditions. However, the problem is being aggressively investigated by research agencies both within and without the Ordnance Department.

A.C. Versus D.C. Welding

This brings us to a consideration of ac. versus d.c. welding, still a controversial subject. With but one notable exception, however, most welding equipment suppliers have been advocating a.c. welding in their advertisements in the past year, emphasizing the absence of magnetic blow on heavy weldments and the ability to get down into deep corners with an a.c. arc; also the lower maintenance costs of a.c. transformers and low idling losses of such equipment, a factor not to be overlooked when considering the usual duty cycle even in production welding. Use of capacitors for power factor correction and the low demand rate has enabled a few shipyards to add a.c. equipment in areas where

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TRACTION bars being welded to the floor plates of tank-carrying invasion barges by a.c. arc welding at the Maywood, Cal., plant of the Consolidated Steel Corp. General Electric a.c. welders are being used on this job, with type W-25 (AWS E-6011) electrodes, an all position a.c. rod that is being extended in use.

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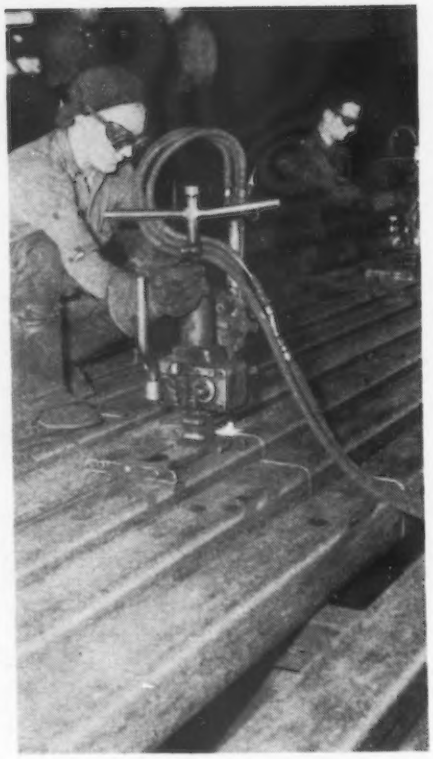
power lines were already at their limit. However, the fact that the yards in general were pretty well equipped, mostly with d.c. equipment, at the beginning of 1943 has limited wider adoption of a.c. machines in that field, except for automatic submerged melt welders. Incidentally, some years ago initial installations of automatic welders were powered from M-G sets and in recent months competitive equipment has appeared using two M-G sets in parallel as the source of power.

The Safety Angle

Open-circuit voltages of a.c. equipment are normally around 80 volts and in extremely hot weather, where perspiration in heavy protective garments is a factor, or in wet weather on shipways, shocks, burns and very occasional fatalities have occurred. Because of a rainy day accident at a Brooklyn yard, "Local 13 News," published there by a unit of the Industrial Union of Marine and Shipbuilding Workers of America (CIO), featured an editorial in its Nov. 16 issue, headlined "The A.C. Welding Machines Must Go." Citing an example of a welder who broke his nose when an overzealous rescuer yanked him from a "hot" line, the paper stressed the weather angle (this man was ankle deep in a puddle) and called attention to the fact that there is many a "4F" classification man employed in the yards these days. The editorial stated that a nationwide campaign was about to be started by the union to get rid of a.c. machines in every yard in the country.

The equipment makers are not unmindful of these hazards. Over a year ago a device was placed on the market for use with a.c. welders so designed that when the operator breaks his arc the primary circuit is instantly broken and a green light flashes on, indicating such a safe condition. Two a.c. welders incorporate a relay that automatically cuts the open-circuit voltage in half when the arc is broken. Yet when the electrode is touched to the work again, full voltage is restored to get the arc established quickly.

In 1943 the first really all-weather a.c. welder was introduced that will function safely in a downpour. Furthermore, when the welder is idling, a control disconnects the welder from the primary line, leaving only a control circuit voltage (35 volts) on the welding lead. This control restores full power to the welder in a few cycles as soon as the electrode is touched to the work. It has the added advantage of reducing the no-load input to less than 1 kva., resulting in a big reduction in the maximum demand where a large group of a.c. welders are operating. This welder has built-in capacitors for power factor correction, as do most big a.c. units. Control equipment intended for the same purpose is also available from an independent controller manufacturer. The only disadvantage of such protective devices is that the voltage drop inherent in long leads renders them inoperative on excessively long lines. While feasible on secondary leads up to 400 ft., which is about the practical limit in merchant shipyards, the system fails on 600-ft. leads, which is a Navy Department requirement.



Linde Air Products photo

PORTABLE, oxy-acetylene bar-cutting machines of this type are being used in various mills to square the ends of rolled bars, to remove etch-test specimens, to cut bars or billets to length for shipment from the mill. The machine is positioned directly on the material to be cut, whether it be round or square bars, and the cutting blowpipe is automatically guided across the bar by means of a swinging mechanism which is actuated by a self-contained hydraulic power unit.

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E-6011 Electrode

On indoor installations, complaints on the safety score are much fewer and there have been some notable a.c. installations made for welding diesel engine bases and heavy duty earth-moving equipment. Extension of a.c. welding in fact has been speeded up by the wide acceptance of the AWS E-6011 all-position a.c. electrode which most suppliers are now offering. This was one of the big developments of 1942. Although the physical property specifications for the deposited metal are the same as for the class E-6010 rod with cellulostic type coating, according to published tests the physicals of the deposited weld metal from the class E-6011 electrode are slightly better than for the corresponding reverse polarity d.c. rod. Its comparitively high yield point and ultimate strength, plus high elongation, make it well suited for joining many types of high tensile, low alloy steels. The fact that the top range of sizes in which the class E-6011 rod is available has been increased from 5/32 to 3/16 in. has promoted its application to heavy work on which a.c. electrodes are particularly advantageous.

At the other end of the scale, in a.c. arc welding of thin gage aircraft tubing where the current must be kept low to avoid burning holes in the metal, the tendency of the arc to be extinguished as the voltage wave passes through zero has been overcome by a new stabilizer recently announced. The device, which is built into an a.c. welding unit, imposes a high voltage, high frequency current on the regular welding circuit. The oscillatory circuit is set up by a spark gap and suitable inductance coils and condensers to give the inductance and capacitance for circuit constants. This high frequency current keeps the air in the arc gap ionized and assures continuous passage of the welding current. This tendency for the arc to be quenched does not occur with d.c. and there is one set on the market that uses vacuum tube rectifiers to convert 3-phase a.c. to d.c. for welding with low voltages and amperages.

Use of "Hot" Rods

Use of the heavy mineral coated "hot" electrodes, class E-6020 and E-6030 has been extended in the past year, particularly in connection with the deep fillet welding technique now advocated by most welding equipment makers. The higher amperage and deeper penetration possible with this type of electrode not only makes for faster deposition of weld metal but less rod consumption per foot, since more of the base metal is melted and equivalent strength of joint is obtained with a smaller fillet. California Shipbuilding Corp. has been able to reduce the manhours expended on fillet welds from 37½ to 45 per cent and to reduce electrode consumption

by 25 per cent ("Deep Fillet Welding in Ship Construction," THE IRON AGE, Sept. 30, 1943, p. 46). This technique has been the subject of continued claims as to who first thought of using a high angle position of the rod with the coating practically dragged along the plates. It has received approval from the Maritime Commission, the American Bureau of Shipping and Lloyd's Register of Shipping, but has not yet been given the nod by the more conservative Navy Department. Incidentally, Calship found that deep fillet welds made with a.c. are superior in strength to welds made with d.c. under the same conditions.

Practically all parties, Navy Department included, favor use of positioned welds and it is not surprising to find wider use of welding positioners. Positioned welds favor the use of larger diameter rods and consequent faster deposition rates. Besides, it has been easier to train down-hand welders which has helped out the problem of green workers, one of the basic causes of structural failures in welded fabrication.

Supply Position Improved

Toward the end of 1943, the supply situation in welding electrodes was definitely over the hump whereas a year ago it was one of the most serious problems of the whole war production program. In the fall of 1942, production of arc welding electrodes was badly out of balance with plate production, to which it is logically tied, but by March, 1943, the WPB was able to announce that parity had been achieved. It was not until last October, however, that stocks began to build up at the electrode plants, although one of the leading suppliers is still quoting deliveries three to four months ahead on popular brands. The largest single factor, as far as WPB is concerned, was policing of inventories and reducing them (by consumption before reordering) to a 60-day supply in line with general CMP regulations. Distribution of welding rods and electrodes had been placed under strict control (WPB Limitation Order L-146) in June, 1942, but shipbuilding, which was taking 65 to 70 per cent of all electrodes, was zooming so rapidly that by the fall of 1942 electrodes were as scarce as Scotch today, except for direct war production. In October, there was a deficit of 25,000,000 lb. per month.

Manufacturers of extrusion presses for coating rod were given AAA priorities and mineral refining equipment was given a green light too. It was estimated by the Navy Department, however, that to make up the monthly capacity deficit by added facilities alone would cost $1,900,000,000 and would require from 8 to 12 months for completion even with emergency priority ratings.

During the fall of 1942, the Bureau of Ships made a survey of all welding electrode producers and evaluated the efficiency of production on the basis of welding rod output per dollar of equipment investment. The ratings assigned each plant visited ranged all the way from 6 points for the most inefficient producer to 37 points for the best (26 points when wire drawing capacity is discounted). The average was around 15 and the Navy concluded that if all companies could produce at any efficiency rate of about 20, a tremendous increase in welding rod output could be obtained.

At this time the Lincoln Electric Co. proposed that since it was able to produce approximately two and one-half times more electrodes per unit of equipment than the average of the industry, some effort should be made to increase production as a whole through more efficient use of existing equipment. The Navy decided that a delay in its contemplated expansion program was justified while Lincoln Electric assisted other members of the industry in improving their output. As a result, according to Navy Department figures furnished the Navy Price Adjustment Board during renegotiation procedure with Lincoln, production of electrodes increased 33 1/3 per cent during the last quarter of 1942, as follows:

	Production, Lb.
October	62,000,000
November	77,000,000
December	84,000,000

By March, 1943, additional capacity previously planned was in operation and output of welding rods passed the 100,000,000 lb. a month mark, at which point rod production got in step

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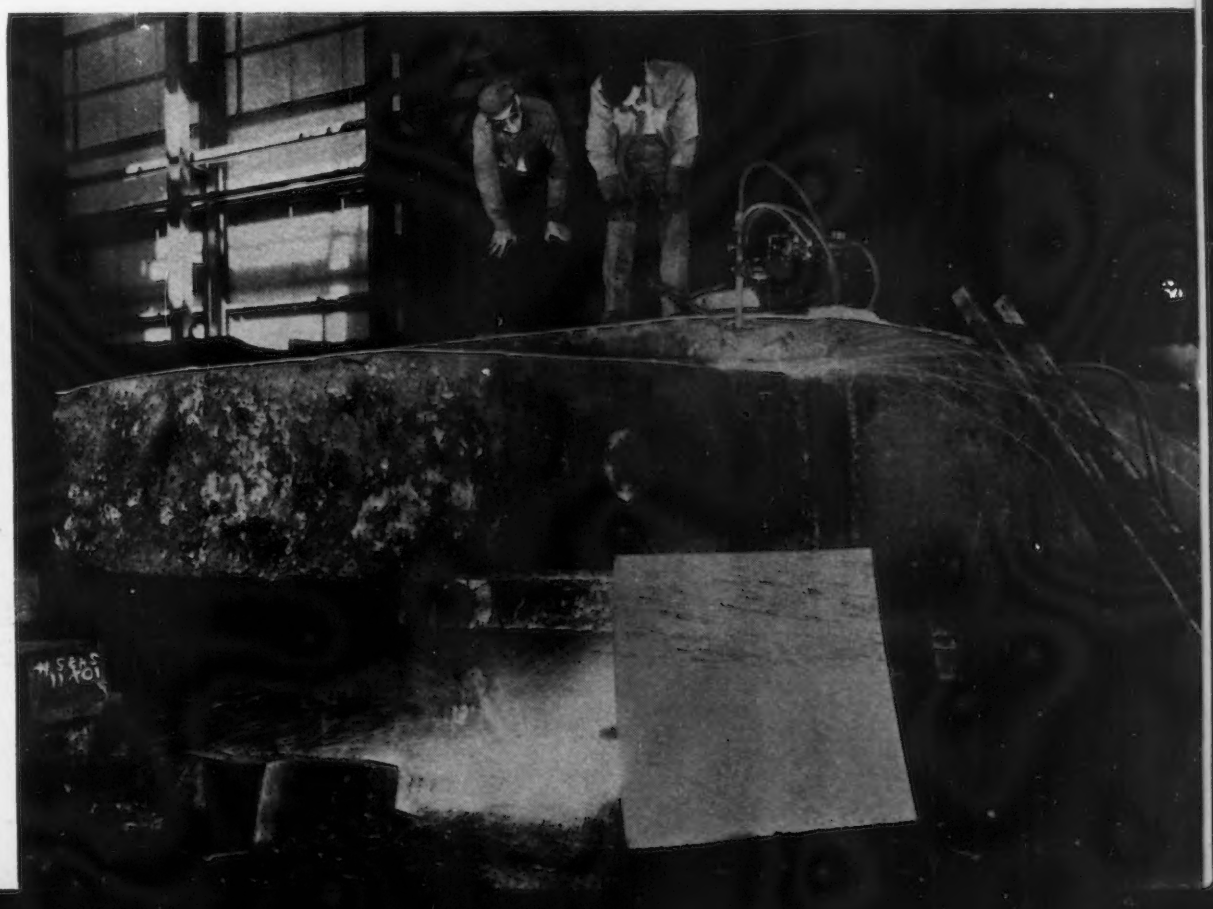

CUTTING the hot top off a 44-in. thick ingot, using a standard, small portable Radiograph and flexible tracks. Production cuts on this class of work are now being made up to and including 51 in. depth.

Bethlehem Steel photo

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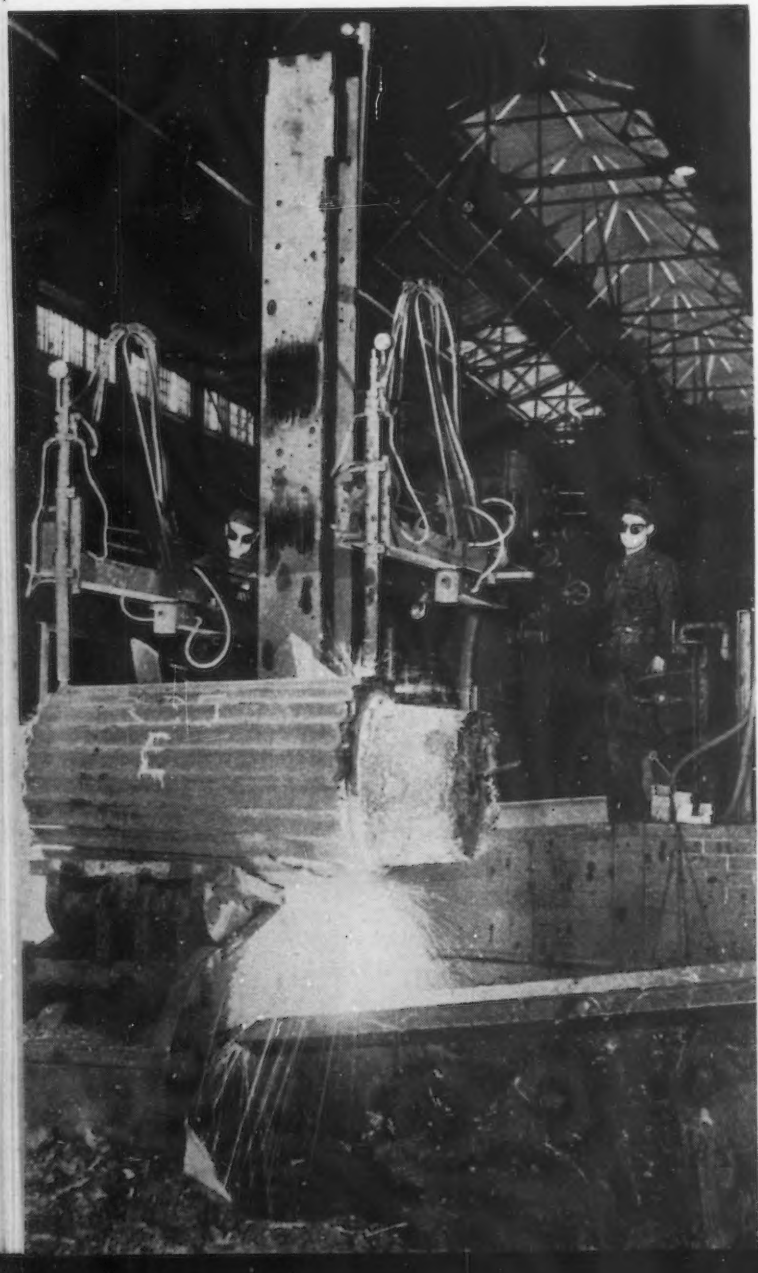
with plate rollings for the first time. The program is worked out so that if emphasis is shifted, for instance, from cargo vessels to landing barges, the estimated requirements for electrodes can be modified accordingly. In a 10,500-ton Liberty ship, for example, 55 lb. of electrode is used per ton of plate. The ratio is lower for naval vessels.

Oxy-Acetylene Cutting

Gas cutting goes hand in hand with welded plate fabrication and in the average shipyard accounts for 12-15 per cent of the employees in the welding and cutting department. Recent developments in cutting equipment have been refinements intended to increase production and save manhours, principally by multiple cutting methods. As many as 14 torches are being operated from one template, for example, and the stack cutting of 10 to 20 plates has also resulted in reduction in time for setting up, handling and cutting. Nesting has also been employed to obtain the maximum number of pieces cut from a plate. The shipbuilding industry not only employs a tremendous amount of gas cutting equipment but also uses quantities of oxy-acetylene for flame straightening to remove buckles in bulkheads, floors and deck plates which have become warped during welding.

Adoption of mechanical travel to the torches and improvements in nozzle design are extending the field of application of the cutting torch in the steel mill and foundry. The so-called "divergent" nozzle has been one of the noteworthy developments in cutting torches. Despite its name, it maintains a narrow kerf with a straight cut through even the thickest sections. Increased cutting speed, greater precision and the maintenance of higher oxygen concentration to a greater depth are possible with this tip. With equipment of this kind, diesel crankshafts are being torch cut out of 25 to 28 in. thick slabs.



SIMULTANEOUS cropping of 36-in. corrugated flask ingots on each end, employing a specially built ingot cutting machine which follows the contour of the ingot and automatically dumps the ingot after cropping, which takes 18 to 20 min.

Bethlehem Steel photo

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In the steel mill, 32 in. corrugated flask ingots are simultaneously cropped at each end by a specially built ingot cutting machine, which follows the contour of the ingot. Flat ingots up to 40 and 50 in. thick have the hot tops cut off by means of a small portable cutting machine which is simply laid on the work.

Additional attention is being paid to cutting all sizes and shapes of steel to closer tolerances so that machining and grinding can be reduced to a minimum.

Manufacturers of gas cutting equipment predict that flame machining, the process of tangentially removing unwanted metal by oxidization at speeds unapproached by other methods, eventually will take its place alongside the mechanical operations of turning, milling and planing. In the steel mill torch planing of blooms is already a proven operation. Procedures are being developed whereby tolerances of ⅛ in. may be adhered to in rough machining rounds with the oxy-acetylene torch. The immediate future will bring forth more accurate control of alinement and tolerances which should result in widespread acceptance.

In the foundry, gates and risers on steel castings are being flame cut so close to the contour of the casting that no snagging is necessary to smooth the cut surface preparatory to machining. More precise preparation of plates and structural sections used in the fabrication of ships, tanks and vehicles is also being achieved, thus improving fitup and minimizing the use of strongbacks, tie rods and shoring in ship construction, all of which are contributing factors to built-in stresses.

Gas Welding

Oxy-acetylene welding continues to find further use in war production. High speed gas tube welding is producing welded steel tubing for a wide variety of war needs, such as alloy tubing for aircraft use and low carbon tubing for Radar antennae. Hot spinning with oxy-acetylene flames has been extended to the manufacture of aerial bombs, burster tubes, flame throwing units, hand grenades and bomb fuses. Operations include flat and hemispherical closures and by special flame manipulation pressure tight closure of cylinder bottoms can be attained. Oxy-acetylene heat is also being used in the process of forge welding heavy gage tubing to forgings in the manufacture of aircraft landing gear struts. Parenthetically, it should be noted that these parts are

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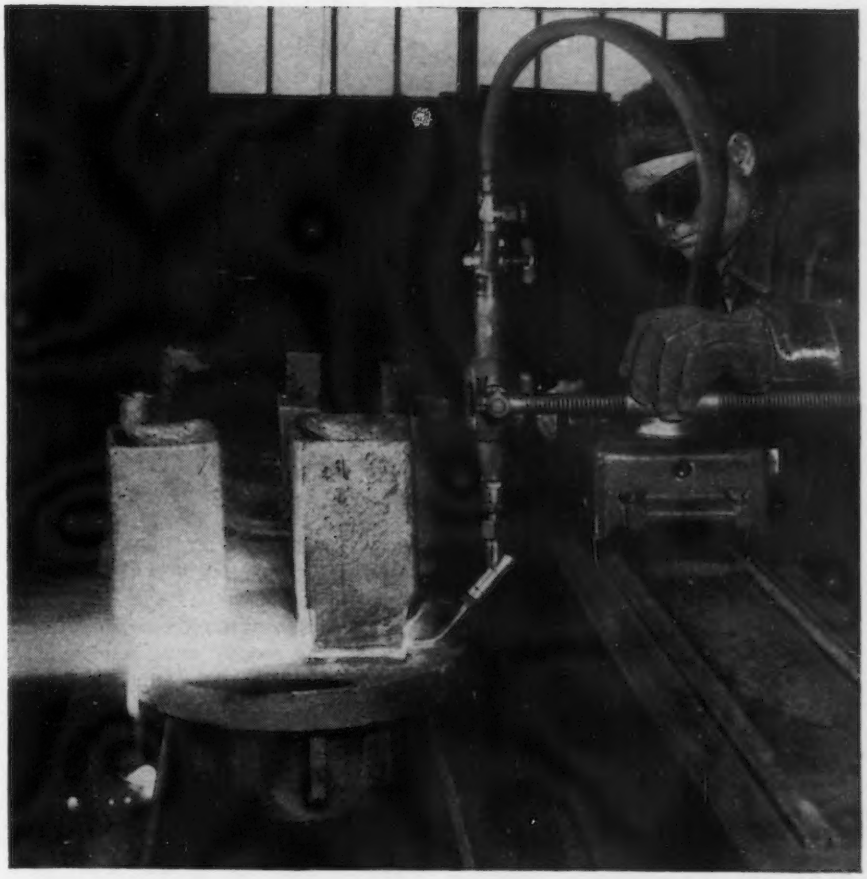
also being flash butt welded together and experimentally at least the process is being extended up to tubing of 15 and 16 in. diameter, way beyond the present commercial range.

Resistance Welding Trends

In general, the aircraft industry has taken to resistance butt welding with a great deal of energy in the past year. On the West Coast particularly have a lot of new applications been tried, some replacing joints previously formed by gas or arc welding. In fact, more of this type of resistance butt welding equipment is going into aircraft plants than spot or roll welders, with which most of the airplane factories are now well equipped.

Limitation on materials for spot welding electrodes (WPB general conservation order L-318, effective Oct. 7, 1943) by which the use of tungsten or molybdenum in copper alloys is prohibited except in electrode facings or inserts has obviously increased interest in and application of refrigerated tips, which can be made of pure copper. Tests made during the past year indicate that with a special forged cap having internal fins cooled by a refrigerant, as many as 5000 spot welds can be made on aluminum sheet without dressing the electrode faces. With refrigerant there is a notable increase in the number of welds made before pickup becomes evident.



Air Reduction photo

ADAPTATION of a portable cutting unit to machine cutting of risers flush with steel castings. The torch is racked out to cut the second (left) riser and the time of doing this is reduced approximately in half, due to preheat from the torch in the initial operation. With this type of setup a smooth cut is obtained, eliminating the usual snagging operation required after hand cutting with a torch.

On the other hand, more than 15,000 spot welds have been made consecutively without cleaning the electrodes on parts that have been cleaned by a one-step etching process developed at Northrop Aircraft, Inc. The fluid in which detail parts or aluminum alloy assemblies are dipped prior to spot welding consists of phosphoric acid and a petroleum derivative used as a solvent cleaning agent. The tips are not refrigerated. What makes this process particularly advantageous is that the solution has a low enough surface tension to get in between the faying surfaces of assemblies that have been clecoed together in a jig before spot welding. Ordinarily separate cleaning is needed for each detail part.

During the past year techniques have been worked out for spot welding magnesium alloys though they have not been extensively applied as yet. The essential equipment requirements are reasonably high welding current capacity, positive control of pressure and accurate control of welding time. Machine settings are substantially the same as for aluminum and both a.c. and stored energy types of equipment may be used. Electrode cooling is an important factor in pickup although cooling to excessively low temperatures has a harmful effect due to condensation on the points.

Capacitor type stored energy welders, originally designed for aluminum, have been found to be excellent for spot welding thin gages of steel also. The quick shot obtained localizes the heat so that with proper electrode care, strength and uniformity will be obtained in the welds and metal finishing costs reduced since there is no electrode indentation under optimum conditions. Tests made with a stored energy machine on 20-gage hot rolled steel at Yellow Coach & Mfg. Co. indicate that the ideal weld nugget is produced with a voltage setting of 1600 on the capacitor bank with a heat setting of 1140 mf. Shear strength on a single spot is about 950 lb.

Spot Welding Hardenable Steel

During the past year, further research has been carried out on the spot welding of hardenable steels containing up to 0.48 per cent carbon. Successful results have been obtained by a post heat treatment of the welds by a second current flow following the welding impulse. Tests made at Rennselaer indicate that remarkable increases in physical properties are possible for SAE 1020, 1035 and 1045 steel by proper control of the weld cycle time interval between welding and heat treating and the length of the heat treating cycle. For SAE 1035 steel the shear strength is increased 70 per cent and the U-strength nearly tripled by tempering, while in SAE 1045 the shear strength may be tripled and the U-strength increased nearly 10 times. Very great increase in toughness also results in welds that are ordinarily very brittle. Significant improvement in the shear impact strength of spot welds is also possible with the temper treatment. With this technique the heat treating current averages around 90 per cent of the initial weld current inasmuch as the resistance of the weld is considerably reduced after the joint has been formed.

Export

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By FRANKLIN JOHNSTON
American Exporter, New York

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WHEN I tell you that in a recent three months' trip in South America, I met only 11 other American travelers, not travelling for the government, you might jump to the conclusion that American manufacturers are neglecting their post-war export opportunities.

Anything but! The paucity of travelers is due chiefly to the lack of adequate plane space, steamship travel being out. Indeed, fundamentally, the most important war-time fact about export is the persistent loyalty of exporting manufacturers to their overseas customers.

Loyalty in the face of a situation where, because of the war effort and the demands of the domestic market, they not only do not need export business but export orders are actually often an acute embarrassment. Besides they entail heartbreaking complications and delays in getting export licenses and actually making shipment.

Now this loyalty is to some degree, but certainly not entirely, based on old friendships with valued customers. No, it is also based on a vivid recollection of what export has meant to these manufacturers in times past, particularly after World War I, when exports reached the then highest levels in history at the very time that the United States government disappeared as a customer. Even in the depths of the world depression of 1930-1932 there were some good export markets and export kept more than one factory out of red ink.

In normal years these manufacturers who really cultivate export business will average about 16 per cent export to total sales. That is two months' production per year, and is not to be sneezed at.

In visiting buyers in South America this year, I found that we have learned a great deal since World War I and our post-war prospects are less glittering than we thought they were in 1919 but actually far better.

From 1914 to 1920 export suffered from a "get rich quick" complex. All sorts of speculators, encouraged I am sorry to say, by some big New York banks who should have known better, became export middlemen. They opened up new importing accounts abroad, not wisely but too well, not only shipping huge quantities of merchandise but extending ridiculous terms to Tom, Dick and Harry.

Our export trade was maintained on a huge scale throughout the war and at prices eventually averaging 100 per cent above pre-war. When the armistice came the buyers abroad pyramided their orders, prices kept rising and an inevitable crash occurred.

This time our exports far exceed in quantity and value those of World War I but 82 per cent of it is Lend-Lease. Commercial exports are far below the pre-war period.

However, as regards Latin America there is very little Lend-Lease and while the value of our exports to Latin America today is probably some 40 per cent above pre-war there are no surpluses of merchandise in the market, because European shipments are absent.

Last year our shipments to Latin America were off 20 per cent in value from 1941. My guess would be that this year our shipments will be about the same as last year, possibly larger. But prices are up only 30 per cent as much now as they were at this stage in World War I.

In other words, merchants abroad are not loaded up with merchandise bought at inflated prices. They have very little merchandise. What they have has been bought—if bought direct from American manufacturers or exporters — not at dangerous price levels. For all our criticism of WPB and OPA and the Office of Economic Warfare, we evidently have some concealed assets as a result of their activities.

Criticism of our export methods, because of the amateurs and speculators of World War I, was bitter and antagonized many merchants. I heard nothing of that sort this time.

Of course, there is anything but satisfaction with the war-time controls, but little if any of the criticism I encountered was against American manufacturers or legitimate export merchants.

What I did encounter over and over again was sharp criticism of so-called "fly by night" exporters who seemed to be able often to get merchandise and make shipments to fly by night importers, by-passing the regular channels of trade.

The new decentralization program for handling exports was just being set up when I was down there and was supposed to correct this, and I think it very largely has.

In Chile I ran into some criticism of our packing but never heard a whisper about it in any other market. At the time I was in South America, merchant stocks were sadly depleted yet everybody was making money. What they lost on volume they made up on prices. I did not find even a fair store location for

Post-war prospects are far less glittering than after World War I, but actually are far better. And stories that Americans do not know how to handle Latins, don't understand the psychology of export selling, never learn the language, can't hold their liquor and in general are a bunch of carpet-bag exploiters, just are not so.

rent except in Montevideo, Uruguay, and there they had just had the worst drought in 25 years.

Nor did I hear, with the exception of two rubber companies, of a single manufacturing plant shut down for lack of supplies. Somehow they have managed to get along, but sometimes only by buying materials locally at exhorbitant prices and even in the black market, where there are local price regulations, usually more honored in the breach than the observance.

Let me pay my "respect" to the newspaper writers and authors who only discovered South America in 1939 and forgot that not only did Columbus do so in 1492 but that United States merchants and engineers and manufacturers did so many, many years ago.

So their stories that Americans do not know how to handle the Latins, don't understand the psychology of export selling, never learn the language, can't hold their liquor and in general are a bunch of carpet-bag exploiters who want to make a killing and get back to God's country by the next steamer just are not so.

You will find no better or finer group of businessmen both in ability and in sense of responsibility than the American colonies in Argentina and Brazil. And most of these men will never leave these countries. They have made their careers there and without losing their American loyalty, they are rooted in the lands of their adoption.

When I read some of these newspaper accounts of our Americans down there—and they are largely responsible for our success and our standing there—I think for example of one of these men so freely criticized.

A man with three sons in the American armed forces who has made his fortune in the Argentine. But instead of coming back with his "ill gotten" gains he has bought a big farm 26 miles from Buenos Aires. He had laid this out in orchards but these orchards have wide streets through them, so that his sons or his grandsons can sell the farm for building lots when Buenos Aires, now with a paltry two million population, grows big enough. That's the kind of a "carpet-bagger" he is.

The truth is that American goods are so well liked and our sales efforts so effective that nearly every country in Latin America had been chronically short of dollars since 1930 up to 1942.

That has been our export headache number one down there and it is very encouraging that at long last we are beginning to realize that we cannot sell unless we buy.

This realization has been shown conspicuously by the fact that as against only five Republicans in the House of Representatives who voted in favor of the extension of the Hull Trade Agreement Program, three years ago, this time 144 Republicans voted for the extension. In fact, if these Republicans had not so voted, the extension would have been killed.

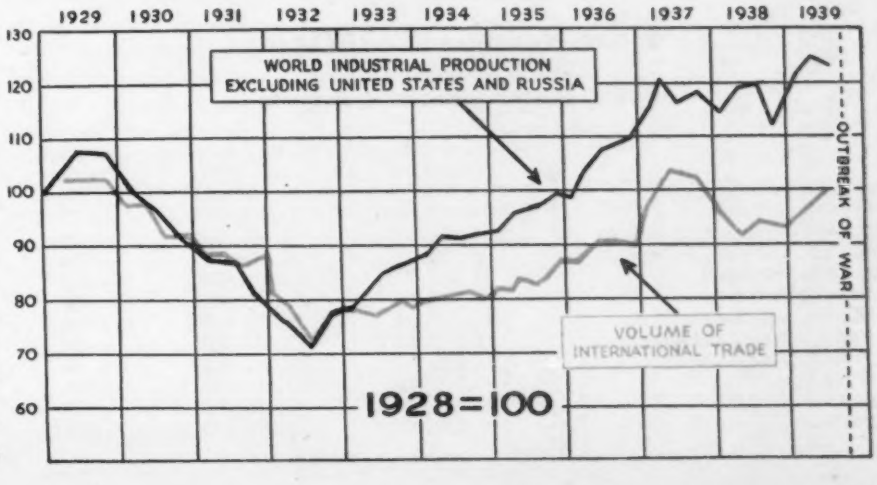
Now we owe Latin America a billion dollars and anticipate huge imports also after the war to replenish our stocks. American businessmen no longer talk about "capturing export markets" as they did in 1917 and 1918. We have learned, with some painful lessons, that the ocean is not a one way street.

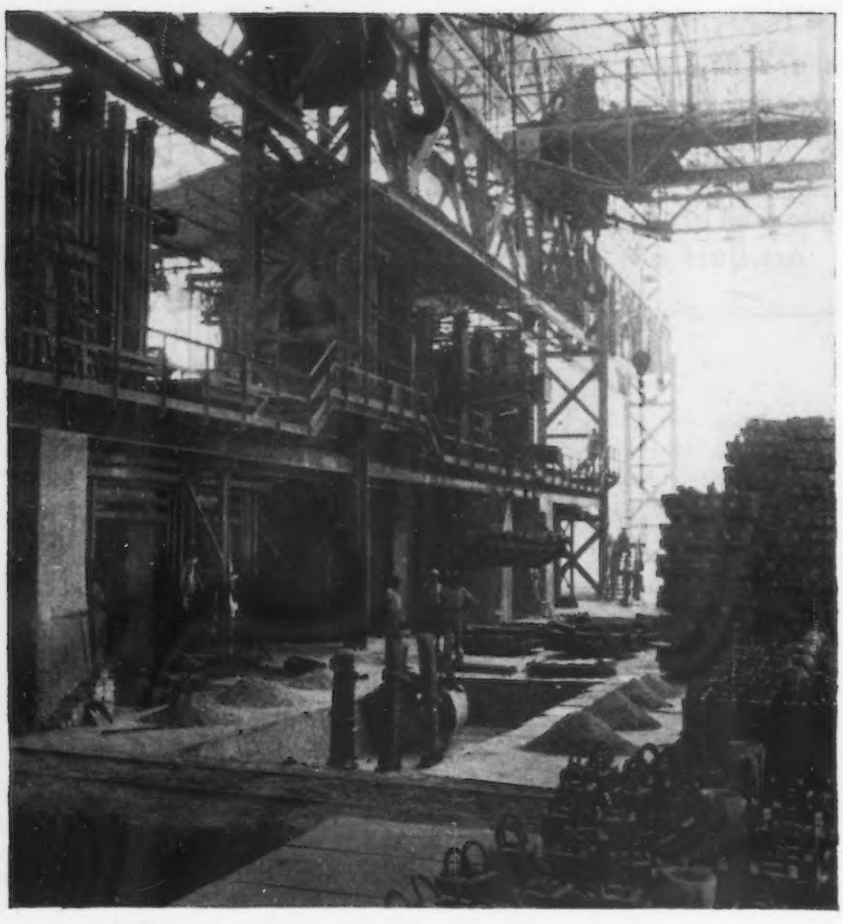
So you have the spectacle in South America of every grade of political thought from Henry A. Wallace with his plea for the common man, to Eric A. Johnston, who wants to see prosperous industry here through world trade, encouraging and helping South America to increase their output and raise their standard of living.

I found in South America that Americans in general, irrespective of political opinion, believe this is a sound development. They take the broad view that our export future depends on helping other markets to increase their purchasing power.

The narrow view is that, for example, we are foolish to help finance with the funds of the Export-Import Bank the development of the great Volta Redona steel mill in Brazil which, when it gets into production in

● Second only in importance to the industrial revolution in England in the late Eighteenth and early Nineteenth Centuries, there has occurred a second revolution, the rapid industrialization of countries formerly chiefly agricultural, pastoral or mining. The turning point was 1933 when for the first time the curve of world industrial production (excluding the U. S. and U. S. S. R.) drew rapidly away from the curve of international trade, as shown here. Although World War II has greatly stimulated this trend, it is a permanent movement, not a war-born one.





● Modern steel mill of the Companhia Siderurgica Belgo-Mineira, at Monlevade, Minas Geraes, Brazil.

What Happened HERE

Expenditures

	War Department	Navy Department
1917	$ 459,540,000	$ 257,166,000
1918	5,705,136,000	1,368,643,000
1919	9,265,325,000	2,009,272,000
1920	1,100,866,000	629,893,000
1921	580,795,000	647,871,000
1922	402,058,000	458,795,000
1923	355,723,000	322,533,000
1924	348,606,000	324,130,000
1925	357,957,000	326,365,000

History has a habit of repeating itself. Manufacturers of industrial equipment and supplies will face an abrupt cessation of government buying here, as in 1919. Army and Navy expenditures after 1919 fell off 85 per cent in a single year; 90 per cent in two years. Note how export sales in 1921-25 helped make up for the loss of war orders.

What Happened ABROAD

United States Industrial Exports

	Pre-War Average, 1910-1914	Post-War Average, 1921-1925	Increase, Per Cent
Lubricating oil	$ 5,270,000	$34,439,000	+234
Steel mill products	54,317,000	93,568,000	+ 72
Insulated copper wire and cable	1,992,000	4,498,000	+126
Electrical machinery and apparatus	20,856,000	69,475,000	+234
Industrial machinery	78,553,000	166,526,000	+112
Power generating	12,042,000	30,901,000	+156
Mining, well and pumping	11,467,000	24,783,000	+116
Power driven metal working	11,573,000	13,814,000	+ 20
Textile, sewing and shoe	12,253,000	23,690,000	+ 93
Other industrial	30,610,000	61,681,000	+101
Industrial chemicals	12,748,000	25,165,000	+ 97
Abrasives	1,749,000	4,980,000	+185

1945, is expected to supply Brazil with 60 per cent of its steel requirements.

But I found the representatives of two of the largest American steel companies, both with a large stake in the Brazilian market, not only complacent about this development but perhaps enthusiastic.

They figure that while we may lose some of the low profit tonnage business, we will have a bigger market than ever before for higher grade business.

There may be some doubts as to whether the American taxpayers' money should be used to finance new plants which, while they may benefit our nation as a whole, may destroy the market for some of these taxpayers. It is a delicate political problem.

But there is no question that we cannot stop this new industrial revolution which is taking place in so many parts of the world and nowhere more conspicuously than in Brazil and Argentina, Brazil particularly.

Some Brazilians like to think that Brazil will take the place of Germany after this war. Others seem to think that it was just by chance that we became an industrial nation while they clung to agriculture. Both of these concepts are exaggerated but that's the way some of them think.

In any event, this second industrial revolution is the rapid industrialization of countries formerly chiefly agricultural, pastoral or mining.

The turning point was 1933 when for the first time the curve of world industrial production (excluding the United States and Soviet Russia) drew rapidly away from the curve of international trade. In South America I found some of the British very critical of our encouragement of this trend. They feel we are building up competition for both ourselves and them.

This divergence of opinion between our British cousins and ourselves is one example of how the British are static in their point of view, while we are dynamic. They want to hold on to what they have. We want to expand and are not afraid to experiment. As Eric Johnston told the British recently, they place security first. We place opportunity first.

As in Brazil, all over the world. John L. Keenan in his recent book "An American Steel Man in India" points out that when Tata planned what is now the largest steel mill in the British Empire they got no encouragement in England. But Mark

A. Hanna and George Westinghouse helped them.

In 1907 Brazil's industrial production exceeded the value of her imports by 3.7 per cent. By 1920 Brazilian industrial production exceeded the value of imports by 52 per cent and by 1938 by 300 per cent. This year I dare say the excess is 500 per cent.

According to the U. S. Department of Commerce Commercial Travelers' Guide to Latin America, Brazil in 1937 had 1,671,000 engaged in industry as compared with 8,860,000 engaged in agriculture.

This meant that 14 per cent of Brazil's working population was engaged in industry as compared with 75 per cent in agriculture.

In Argentina on the other hand, 43 per cent of its working population was engaged in industry as early as 1933 as against only 22.6 per cent in agriculture. Almost double in the land of the Pampas.

A Brazilian authority, Jose Jobin's "Brazil in the Making," says that in 1940 the total of industrial workers in Brazil was 1,412,432 engaged in 70,026 plants—an average of some 20 per plant. But they are not all small. General Electric's plant has 1100 people, just 12 of whom are Americans. And a newspaper and pulp mill, using American equipment, has 2000. This operation has 1500 square miles of timber and has, in addition, planted one million eucalyptus trees for fuel.

Some of the industries share in the Brazilian total as follows: Textiles, 22 per cent; foodstuffs, 13 per cent; building construction, 15 per cent; clothing, 8 per cent; chemicals, 7 per cent; and iron and steel, 10 per cent. You will note that metal working industries lag behind the others.

This is true of other markets I visited. Thus in Chile I found that 70 per cent of the merchandise in the Gath & Chaves department store was made in Chile, but in Veiga, Noriega & Cia's hardware store only 10 per cent. But, there are ten plants in Sao Paulo making imitations of a well known South Bend lathe. So you see they don't need much exhortation even from Mr. Wallace to industrialize.

The new industrial revolution is here. It will profoundly alter our export trade, but it can't be stopped. And the American policy is not only more progressive than that of the British but follows the old advice: if you can't lick 'em, join 'em.

So to a large degree, American industry itself has promoted this revolution—the biggest of all South American revolutions by the way. For you find American branch plants on a large scale in both Argentina and Brazil as well as in Australia and even in South Africa.

Contrasting the progressive, if not aggressive, tactics of our people with the static, defensive attitude of the British and the stubborn German emphasis on cheapness, I marvel at the lack of faith in our own export ability which some Americans persistently cling to.

Our exports normally exceeded in value those of any other country in the world. In 1938 our exports exceeded those of either Great Britain or Germany (their exports were about equal) by 23 per cent. Here is how the trade was divided:

1938 Distribution of Exports

	To Europe, Per Cent	To British Empire, Per Cent	To Latin America, Per Cent
Great Britain	28.5	49.8	6.9
Germany	68.4 (1937)	7.2	11.0
U.S.A. (Manufactured goods only, Exclusive of Canada and Newfoundland)	35.4	16.0	27.2

As you see, Germany's best export market was Europe; Great Britain's was her own Empire and it was the United States that really did the world wide business.

In 1938 Great Britain had only 10 per cent of all the exports to Latin America, Germany had 16½ per cent and we had 34 per cent. (Our total share was really far greater since a great many American products are now manufactured in Latin America in American owned branch plants).

When I cited such figures recently a skeptical manufacturer wrote me that if automobiles, radios, movies and refrigerators and airplanes were excluded, we could not show up so well. All right, let's try it. Take Peru, for example. Peru gets out very complete statistics, a 300 page book with 2030 different classifications of imports, showing the amount from each country.

Here is how Peru's imports were divided by countries of origin in 1939 before the full effect of the war was felt:

U. S. A. ..... 41.1 per cent
Germany ..... 14.7 per cent
Great Britain ..... 8.4 per cent
Japan ..... 3.1 per cent

In metals, the principal importations came from the following countries:

United States ..... 16,432,161 pesos
Germany ..... 8,977,629 pesos
Great Britain ..... 1,928,381 pesos
Japan ..... 383,746 pesos

Tools:

United States ..... 40,346,507 pesos
Germany ..... 6,376,883 pesos
United Kingdom ... 5,144,175 pesos
Japan ..... 77,008 pesos

Machinery and vehicles, exclusive of airplanes, parts, automobiles, trucks and parts:

United States ..... 23,890,089 pesos
Germany ..... 5,663,619 pesos
United Kingdom ... 5,025,677 pesos

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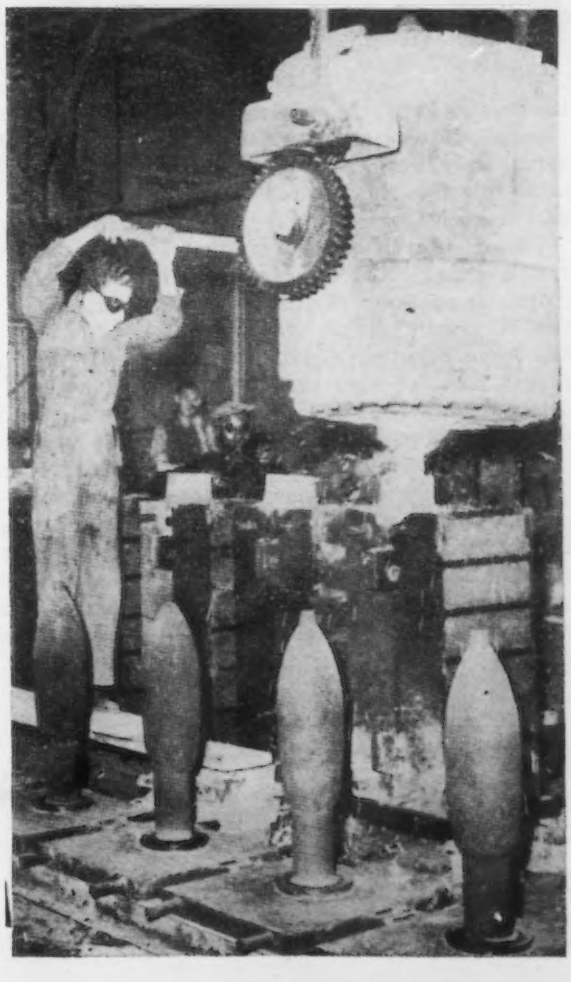

● A typical foundry, making bombs for South Africa's war effort.

Japan ..... 13,180 pesos

Incidentally, this manufacturer makes valves and I was interested to note that Peru's imports of valves came principally as follows:

United States	317,529 pesos
Canada	89,806 pesos
Germany	50,059 pesos
Great Britain	30,757 pesos
Japan	379 pesos

I am sure that similar results would be obtained on any survey made of any Latin American country with this qualification—that the nearer the country to the United States the greater the trade we have; the farther the country away, the smaller the percentage—British and German goods being more important in Argentina and Chile than in Mexico, Colombia or Venezuela.

I am constantly puzzled at what I feel is exaggerated consciousness of British competition. British competition is greatly exaggerated and far less formidable than Germany's. The British insist on high profit on their output, however small. They are never afflicted with volumitis. I sometimes think American manufacturers think primarily of volume, but the British think first, last and all the time of the profit. And a steady profit at that. No wild fluctuations.

This near-obsession about British competition sometimes takes the form of suspecting that the British are not above getting materials from us through Lend-Lease and fabricating them to Latin America. This is a libel.

Practically speaking, Great Britain has ceased to ship anything of metal to Latin America, both because of shortages and because of the Lend-Lease agreement. British exports are being maintained at about 60 per cent of par to Argentina but chiefly coal, textiles, earthenware, chemicals, whiskey and other British specialties.

British exports are so bad that no statistics have been published since December, 1940. But Latin American local statistics show that whereas before the war we were outselling Great Britain four and a half to one in Chile and Brazil, now we are outselling them nine to one.

I was told in Chile that only four steamers were alloted by the British to trade with Chile. Two were then in drydock, one had just been sunk off Florida by a U-boat and that left only one operating. I found by personal observation just one British steamer in Argentina's second port, Rosario. In Rio de Janeiro the only British boat I noticed was a former Cunard-White Star liner. Cargo: German prisoners from the Afrika Corps in transit to Texas.

There is one factor about Britain that is hard for us to compete with and that is that where we constantly export more than we import, she does just the opposite. In 1938 for every dollar's worth we exported, we imported only 64c. worth. That's even after the Hull program discounted the Hawley-Smoot tariff. Great Britain, on the other hand, for every dollar's worth she exported, imported $1.75 worth. We now have 80 per cent of the world's gold and everybody is in debt to us. Great Britain, on the other hand, is everybody's customer. And the customer is always right.

Meaning in this case that Great Britain is in a position to bargain bi-laterally with her suppliers, chiefly the Dominions and Argentina—"Buy from those you sell."

Even so, Australia and New Zealand will probably reduce Empire tariff preference after this war, thanks to Lend-Lease and General MacArthur. And it is in the Empire, not in Latin America, that we meet stiff British competition.

And the importance of the British Empire markets are not to be made light of. Despite the limelight on Latin America it is only about one-third of the total export market normally. Europe is one-third and Asia, Africa and Oceania another third.

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● This particular plant, Focos Mexicanos, S. A., Monterrey, Mexico, typifies the new industrial revolution, because its owner was for many years previously an importer of electrical goods from the U. S., and distributer of Frigidaire, Zenith radios, Sylvania radio tubes, etc., but is now a manufacturer only. The plant output is 8,000,000 incandescent lamps yearly, which cares for 95 per cent of the country's needs.

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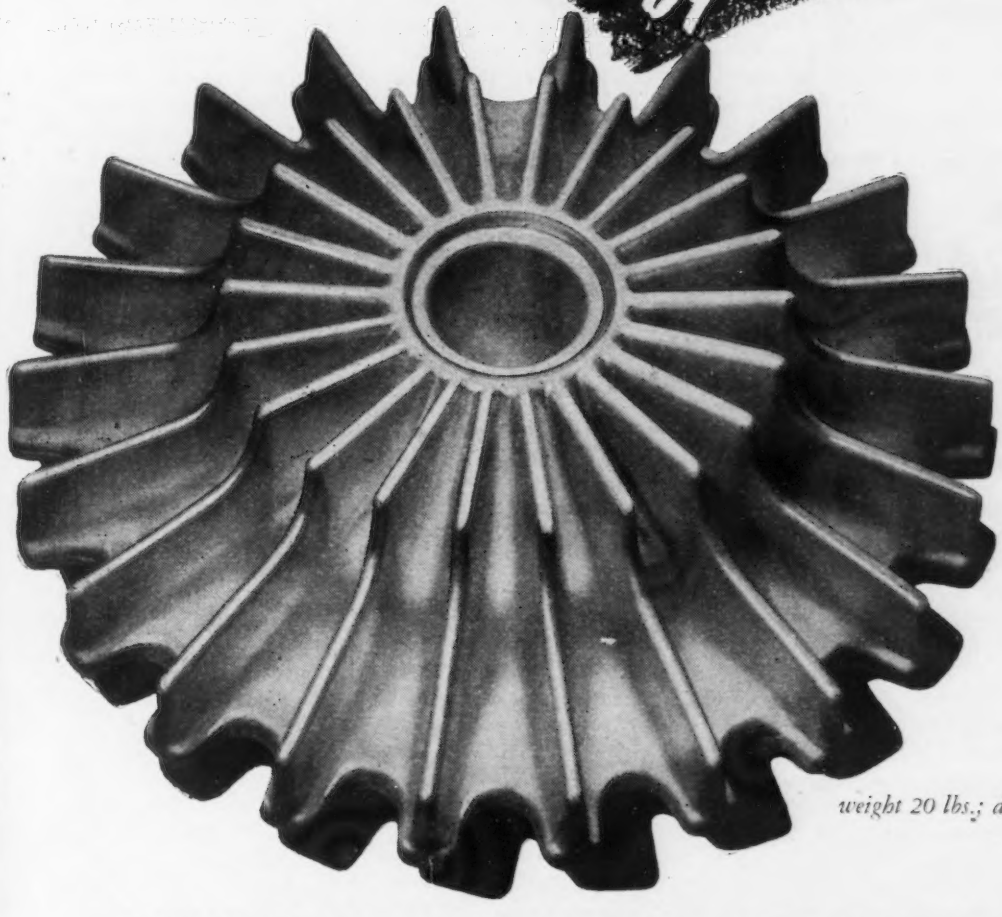
ALUMINUM DIE-PRESSED FORGING by REVERE



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STANLEY H. BRAMS

• Unionist Walter Reuther is formulating new plan for reconversion to civilian output, built on central government controls for manufacturing.

DETROIT — Industry may soon be given a New Year present of controversial interest — a second Reuther Plan. The labor leader-author of the original plan which created such a hubbub almost three years ago is hatching a new program, this time for reconversion to peacetime production.

Mr. Reuther's thinking, whether right or not, is brass-tacky enough to start another widespread debate. It is socialistic enough to kindle philosophic argument. And the viewpoints may be those of a large enough segment of labor to make the issue a compelling one.

At any rate, because Mr. Reuther is one of the most articulate of the union leaders, this program might turn out to be controversial as was the original blueprint of 1941, purporting to show how the automobile industry could turn to mass production of bombers, and do it in stride.

The original Reuther Plan was founded on an engineering fallacy. The objective was good, but the methods for doing it had no basis in sound practice. In his new plan, Walter Reuther appears to have profited from his first experience. The conclusions reached thus far, while arguable, represent the end-products of viewpoints rather than provable or rebuttable claims of fact. This makes rejoinder difficult.

The keystone of the new Reuther program is quite obviously a more intense and widespread government control. This obviously infers that Reuther expects labor to continue to be a most powerful factor, if not the most powerful, in Washington after the war. Otherwise, of course, labor would not want to trust its destinies to a federal bureaucracy—an anticipation which, after all, may be the great blind spot in the forward vision of labor or any other organization which offers itself to a government for handcuffing in the fond belief that whenever it chooses it can have back the key to the cuffs.

Mr. Reuther first proposes a "Peace Production Board" which would allocate material, manpower and tooling to all companies in the immediate post-war period. The proposed PPB would be drawn from the ranks of government, labor, industry, agriculture and consumers. Its governing policy on production would be "Social Priority." a system of ranking under which the most urgent civilian needs would receive top preference. Apparently free enterprise would have little place in this program.

MR. REUTHER feels that the automobile industry may be relegated to second place in the consumer market by the housing industry if his beliefs in social priorities prevail after the war. He feels that an enormous housing program is necessary after the war, generated in prefabricated home factories, not only as a means of satisfying the living requirements of hundreds of thousands of families, but also as a means of absorbing temporarily unemployed men in work. The Reuther jigsaw is further fitted with the point that production of housing should be undertaken in surplus aircraft factories after the war.

Implicit in this planning is the inference that if business does not undertake the housing job—or any other job which seems socially necessary—it will be up to the government to do it.

Disposition of government-owned plants is conditioned in the forthcoming second Reuther Plan, by necessary assurances from lessor companies that they will maintain adequate wage standards, guarantee continuous employment and produce socially necessary commodities at fair prices. But government plants in strategic or semi-monopolistic industry should be retained in Washington's hands, Mr. Reuther believes.

Mr. Reuther's forthcoming plan also will propose (and solid backing for this point is evident in further remarks of a recent statement by UAW President R. J. Thomas to a House Committee) that the entire concept of the federal patent system be changed. A central government research agency is proposed to coordinate all research work on patents and advances in technology "and to make certain that technological and scientific knowledge is universally applied in the public interest." Amplifying this, Mr. Thomas urged that "under the guidance of government there shall be a full pooling of technical and scientific resources for the development of new products and methods to provide at lower prices fuller supplies of essential or desirable goods or services for the people." Quite obviously any such program, an extension of the war system of patent pooling, means the death of idea rights as they have always been known in this country.

POST-WAR labor policy should be determined now, Mr. Reuther believes. Primary in any such thinking should be the establishment of a 30-hr. week, the pay envelope to be as fat as it is today under a 40-hr. week. Technological progress, says Mr. Reuther, makes 30-hr. work of today the production equivalant of 40-hr. schedules ten years ago.

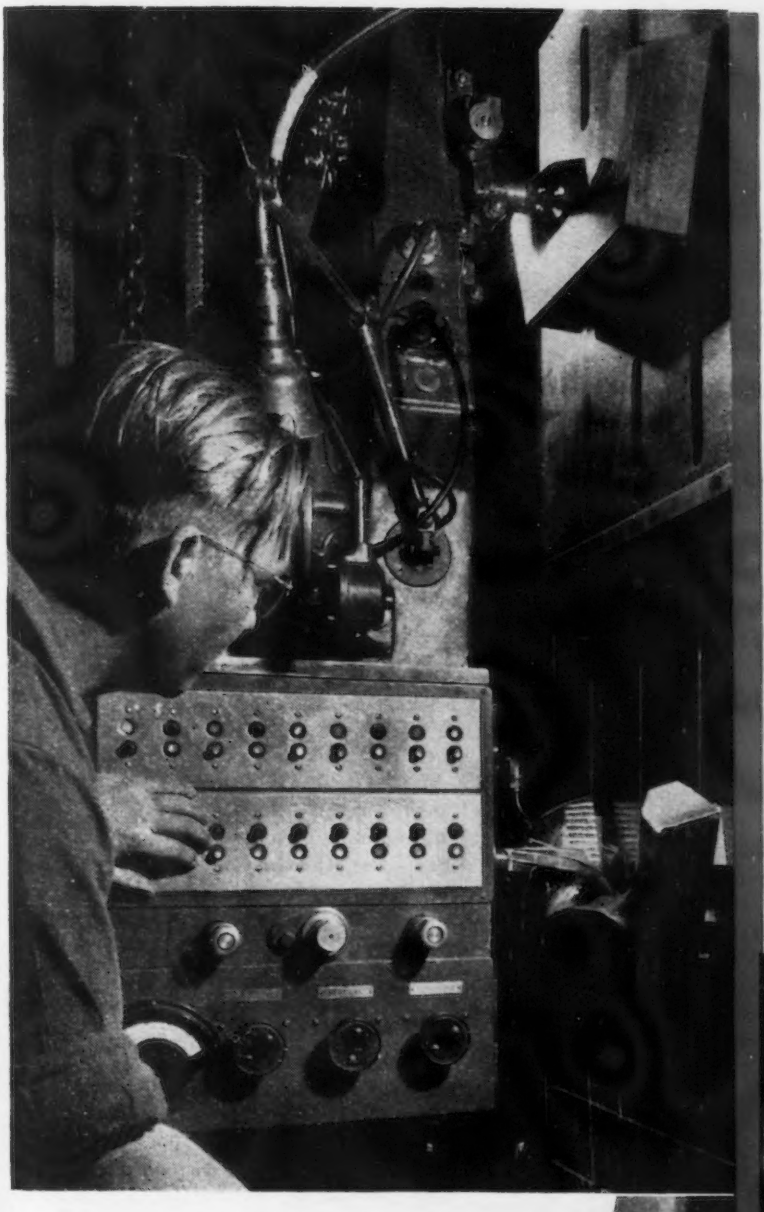
He also proposes a two-month vacation with pay for most of the nation's war workers when the arms program ends, as a means of "restoring health" of overworked men and women and also as a cushioning of plant shutdowns during tooling for peace production.

One other phase of the post-war labor planning would be the establishment, mandatorily, of management-labor councils in every industry, with consumers added to these panels to insure fair play by both sides.

Backing up this program in industrial plants would be a schedule of public work to be undertaken under the Peace Production Board, "not as a glorified WPA," but as a "permanent part of a healthy, expanding national economy." Apparently this new public works program would be an equalizer for slack or fat times in what we now consider private industry.

With reference to automobile manufacture, Mr. Reuther has a proposal first brought up about ten years ago and then dismissed noncommitally in a report by Leon Henderson on the

"Pre-Converted"



BUT STILL AT WAR

HERE you see the versatile Keller — the machine with the mechanical-electrical brain that was "pre-converted" for peace the day it went to war. With in-built ability to stand the gaff twenty-four hours a day, this Keller is still on its wartime job, speeding aircraft production in one of America's big plants.

But when its war work is over there will still be no rest for the Keller — no time out to be rebuilt or adapted for peace. It was pre-converted to start with, and its "brain" will function with the same speed and dexterity in shaping dies or parts for the postwar products of tomorrow. It will continue to serve the designers, engineers and production men who (soon we hope) will be setting their sights higher than ever in the coming fight to win the peace . . . to produce more and better . . . at the lowest possible cost.

Right — Speeding aircraft production, this Keller is automatically shaping a vital part, as its mechanical-electrical brain follows the template shown at the top of the larger picture. Operator sets up the job with push buttons — the Keller does the rest.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD, CONNECTICUT, U. S. A.

stabilization of automotive employment, prepared for NRA.

It is suggested that a sliding price plan be worked out by the auto industry acting in concert, so that during slack winter months delivery price would be, say, ten pct. below list price, while in the boom spring months the price would be advanced ten pct. or so over list. The objective, of course, would be to stabilize employment in the factories.

ANOTHER plank of general interest has not yet been completed by Mr. Reuther, but likely will make its appearance in the forthcoming plan in one shape or another. In brief, this thinking is to expand single product industries, like automobiles, into multi-product facilities. The example he cites is an automobile plant which could be used to manufacture stokers, to take up employment slack during its automotive retooling period.

The engineering fallacy in such latter suggestions is apparent and should be easily provable to the unprejudiced juryman. It is reminiscent of the factual mistakes which were strewn through the original Reuther plan.

However, the actual formulation of the new plan offers a lesson to management. In much of its conversation, indignation and asseveration on reconversion and post-war planning, industry has never publicly outlined the complete machinery of its proposals as clearly as Mr. Reuther has even in the preliminary makeup of his plan. Industry, so far as the public record has gone, has proposed little beyond request for payment of a proportion of its claims to assure capital for operations, and request that its factory floors be cleared to open up space, etc. Mr. Reuther, too, talks in terms of broad objectives, like social priorities. But there a similarity ends. Mr. Reuther goes on to describe how such objectives are to be reached, while the chapter and verse of management proposals are lacking.

G-M Sales Head Retires

Detroit

• • • **Richard H. Grant, vice-president in charge of sales for General Motors Corp., will retire Jan. 15, it was learned, but will continue in an advisory capacity for the corporation. No successor has yet been named.**

U.S. Exports Most Lend-Lease War Planes and Motor Vehicles to Russia

Washington

• • • **Russia**, although she came late into the field of Lend-Lease, has obtained more war planes and motor vehicles from the United States than have been exported to any other country under the Lend-Lease Act, according to a statement by Leo T. Crowley, Foreign Economic Administrator.

Up to Oct. 31 the United States had shipped to the Soviet Union 7000 planes, 3500 tanks, 130,000 submachine guns, 150,000 trucks, 25,000 jeeps, 225,000 field telephones and 750,000 miles of field telephone wire.

Industrial products sent to Russia, which helped her to expand her own production of munitions, included 1,000,000 tons of steel, 350,000 tons of nonferrous metals, 400,000 tons of chemicals and explosives, 600,000 tons of petroleum products and 18,000 metal-cutting machine tools.

The money value of shipments of Lend-Lease goods to Russia up to the end of October was $3,550,443,000, or about 27 per cent of the total amount of Lend-Lease aid granted to the United Nations. Of the Russian total $1,991,102,000 represented military items.

Removal from Lend-Lease lists of some of the capital goods which Great Britain has been obtaining from this country, along with munitions and foodstuffs, may be announced soon in line with a policy to confine the aid to actual war activities. Capital goods purchases would still be subject to export controls.

o o o

Ordnance Contractors Being Given "Rebuilding" Contracts for Equipment

Cleveland

• • • **Recently requested** by the War Department to re-manufacture tanks used in replacement training centers, tanks which are badly in need of repair as a result of the intensive training given tank crews, Federal Machine & Welder Co., Warren, Ohio, is now handling this work. The tanks will be as good as new when Federal is through with them, and they will be returned to the Army for future assignments. Federal was picked for this work because of the experience in tank production and its record of high quality production.

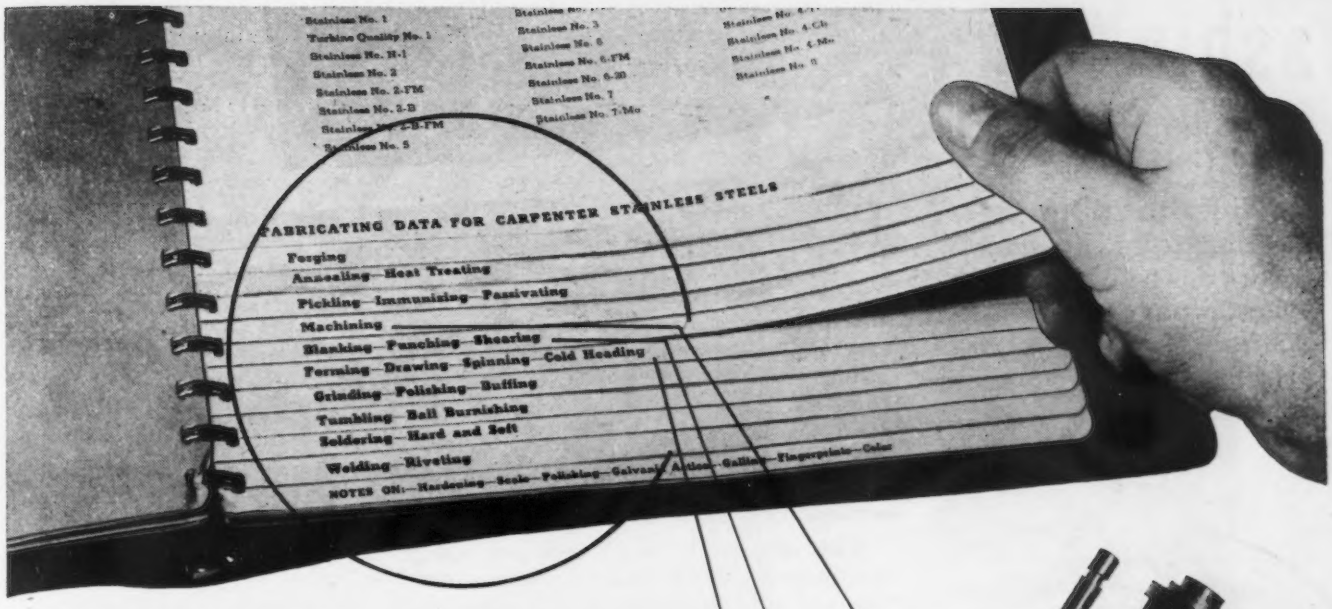
Other ordnance contractors in this district, because of equipment and past experience, are better able to handle the recent repair and salvage program on scout cars once tentatively scheduled for Federal Machine & Welder. Contractors with plants originally designed to produce scout cars will continue on the job of remanufacturing them, and tank contractors with facilities for the production of tanks will continue to remanufacture tanks.

Commenting on Federal Machine & Welder's record, Col. H. M. Reedall, chief, Cleveland ordnance district, said: "Federal Machine & Welder's qualitative production record is excellent, and, in taking over the remanufacture of these tanks, they are performing a dual function . . . filling an important assignment in the war production program and performing a specialized sort of manufacturing at a very considerable saving to the taxpayer. These tanks, coming off the line at Federal, will be the equal of anything turned out new anywhere, and at the cost of 30 per cent of a new tank."

"Fluctuating demands, determined only by the progress and needs of the Army, make it important that ordnance contractors be able to make any production conversion schedules may call for," Col. Reedall added. "New tactics in the field, employing wider use of bombing, and heavy artillery, have been a factor in the tank cutback."

"No one can predict," continued Col. Reedall, "what our demands will be six months from now and we must be prepared to make changes accordingly. We try to anticipate the need, and are ready to re-allocate our contracts, if necessary, in the best interests of war production."

Recently Federal turned back voluntarily to the government over a million dollars saved by reducing the unit cost on the General Sherman tank.



HERE'S A GUIDE

for speeding output of Stainless parts

Hard-pressed production men continue to express appreciation for this book "Working Data for Carpenter Stainless Steels", and the many ways it is helping them speed production of vitally needed Stainless parts. Says one production superintendent—

"...It has opened my eyes to the fabricating possibilities of Stainless Steel." Says another: "By showing what I can expect in working various types of Stainless, this book has certainly been helpful."

And helping Stainless users to solve fabricating problems is no new job to us at Carpenter. Ever since we pioneered the first bright, ductile Stainless Strip... ever since Carpenter's invention of Free-Machining Stainless... our representatives, metallurgists and research men have been in the front line of this business of problem-solving.

It's always been Carpenter's policy to share its "know-how" and experience with Stainless users. So, if you'd like a copy of "Working Data for Carpenter Stainless Steels" drop us a line on your company letterhead. And for personal cooperation on your tough fabricating problems, call in your nearby Carpenter representative.

Easier, Faster Machining, but better valve action, too, because these parts were made from Free-Machining Stainless Steel.

Faster Press Speeds with Stainless that responds easily and uniformly to your press operations. And Carpenter Stainless Strip works the same, coil after coil.

Fewer Rejects on drawn parts, thanks to the uniformity of soft and ductile Carpenter Stainless Strip.

The Carpenter Steel Company • 121 W. Bern Street, Reading, Pa.

Carpenter STAINLESS STEELS

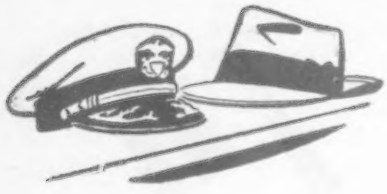
...for
Strength
Rigidity
Heat Resistance
Corrosion Resistance
Longer Product Life
Sales Appeal

BRANCHES AT
Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington . . . .

L. W. MOFFETT

• The situations Bernard Baruch has been asked to clean up should never have happened . . . Prices of excess steel being sold indicate dumping.



WASHINGTON — Until the Baruch report on contract termination is issued and put into effect chances are good for confusion to continue unchanged in this highly important field.

Supporters of Mr. Baruch say that he and his capable assistants cannot be expected to perform miracles in solving these problems of unparalleled difficulty and magnitude when criticisms are made for the lateness of the report. It is clear that Mr. Baruch has refused to be hurried and feels that the failure of other Government officials to evolve a proper and workable program in more than a year shouldn't be laid at his feet if he does not issue a report in a few weeks.

Nevertheless, the situations Mr. Baruch has been asked to clean up such as rubber and manpower, terminations and surpluses, should never have happened.

In every case, the snarls are directly traceable to the President who has refused to delegate authority to those he has chosen to execute policies and who has also been inattentive to the most pressing of the home front problems until forced to action by the frightful prospect of the railroad and steel strikes. Also, Mr. Roosevelt has had a remarkably unfortunate record in his choice of war and business administrators, both civilian and military.

PRICES which the War Department is approving in the sale of steel inventories amount to dumping. For instance, according to the War Department, the contract of one steel consumer was terminated who had 5000 tons of uncut steel rods and bars. On the average the steel cost $56 a ton. It was sold for $30 a ton. The Government took the loss and the consumer was paid in full, in the settlement of his contract.

WPB officials say that this is general practice rather than the exception and if it is followed after the European war is over, steel prices will collapse in spite of the fact that OPA may soon permit limited price rises to compensate for increased labor costs. Because if the 10,000,000 to 15,000,000 tons of steel which will be above ground and excess as a result of drastic cutbacks in military programs are sold at sacrifice prices under the Army dumping procedure, even the prices to the Government will be inevitably dragged down on new contracts.

The War Department had no adequate method of maintaining inventory on other than major military items. For this failure, the War Department has been needled by the Truman Committee which has pointed out with inescapable logic that the War Department cannot possibly know what it needs in the way of more equipment, nor be able to decide what property if any is excess, without adequate property inventories. The War Department has opposed the creation of a single civilian agency with power to dispose of all surplus commodities because it wishes to retain its authority over property disposal, and because the permitting of another agency to sell the goods and deposit the receipts in the Treasury will interfere with War Department requests for large appropriations, WPB officials say.

High WPB officials say that the War Department does not have personnel who are experienced enough to devise procedures to execute the sale of the millions of items which will have to be disposed of under the War Department regulations. These officials say that the War Department needs more business men.

It is reported by WPB that Mr. Baruch will advocate the creation of a single agency to handle the surpluses and to set definite policies which will prevent dumping.

The creation of a new civilian agency to handle surpluses will also kill the crippling disadvantage that surround nearly all sales of surplus properties today which are governed by the rulings of the various agencies which have control over the property.

AS a result of all the confusion of jurisdictional lines between agencies on property disposal, the WPB Redistribution Division says that the Smaller War Plants Corp. is edging its way into the situation.

WPB officials think that they should be permitted to tell the other war agencies what is surplus and direct the sale of the amount and kind of property which it thinks the Army should get rid of. Of course, the War Department flatly rejects such proposals as an invasion of its authority.

Also, while the War Department claims that it has satisfactory working policies on the priority of contract terminations, the Truman Committee is not convinced of this fact, nor is another very highly placed Administration official.

WPR Redistribution officials complain that they have no adequate authority over the disposition of machine tools of contractors in the process of termination. WPB Facilities Bureau and the Machine Tool Division alone have the authority.

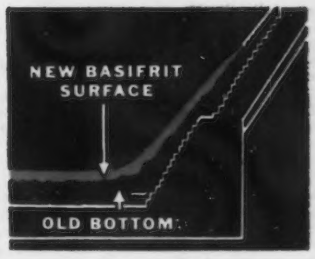
In connection with the disposal of tools, the proposal has been made that the surpluses in this type of equipment is now so overwhelmingly great that dealers should be permitted to buy them for speculative purposes. This would help a great deal, the Redistribution Division says because machine tool dealers have already performed a valuable function in the redistribution of surplus tools to war contractors.

Copper Relaxation

• • • **The use of copper** in farm tractor radiator fins and power take off gears is now permitted. Order L-170-a, as amended, removes the previous restrictions.

To Keep Them Pouring

Resurface Open Hearth Bottoms with BASIFRIT



HERE'S a suggestion to add hundreds of heats to the life of that open hearth furnace whose bottom is old and unreliable: Resurface it with Basifrit.

Briefly, here's how: Before the furnace goes down for repairs, wash it down, using coke breeze on the banks and blowing them down with air about every hour. Run slag out every two hours. Continue until the hearth is washed down about 6 inches. Then start resurfacing. Throw in Basifrit with shovels, *without any admixture of slag* The quick-setting Basifrit burns in almost as fast as it can be shoveled. Apply additional layers, one after another, and finish with a light slag wash. Cool until cracks show, then heat up, coat with raw dolomite, and charge. Take off two or three heats before shutting down the furnace for the repairs. The whole job takes 52 to 54 hours.

Resurfacing is just that simple—with minimum lost production. In fact, resurfacing time is not lost time, because it is soon more than made up by reductions in delay time between heats. And you have a sound bottom to protect the quality of your steel.

Basic Refractories Engineers are always at your service on any problem of hearth construction, repair or maintenance.

BASIC REFRACTORIES, INCORPORATED

CLEVELAND 15, OHIO

Briefly Told—

International Harvester Buys Tract . . . Blood And Guts Copy Urged

● *International Harvester Co. has purchased a 375-acre tract on the east bank of the Mississippi River between Alton and Wood River, Ill., on which it will construct a post-war farm equipment manufacturing plant. Designs call for a single story plant, including foundry, forge shop, machine shop and warehouse with a central heating plant. Approximately 3500 people will be employed.*

●

● **"Blood and guts" copy is needed to combat some types of absenteeism Lukens Steel Co. believes. Accordingly, the firm inserted a series of advertisements in the Coatesville (Pa.) Record, all built around a picture of a guy "taking it easy," with full copy that heaped scorching ridicule on workers who report off because of a hangover, spend the day at the track, or the night over the pasteboards.**

●

● *Bituminous coal miners, working under a contract with the government dug 12,975,000 tons of coal during the week of Dec. 11, largest since the week of March 26, 1927, when the miners dug 13,320,000 tons of coal. Average employment in the bituminous coal mines in 1927 was 593,918 men. It is estimated that there were nearly 200,000 men less than this number employed in the mines during the week of Dec. 11.*

●

● A railroad train reaching 2580 miles—almost across the country—would be required to haul the iron ore, coal and limestone now being used annually by Republic Steel Corp. According to *Republic Reports*, the steel company is now using ore at the rate of approximately 10,200,000 tons per year, coal at the rate of 7,140,000 tons annually, and limestone at the rate of 3,120,000 tons annually.

●

● **Because Parker Appliance Co., Cleveland, did not wait for approval of the WLB before granting wage increases negotiated with five AFL unions, $50,000 in labor costs will be disallowed as a deductible expense for income tax purposes or in determining costs.**

●

● While Canada has sharply reduced her cargo shipbuilding program there has been no slowing down in the building of fighting ships. C. D. Howe, Minister of Munitions and Supply, stated that Canadian shipyards established a new record in November when 11 escort vessels were delivered.

●

● The Gillette tire plant of the United States Rubber Co., Eau Claire, Wis., which has been operating as the Eau Claire Ordnance Plant on .30 cal. machine gun ammunition for the past year, has turned out its last cartridge, and the last of its special machinery has been dismantled. The plant will be reconverted for producing synthetc rubber tires for military needs.

Republic Suffers From Strike of 300

Massillon, Ohio

● ● ● **More than 300 employees of** the Enduro Division of Republic Steel Corp., at Massillon, Ohio, went on strike on New Year's Day in an attempt, according to the company, to dictate a change in work schedules in order to obtain additional overtime. The division has been working 18 turns or six full days, but increased demand for stainless steel for aircraft has made necessary an increase in the work schedule to 20 turns. Normally, such a change would be made by inaugurating a swing shift so that the men work 48 hr. a week, 8-hr. of which are at time and a half pay. The USWA-CIO demands that the work be arranged so that the men work seven days instead of six, thereby requiring the company to pay double time for the seventh day. To meet these demands, the company states that the entire corporation's scheduling procedure, which has been in effect for many years, would have to be changed.

Open Hearth Strike Halts Lukens Steel Co.

Coatesville, Pa.

● ● ● **A surprise walkout** of workers closed the open hearth department of the Lukens Steel Co. here last Friday. Approximately 200 pit crew workers walked out Thursday night during negotiations over a series of demands the men had presented. Ten open hearth furnaces were shut down. The men returned Saturday morning.

Sloss-Sheffield Strike Cripples Whole Area

Birmingham

● ● ● **At least 16 plants** employing about 13,000 persons in this area were shutdown by the middle of last week due to gas and power shortages caused by the Tuesday strike of Sloss-Sheffield Steel & Iron Co. workers.

All operation at Sloss-Sheffield were abandoned on Tuesday when a walkout of 79 commissary and office workers was joined by the company's blast furnace and by-product workers. Shortages of power and gas caused when four blast furnaces were banked forced the closing of the company's coal and ore mines and has generally disrupted the functions of the entire area which depends in part upon Sloss-Sheffield for both gas and power. About 6000 tons of pig iron was lost.

The altercation with the workers resulted from a WLB decision making work rules retroactive to Oct. 20, 1943, instead of back to October of 1942 as requested by these District 50, UMW, members. The strikers returned the night of Dec. 29.

NEW THREAD-GRINDING ECONOMY ON COMMERCIAL PRODUCTION

Greatly increased production of thread grinding which produces a far more accurate and precise thread of superior finish than possible with other methods, may be achieved with Sheffield Precision Thread Grinders. These are the first American designed machines on which either the multi-ribbed or single-ribbed wheel may be used.

The finished thread may be formed in one plunge cut with the multi-ribbed wheel—high production of high quality. Multiple threads are ground in one pass without necessity for precision indexing.

Fine threads can be ground AFTER hardening, especially on thin-walled components, eliminating objectionable stresses and possibility of distortion—also assures thread being held concentric with other ground diameters and threaded sections of work part.

Substantial savings in operating time over conventional machines make it more economical to grind threads with a Sheffield Thread Grinder. Also because of these savings, it is now feasible to grind threads formerly produced by other methods.

WRITE FOR FULL DETAILS • BULLETIN M-100-143

SHEFFIELD MASTER CRAFTSMEN

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

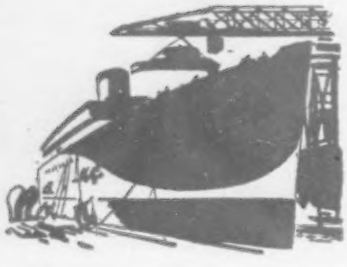
MACHINE TOOLS—GAGES—MEASURING INSTRUMENTS—CONTRACT SERVICES

ARMY E NAVY

WEST COAST . . .

OSGOOD MURDOCK

• Geneva seems to offer no more conviction nor official assurance for future steel than it did for world peace . . . Gray iron foundries inactive, with unpromising prospects.



SAN FRANCISCO—No less widespread nor irresponsible than speculation on the whether and when of the second European front have been rumors, conjecture, false steers, reports and denials on the whether and when of the $200,000,000 plate mill at Geneva, Utah, now over 90 per cent complete and which will be ready about March 1 to supply a major share of such ship plates as will probably be required for Pacific Coast Maritime construction after that date.

An apparently entirely unauthorized flash press wire over a weekend from Washington last month produced banner headlines in unsuspecting commercial papers on the West Coast, and in the parentally proud Salt Lake papers to the effect that the mill would not be operated, at least in wartime. Traced to their supposed source with WPB in Washington, the dispatches were denied, but there seemed evidence that this particular war program is still under discussion. Maritime Commission wants the plates. Defense Transportation wants to save freight cars by shipping plates from Utah instead of Chicago or Pittsburgh. War Manpower wants workers, of whom it will take 5000 to 8000 to operate the mill. WPB husbands materials and its steel division is conscious of a generally easier national steel situation. Meanwhile Defense Plant Corp. holds a pretty big bag and is proud of the earnest enthusiasm and competence in overcoming obstacles which have been reflected in the administration of E. M. Barber, vice-president of Columbia Steel Co., as construction contractors, and Walter Mathesius, president of Geneva Steel Co., as contracted operating organization. Mr. Mathesius personally is sincerely and enthusiastically impressed with the economic and startegic importance of this plant, not only for the emergency but in the long run, and he has dedicated his energy and his organization to prove its present and future value and the wisdom of its creation.

A few weeks ago WPB announced the halting of further construction on the structural mill. Arrangements have been made for storing scheduled materials as received, so that this unit of the plant could be completed later. It represents less than 10 per cent of the entire Geneva operation and is probably 80 per cent complete already. Its urgency for emergency needs is not as great as plate production. Barring political interference or production slowdowns as the result of sniping by arm chair economists, there is now every probability that approximately one-third of the total rated plate producing capacity of the plant can be in full operation about March 1. Plans are tentative to heat the first of three furnaces the first week in January, to be followed soon by operation of three open hearths, so that pig iron, ingots and slabs can be in readiness for rolling.

REALISTIC steel executives in the Far West, both in production and sales, feel that the Geneva plant will operate economically, that it is strategically situated especially for raw materials, that its capacity is no greater than that of the Pueblo operations of C.F.&I. which has proved practical for the past several decades, and that although it is unbalanced and larger than would have been built under normal circumstances, it seems ill advised to consider halting or limiting the operation at this late date, when so much has been spent, within a few short weeks of operation, and particularly when plates are still urgently needed on the West Coast and rail transportation is desperately short.

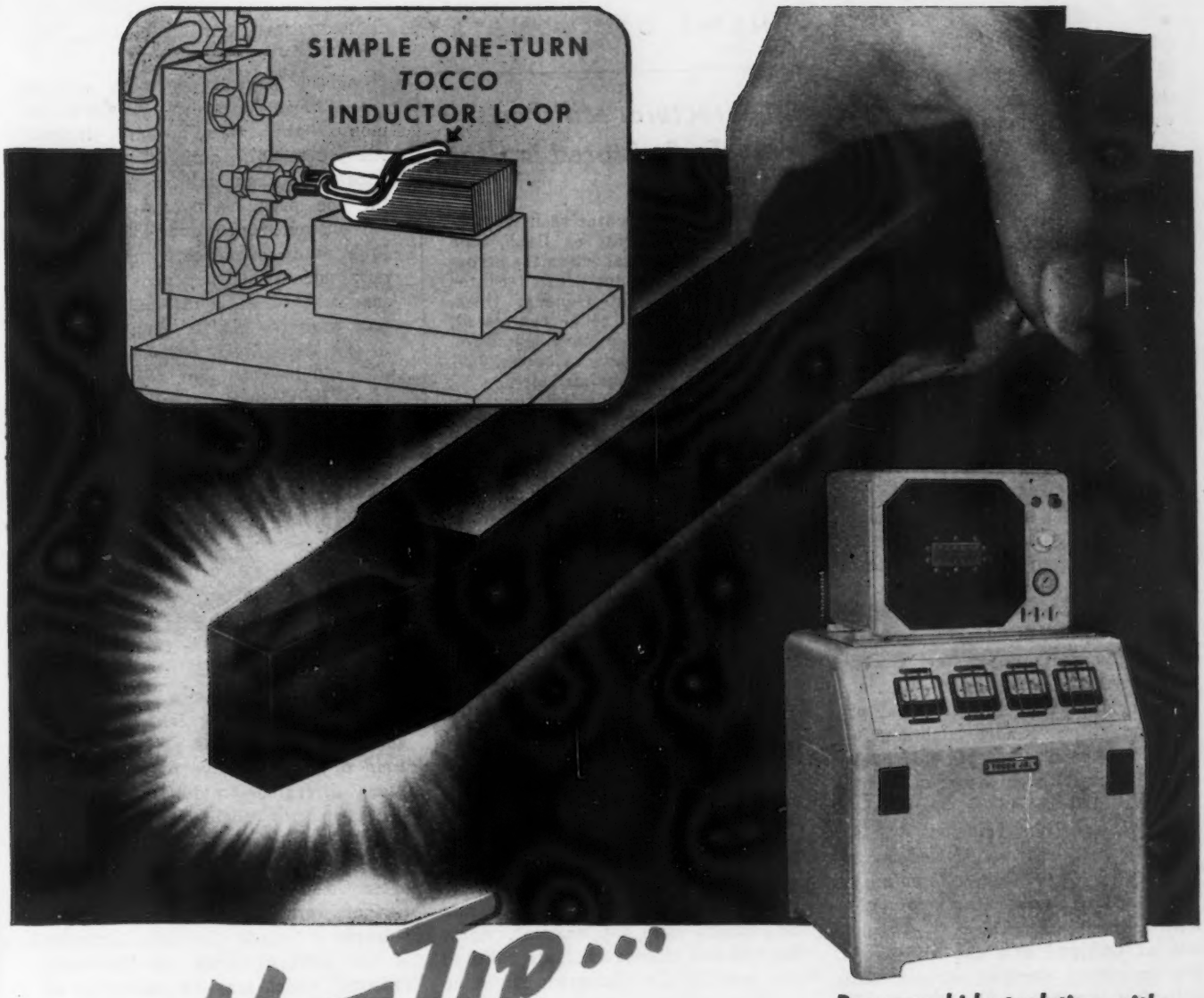
It is reliably reported that Senator Pat McCarran is arranging February hearings, in southern California and later in Salt Lake, to go into steel plant situation on the West Coast, particularly in connection with the California Commission on Interstate Cooperation of which Attorney General Robert W. Kenny is chairman. This record and forum would undoubtedly offer an opportunity for beating the tom-tom for home enterprise and development of natural resources and especially the decentralization of industry and the machinations of monopolies and trusts. If the West Coast steel production of the future is to depend upon the result of Senatorial or Congressional hearings and decisions resulting from pressures and unseen influences at Washington, prospects are dim indeed.

EYEBROWS have arched and tongues are in cheeks since OPA permitted Kaiser Steel to charge the Maritime Commission, retroactively to October, for plates from Fontana at the rate of $64 a ton. This is equivalent to the Chicago mill price plus all rail freight to the West Coast. Mill prices on the West Coast hitherto have been based on water freight from eastern seaboard, and on this basis, carbon steel plates would have been sold, if they had been previously produced, for $53 a ton. Compared with the Sparrows Point, Chicago and Pittsburgh at $42 a ton, even the former $11 water rate differential was criticized as an undue handicap to Pacific Coast industry. When the Kaiser plant was established at Fon-

First Pig Iron Made At Geneva Co. Plant

Salt Lake City, Utah

• • • Pig iron production began Jan. 4 at the Government's new $180,000,000 steel plant near Provo, Utah, with the blowing in of the first blast furnace. This plant is operated for the Government by Geneva Steel Co., U. S. Steel subsidiary. The first iron will be tapped within 24 hr. This furnace is one of three which have been erected at the new plant. Each furnace has daily capacity of 1100 tons of iron. Iron ore was brought to Geneva from Columbia Steel Co.'s open pit iron mine near Cedar City, Utah. Cope production started Dec. 14.



A Hot Tip...

Braze carbide tool tips with this "TOCCO JR. 7½"... the new low-cost "heat-treating department" with a multitude of uses.

● Simply place the prepared shank and tip in the TOCCO inductor, press a button and in 10 to 30 seconds the tool tip becomes red hot . . . so quickly the tool often can be removed with the bare hand before the heat has time to reach the far end!

Timing is automatic, accurate to a split second.

All sides of brazed joint are heated simultaneously, uniformly.

Speedy heating affords high rate of output.

Three sizes of inductor loops (which can be made readily in your shop from standard copper tubing) cover the average range of tool sizes.

Clean, cool and compact, the "TOCCO JR." is ideal for the tool room or production line.

By simple change of work fixture, the TOCCO machine can be adapted to brazing, hardening, annealing or heating for forming of a wide range of parts . . . for war or peacetime production.

Ask for bulletins on the New "TOCCO JR. 7½" and "TOCCO JR. 15" . . . small, low-cost units ideal for brazing of tool tips and scores of other heat-treating applications.

THE OHIO CRANKSHAFT COMPANY · Cleveland 1, Ohio

TOCCO

HARDENING..BRAZING

ANNEALING..HEATING

★

tana all southern California hailed the event as presaging a new day, with a Pacific Coast raw steel basing point that would put West Coast fabricators in competition. But if the protective umbrella of $22 a ton rail freight is necessary as a subsidy, from the public treasury now but from private industry later, the advantages of the Fontana operation may be more sentimental than actual so far as West Coast and particularly southern California's industrial ambition for the future are concerned.

GRAY iron foundries pretty generally on the West Coast are shopping for orders and open to propositions. A sizable and steady volume has previously been involved in Liberty Ships and particularly for the simple reciprocating engines for them. With the gradual changeover to Victory ships with turbines and replacement of cast iron by steel castings and forgings on deck and outside of the engine rooms, the principal previous wartime foundry customer will be pretty much out of the market from now on. Since cast iron scrap is and will continue to be short, it appears that the honeymoon is over for West Coast foundries. Malleables are not so short or at such a premium as in the Midwest and the three malleable facilities, one at Los Angeles, one at Oakland and one at Seattle, are supplying demand without difficulty but in comfortable volume.

UNPREDICTABLE, inscrutable but always news conscious, Henry J. Kaiser gave out a widely quoted interview that the peak of war production in almost every item is over and that the time has come to begin the gigantic task of shifting back to peacetime economy and efficiency in production. (There was no discussion of the cost of producing plate at Fontana.) Mr. Kaiser further suggested that the War and Navy departments canvass every man at every fighting front about his specific desires for eventual return to civil life, where he wants to go, and what work he wants to do.

To Army and Navy men primarily concerned with getting as much equipment as possible to win the war as quickly as possible, the statement and suggestions were not welcome. Some skeptics and shrewd analysts believed that possibly the statement might be directed indirectly at nearly 200,000 Kaiser employees on the West Coast in shipyards, steel, magnesium, aggregate and general contracting enterprises, to suggest future labor competition and reduced turnover.

TURNOVER, terminations and turmoil in essential industrial employment have been greatly reduced this past month, since the severe employment ceiling freeze, but a frightful situation has simply been made better although still bad. Among some 90,000 employees at the Richmond shipyards, in the first two weeks in November there were 4313 terminations, 1556 with clearance, 2135 without clearance and 622 dropped from the payroll or "sunk without trace." For the last two weeks in the month the terminations dropped sharply to 2877, only 722 with clearance (less than half of the number for the previous two weeks), 1716 without clearance and 439 dropped. In a study of reported reasons for terminations, 21 per cent were discharged and an additional 17½ per cent were for health. Approximately 10 per cent were military and another 10 per cent for personal business. Belying the shrieks and demands of labor leaders and social reformers for housing, transportation, child care and social services, only 1.6 per cent left for child care, only 1.9 per cent for transportation, and 4.6 per cent because they were dissatisfied. Only 1.1 per cent gave "another job" as their reason.

In southern California the Aircraft War Production Council's figures for war plane workers showed even greater turnover. In a year's time approximately 85 per cent of all persons hired left. Of all new hires, less than 6 per cent have ever had previous airframe building experience, proving pretty conclusively that workers don't leave one plant for another. As of late December, the seven major West Coast companies composing the Council were still losing about 17,000 workers a month through turnover, 55 per cent of them for "personal reasons" which may be translated as low morale, lack of ambition or indifference.

Structural Mill Parts To Be Stored in Utah

Washington

• • • **Representative J. W. Robinson, Democrat of Utah, said last Friday that while the structural mill of the United States Steel Corp. at Geneva, Utah, was not going to be completed, DPC had given permission for the various parts to be finished and stored on the mill site.**

Stories originating on the West Coast to the effect that WPB has decided not to permit the $190,000,000 giant steel installations of the West to operate for the duration were denied by WPB. Steel Division officials said that the Government would hardly spend so much to complete the steelworks, and then turn the key without deriving any benefit from the expenditure. Moreover, it was emphasized that the plate mill was being rushed to completion in the hope that it would be in production late this month or early in February.

Sloan Outlines Post-War Plans for American Enterprise

New York

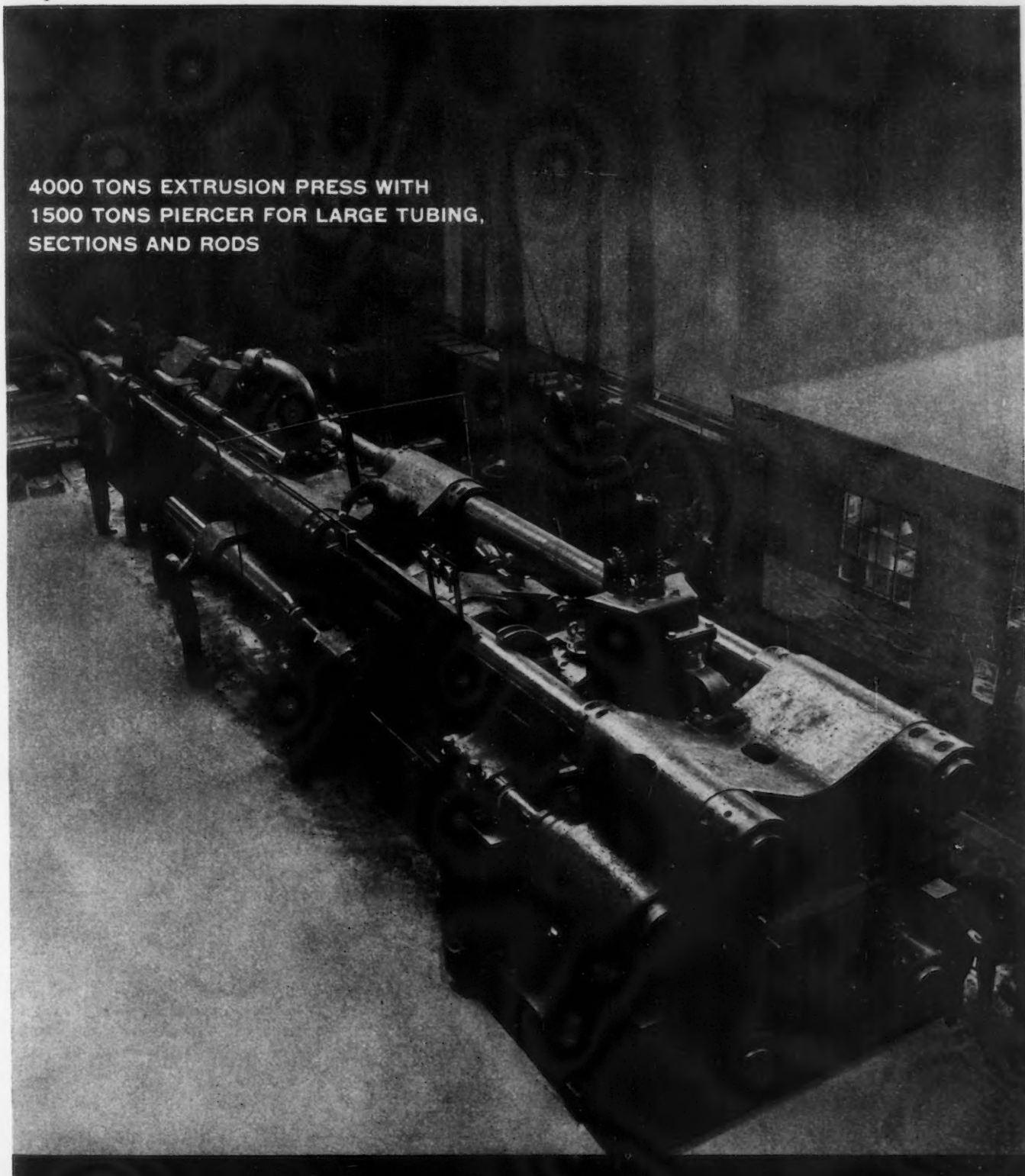
• • • **Asserting** that "expanding job opportunities are a social, political and economic essential in the post-war era" which can be achieved only by "a virile and expanding system of American enterprise," Alfred P. Sloan, Jr., chairman of the board of General Motors Corp., outlined recently a program to carry that message to the American people.

As chairman of the National Industrial Information Committee, to which 6000 business organizations subscribe and which is sponsored by the National Association of Manufacturers. Mr. Sloan said that every avenue of communication would be utilized fully to bring home to 137 million Americans the post-war ambitions of American enterprise.

. . . *Cited for Awards* . . .

• • • **The following companies** have received the Army-Navy E award for excellence in war production:

Bell Sound Systems, Inc., Columbus, Ohio.
American Red Cross, Blood Donor Center, Atlanta, and Portland, Ore.
W. S. Darley & Co., Chippewa Falls and Chicago Avenue Plants, Chicago.
Outboard, Marine & Mfg. Co., Gale Products Co., Galesburg, Ill.
Owens-Illinois Can Co., Baltimore Plant, Baltimore.
Silver Falls Timber Co., Silverton, Ore.



HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
STRETCHERS · PUMPS · ACCUMULATORS

570 LEXINGTON AVENUE · NEW YORK · N. Y.

Fatigue Cracks . . .

BY A. H. DIX

We Threw in Reverse Gear

• • • You hold in your hands a triumph of salesmanship in reverse. In last year's 656-page Annual Number our pres. and ed., John H. Van Deventer, announced that because of the paper situation, special issues were out for the duration. This year we deliberately set out to keep advertising in the Annual from attaining jumbo proportions, and, as you see, we succeeded.

No limits, however, were placed on the brains department's acreage. The tillers of this floor's northwest patch have sown a crop that will keep you in calories for weeks to come. The fare is rich and we warn against ingesting all at one sitting. Twenty pages at a time will give your cerebrum that sleek, well-nourished look.

Octogenarian Infant

• • • At the beginning of each new year we have been in the habit of subtracting from it 1855, the year John Williams started your favorite family journal, and blurbing about our years of service as the country's oldest business paper.

But this year our heart is not in it, as Frank Oliver, who occupies the cell next to us, has brought us the deflating news that the going and highly prosperous Stora Kopparbergs Berglags Aktiebolag, Sweden (Great Copper Mountain Co. Ltd.) was started in 1228.

Is that wetness we feel behind the ears?

Suction-Cupped Monickers

• • • *Most names lack mnemonic grip. But a few men are blessed with names it is impossible to forget. Most blessed of those we have run across recently are Posey T. Kime, of the Anti-Trust Division, Department of Justice, Washington, and Oscar Doob, Advertising Director of Loew's Theatre, New York, now on special duty in Washington.*

Counter-Clockwise Twist Drill

Why the left-hand twist drill in "The Bull of the Woods" of Dec. 9?

—*Ole K. Olsen, Inc., New Orleans, La.*

• • • J. R. Williams, "The Bull's" brilliant creator, learned his trade well in an Alliance, Ohio, machine shop, under the critical eye of the original "Bull." Mr. Williams never errs technically. There is doubtless an excellent reason why the drill is unconventional. The lady is probably a southpaw.

Calendar Hoarder

I note with interest that the Clarence Pettays, of Cambridge, Ohio, have written to you for calendars. This amused me no end as we have been receiving two or three postal cards each year regarding our calendar.

—*Daniel Reebel, Advertising Manager, Mesta Machine Co., Pittsburgh*

For the past five or six years Mr. Pettay has been sending me a similar request. It has gotten to be an office duty for all of us to collect our calendars and send them to the old gentleman with our best wishes. To date we have accumulated about six.

—*John G. Mapes, American Iron & Steel Institute, New York*

Calendar collection with the Pettays is apparently no mere whim but passion. Like the man who confessed to the psychiatrist that he was fond of wheatcakes, they must have trunksful.

We have done our part to make 1944 a banner year for the Pettays by sending them the only two calendars we have received, one from the West Virginia Pulp & Paper Co. and another from Waldorf Clothes, Paterson, N. J. Neither is our type, having big pictures and little dates. What we crave is one with little or no picture and big dates, and if Mr. Reebel's fits this specification he will make our life complete by sending us one.

Predestination

• • • As we look back over 1943, the aptronymic discovery that gave us the greatest satisfaction was in finding that Continental Motors' chief draftsman is Joe Sketch.

Scintillating Simile

• • • As the most striking figure of speech published in this journal last year we nominate "as inseparable as a mermaid's knees."

Woolgathering Typesetter

• • • The most embarrassing typographical switch of the year was the *Christian Science Monitor's* front page headline at the time of the Moscow conference, "U. S. SECRETARY OF STATE GIVES FLAT ASSURANCE ALL VITAL TOPICS WERE DISCARDED." The last word, as corrected in a later issue, should have been "discussed."

Winning Editorial

• • • Combining truth and apple polishing, we declare that it is difficult to select the best of our pres. and ed.'s fifty-two 1943 editorials. His Remington is set to produce nothing but gems. But the customers chose "Nameless Children," which appeared first in the June 3 issue and later in a host of other publications.

This is the block buster, aimed at brand eliminators, that ended up with:

> We have a word in this language, and it is not a pretty one, that we apply to nameless children. Do we want this same term applied to the products of America's farms and factories?

No. 1 Feature

• • • Using requests for reprints as an applause meter, No. 1 on the 1943 editorial feature hit parade was the 19 in. by 43 in. NE Steel Chart that appeared as a supplement to the May 6 issue. It has been out eight months; it is out of date, but the demand for it seems never-ending.

Parabird

• • • *The most happy corporate name we encountered last year belongs to a Venice, Calif., parachute fittings manufacturer, the Skylark Mfg. Co.*

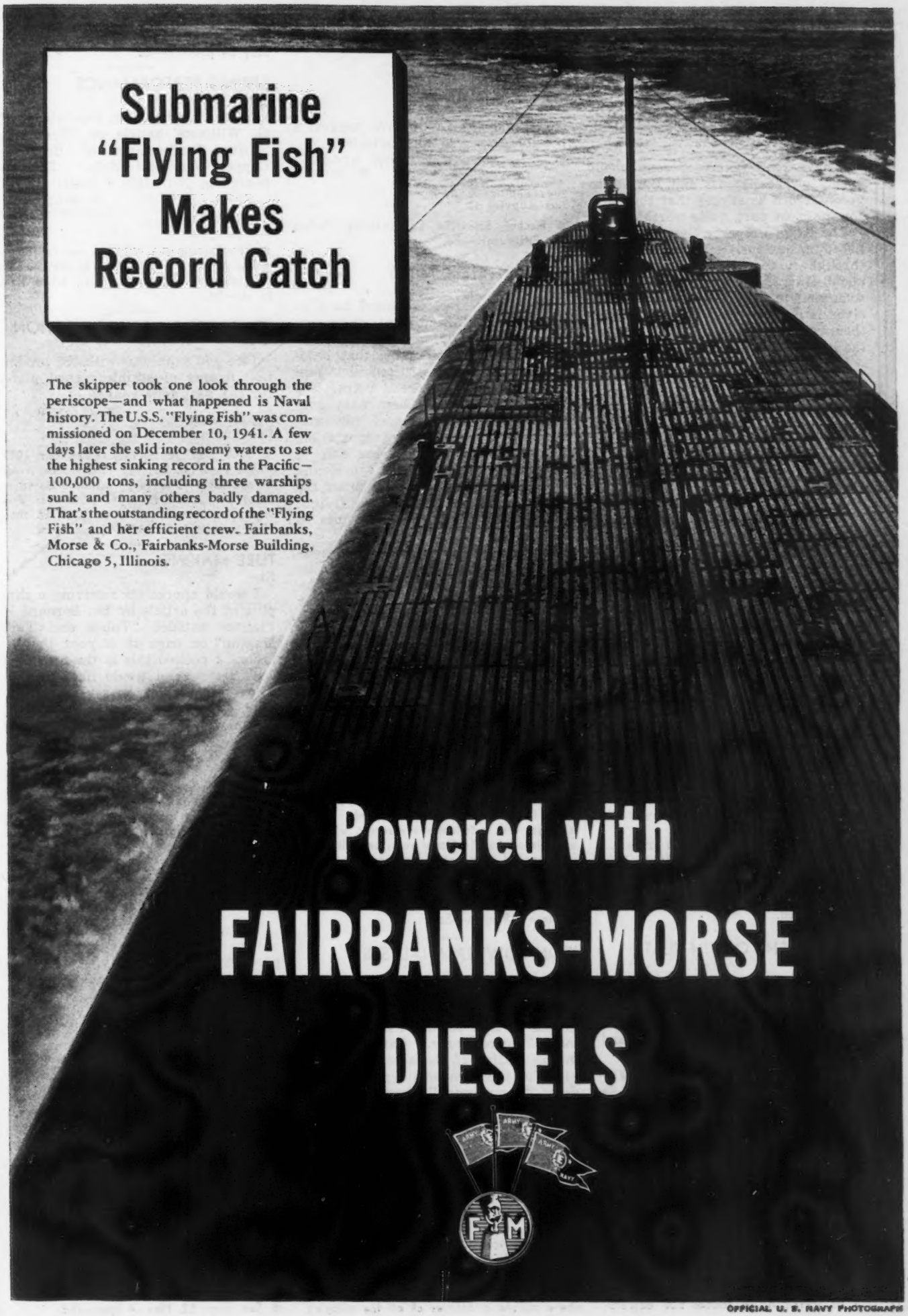
Puzzles

Last week's watch cost $17, and A, B, and C's pocketbooks contained $5, $11, and $13 respectively. That is what our puzzle book says, but as we figure it any answer with the same ratios is correct.

This one, from C. K. (American Cast Iron Pipe Co.) Donoho, will make your 65 deg. living room seem warmer:

A man rows a boat directly upstream. His son sits in the bow flying a kite in the wind which is blowing in the same direction that the river is flowing, but twice as fast. The kite string breaks as the kite is 110 yards behind the boat, allowing the kite to drift freely through the air for one minute and then fall into the river.

In spite of his son's objections, the father continues rowing upstream. But 5 minutes after the kite had hit the water, he turns the boat downstream. After 6 minutes rowing downstream he sees that the kite is still ⅛th mile away and gives up in disgust. What is the wind velocity, assuming that the oarsman's water speed is constant, that the kite travels exactly with the wind when floating in air and with the river when floating in water?



OFFICIAL U. S. NAVY PHOTOGRAPH

Dear Editor:

SEIZED PATENTS OF LITTLE VALUE

Sir:

I have read reams of copy about enemy owned patents and I want to go on record as saying that they are, for the most part, quite worthless.

The Alien Property Custodian published an extensive listing. I went through it carefully and called for about thirty which seemed to apply somewhat to our business. These arrived in due time and I went through them very thoroughly. I finally tossed the lot into the waste basket.

I would make this general statement—that patents of any worth are known and valued and when any circumstances develop which make them available, those familiar with them would take advantage of the situation promptly. Such patents in all likelihood have long since been culled from the lot. What remain, in my opinion, have little or no value.

D. B. TOLLEY,
Vice-Pres.
Globe American Corp.,
Macomb, Ill.

● How do other readers feel about the worth of seized patents?—Ed.

ELASTIC LIMIT OF STEEL

Sir:

We are planning to utilize some scrap steel rolls and it is necessary that we have an accurate knowledge of the elastic limit of this steel, in both tension and compression. We also have some cast iron rolls on which we want to have compression tests made. Can you give us the name of a commercial laboratory in the U. S. that can make these tests for us?

FRANK TROTTER,
Genl. Supt.
Cuban Mining Co.,
Cristo, Cuba

● Write to Sam Tour & Co., 65 Pine St., New York.—Ed.

DEVELOPMENT OF TIN PLATE

Sir:

We read with interest the excellent article by Howard A. Knox on "The Development of the American Tin Plate Industry," in your Nov. 25 and Dec. 2 issues.

We are wondering whether you have any reprints of this article, as they are of much value to anybody in the tin plate business.

F. G. WHITE, Chief,
Dept. Metallurgy and Inspection
Granite City Steel Co.,
Granite City, Ill.

● Reprints may be obtained from the Carnegie-Illinois Steel Corp., Pittsburgh.—Ed.

GERMANIUM METAL

Sir:

I would like to obtain a small quantity of germanium metal for experimental purposes. Can you suggest a possible source of this material?

HAROLD H. BLOCK,
Metallurgist
Airesearch Mfg. Co.,
9851 Sepulveda Blvd.,
Los Angeles 45

● Fischer Scientific Laboratories, Forbes St., Pittsburgh.—Ed.

SEAPORT STEEL MILLS

Sir:

Heretofore steel producers have located their mills and plants at sources close to deposits of ore, lime and coal. Bethlehem departed from that practice when they constructed their mill on tidewater at Sparrows Point. We understand this has been very successful due to imports of raw materials by cheap water transportation, and also due to their being able to load finished products for export and coastwise shipments direct from the mill to vessel, thus eliminating freight and handling from inland points to shipside.

If these are among the main reasons for the Sparrows Point success, would not other steel companies be interested in a similar development at another seaport location?

R. M. NELSON,
Chairman
Savannah & Atlanta Railway Co.,
17 East 42nd Steet,
New York 17

● Bethlehem's Sparrows Point plant is only a part of a much larger integrated steel unit. It uses its own ore boats rather than depending on other carriers. In addition, the Sparrows Point plant supplies a large inland market as well as a coastwise market and the plant furnishes considerable raw material and semi-finished material to Bethlehem's several Pacific Coast plants. As it is large, with excellent ore reserves, with an established Pacific Coast sales organization, and located adjacent to an excellent inland market, it is in a situation to be successful, whereas some other plant with only one or two of the same factors in its favor might run into difficulty.—Ed.

IRON POWDER ANALYSES

Sir:

I am greatly interested in obtaining the tentative analyses of the several grades of iron powder listed in your market price pages. Can you give me an outline of the accepted standards for these various types of powders: "commercial," "crushed," "by hydrogen," and "electrolytic?"

HENRY O. WILLIER
801 Jackson Avenue,
Takoma Park 12 (Md.)
Washington, D. C.

● Commercial—96 per cent plus Fe
Crushed—90 per cent plus Fe
Hydrogen Reduced—98½ per cent plus Fe
Electrolytic—99 per cent plus Fe
Carbonyl—98 to 99.80 per cent plus Fe

The remainder constitutes an oxygen content except in the case of the crushed iron where minute quantities of all the alloying materials usually found in pig or cast iron may be present.—Ed.

SPRING PERFORMANCE

Sir:

Please send us ten reprints of H. G. Williams' article on "Predicting Spring Performance of Beryllium Copper Wire and Strip." This appeared in your July 8 issue.

H. MILLARD,
Engineering Dept.
Micro Switch Corp.,
Freeport, Ill.

● We believe Mr. Williams can furnish reprints of his article. Write to him in care of Instrument Specialties Co., Little Falls, N. J.—Ed.

STAINLESS PLATE PRODUCTION

Sir:

Can you supply us with the production figures of stainless steel plates for the past four years?

M. J. CONWAY
Lukens Steel Co.,
Coatesville, Pa.

● 1940, 3,409 tons; 1941, 14,026 tons; 1942, 15,626 tons. To get the 1943 figure, it will be necessary to make an estimate based on ingot production for 1942. Stainless steel ingot production in 1942 was 340,780 tons; 1943 is estimated at 425,000 tons.—Ed.

TUBE MAKING

Sir:

I would appreciate receiving a clipping of the article by Dr. Bernard P. Planner entitled "Tubes and Tube Making" on page 48 of your Dec. 16 issue. I noticed this is the first part of a series, and would like to know when the rest of the series will appear.

Can you also tell me Dr. Planner's address?

J. P. DODS,
Director of Research in
Charge of Advertising
Summerill Tubing Co.,
Bridgeport, Pa.

● Dr. Planner's three-part article appeared in the Dec. 16, 23 and 30 issues. He is consulting engineer of the National Tube Co., Pittsburgh.—Ed.

UNION CHANGES

Sir:

We would appreciate having four or five reprints of page 103, "Proposed Steel Union Changes vs. Present Contract," in the Dec. 9 issue.

W. D. MOORE,
President
American Cast Iron Pipe Co.,
Birmingham 2, Ala.

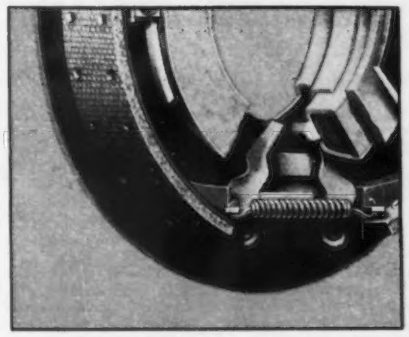
HIGH STRENGTH STEEL CASTINGS

Sir:

Your Nov. 4 News Front reads, "High strength steel castings for aircraft parts, hitherto impossible to obtain in the shapes, sizes and quality desired, will soon be available in production quantities." Can you give us more information regarding this statement?

G. V. VENNELS,
District Mgr.
Railway & Power Engineering Corp., Ltd.,
1016 Mainland Street,
Vancouver, B. C.

● See page 52, Nov. 4 issue.—Ed.



MUEHLHAUSEN SPRINGS PREVENT FROZEN BRAKES

AS applied to motion, electricity has been considered generally as a starting and moving force—but now, with Warner Electric Brakes, it is used for stopping as well.

This brake has another thing in common with many other products—the use of well-engineered springs to control important mechanical actions. Warner relies on Muehlhausen Springs to free the brake bands after the vehicle has slowed or stopped. On one grueling run after another, through heat, rain and crystallizing cold, Muehlhausen Springs perform this job automatically.

A big responsibility for a little spring! But, because of careful design by experienced engineers, it does its job unfailingly.

MUEHLHAUSEN SPRING CORPORATION *(Division of Standard Steel Spring Company)*, 817 Michigan Avenue, Logansport, Indiana

Leading product designers in every industry are consulting Muehlhausen Engineers to secure springs of lasting efficiency.

MUEHLHAUSEN
SPRINGS
EVERY TYPE AND SIZE

This Industrial Week . .

- ***New Tests Face Industries at Start of New Year***
- ***Steel Output to Be Lower; Aluminum Cutback Starts***
- ***Machine Tool Volume in 1944 Around $350,000,000***

A PERIOD of new tests of a severe nature faces metals producing and metals using industries at the start of 1944, the year of the European Invasion.

Twelve months ago, tremendous order backlogs, material and manpower shortages and expansion needs were the topics of the day, and few persons were able to visualize fully the unprecedently high production destined to be achieved in 1943. This week backlogs are declining in a number of lines, much of the new capacity has proved unnecessary, and cutbacks, renegotiation and surplus goods disposal are the current subjects of importance.

WPB has under consideration an order which would permit the use of excess steel stocks without regard to the items or to the terms of any material restrictions imposed by limitation orders. This would mean that manufacturers with adequate manpower and facilities could use the supplies for civilian production upon WPB permission.

In six months, the steel production-distribution pattern is expected to be closer to normal than at any time since the war began. Output of ingots will be lower during 1944 than the record 1943 production of around 89,000,000 net tons. Supplies of ingots and semi-finished steel are easy currently. Demand for flat rolled steel is still high and probably will remain there until landing barges, landing mats and other invasion equipment are completed. Substantial increases in rail and pipe production are likely.

THE recently announced closing of four aluminum pot lines owned by the government with a total output of 12,000,000 lb. a month is one development emphasizing the easier situation in metals. Other major cutbacks in aluminum output, which rose to 7½

Month by Month Through 1943 in "This Industrial Week"

January—With much questionable tonnage cleared away, order books are healthier than at any time since war began in Europe. . . . Plate production will move up rapidly in the next six months. . . . Lack of hot topping facilities at steel plants continues to be serious barrier. . . . Scheduling of components can be expected.

February—Making of steel shell cases will be boosted. . . . Excess steel in bessemer, top cut billets and used rail equals 100,000 tons per month. . . . Bottlenecks in alloy steel and aluminum extrusions, delaying aircraft program, are being blasted. . . . Machine tool industry will be looking for work before year is over. . . . Huge quantities of idle steel being uncovered by government.

March—Maritime Commission is designing new type merchant ship. . . . Increased use of open hearth alloy steel being urged. . . . Heated disagreements over certain phases of CMP have arisen. . . . Labor leaders urging 48 hr. week in steel. . . . Steel expansion program lagging behind schedule.

April—Requests for carbon steel by claimant agencies for third quarter are 20 per cent greater than tonnage sought for second quarter. . . . Kaiser will begin making steel in May. . . . Controversy over inspection of steel plates results in pileup of material. . . . Minor strikes are numerous. . . .

May—48 hr. week ordered in steel industry. . . . First coal mine shutdown will be felt for some time. . . . Munitions programs undergoing adjustments. . . . Ingot production for 1943 won't reach goal of 92,000,000 tons. . . . Aircraft firms urge foundries to switch to magnesium. . . . Jobbing foundries beginning to look for work. . . .Around 3,000,000 tons of new steel capacity added since Pearl Harbor.

June—Second coal strike on. . . . Byrnes appointed war mobilizer. . . . Component Scheduling Procedure issued. . . . Tank armor mill at Chicago lays off many. . . . Lake Superior ore shippers doubtful of reaching goal of 91,000,000 tons. . . . Drive for 2,000,000 more tons of steel starts. . . . Work stoppages delay production. . . . Ingots piling up on West Coast may be exported. . . . Third coal mine strike starts. . . .Blooming mills main bottleneck to greater steel output.

July—Recession from high production tempo in war goods manufacture appears. . . . Molybdenum supply and demand in balance. . . . Attempt to decentralize steel industry formulated by Senator McCarren. . . . John Whiting heads WPB Steel Division. . . . Demand for fourth quarter steel by Claimant Agencies 5,000 000 tons above supply. . . . Complaint against WMC for creating "intolerable" situation in steel with its 48-hr. week policies is issued. . . . Switches in war program numerous.

August—Steel mill books rapidly being filled for balance of year. . . . Shortage of manpower outdistancing all other war production problems. . . . Better balance between steel supply and demand becoming evident, but plates and sheets are tighter. . . . Excess ingots beginning to be a problem. . . . Army tank program rapidly diminishing. . . .

September—Plate mills face hectic production situation. . . . A few electric furnaces are idle because of lack of orders. . . . Baruch report on critical manpower situation issued. . . . Steel still suffering from sporadic strikes. . . . Redistribution of huge amounts of idle or used equipment planned. . . .

October—Large steel buyers are seeking to reserve tonnages for use after war ends. . . . Jam on flat rolled steel more intense. . . . Weirton now rolling brass slabs. . . . Armor plate division at Gary will relase more workers. . . . Ingot production setting new peak. . . . Marked easing of ferroalloys noted. . . . Battle starts at Washington over contract cencellation policies. . . . Excess ingots piling up. . . . Production of finished material achieving good gains against order backlogs. . . . New Direction , transferring open hearth alloy steel to electric furnaces, will be withdrawn when shortage of carbon steel ceases. . . .

November—Fourth coal mine strike on. . . . Salaried workers in steel organizing. . . . Wastage of alloy materials in steel studied. . . . CIO will seek to reopen its steel wage contracts. . . .Relaxation of pig iron controls is a possibility. . . . 100,000 tons of unused steel allotments for fourth quarter returned to ASU at Wright Field. . . . Significant post-war trends seen in study of steel operating rates for 300 past months. . . . Labor complains against layoffs but Washington not fully prepared to open civilian goods production on large scale now. . . . Eventually, WPB will ease limitation orders.

December—New cutbacks revealed. . . . Supply of malleable castings inadequate. . .. Layoffs made at some war goods factories. . . . Plan to swap machine tools for Russia's raw materials gain headway. . . . Union demands 17c per hour wage rate boost in steel and numerous post-war guarantees. . . . Attempts to curtail production bring vigorous objections from union. . . . Final total of 84,404.852 gross tons of ore achieved by Great Lakes vessel fleet. . . . Steel industry product mix very unbalanced. . . . Alloy scrap generated at 100,000 tons per month above consumption. . . . Abolishing of pig iron allocations set for February. . . . Lumping of war settlements in one final transaction with contractors being attempted. . . . OPA unfreezes ore prices. . . . Huge steel strike hits industry. . . . Slashing of military contracts to continue in 1944. . . . Direction 2 in alloy steel lifted. . . . Large stocks of ferro-alloy materials shown.

times the pre-war level, are scheduled to come. WPB estimates the 1943 aluminum supply at 2,703,500,000 lb., with allotments made of 2,639,300,000 lb. Consequently, there was a 62,200,000 lb. surplus at the end of the year. Broken down, primary aluminum production was approximately 1,821,200,000 lb.; secondary production and imports amounted to 508,200,000 and 353,700,000 lb., respectively. At the same time, exports amounted to a probably 260,900,000 lb.

Cutbacks in steel and copper expansion programs are sure to follow WPB's announcement on curtailment in the aluminum program. High on the WPB list, it is reported, the Lone Star Steel Co. will not be permitted to go further with its expansion plans at Daingerfield, Tex. The company is completing construction of a blast furnace and had asked for authority to build steelworks and finishing mills. At the DPC steel mill project at Geneva, Utah, reports of first pig iron production and the decision to store finished parts of the abandoned structural mill were almost simultaneous this week.

The improved zinc supply situation has permitted relaxation of some controls recently. Orders have been issued for the production of 2,000,000 electric irons and 50,000 bathtubs during 1944, a modest but significant event. Restrictions on the delivery and sale of tungsten, vanadium, cobalt and molybdenum have been lifted. Ferromanganese and spiegel are reported easier.

THE announcement that pig iron allocations are to cease in February has been greeted joyously by foundries which are now relieved of the burden of reporting and in some instances of the necessity of paying over-ceiling prices. Some foundries were allocated more iron in December and January than they requested. The announcement was unsettling for operators of high cost furnaces, some of which may be forced out of business.

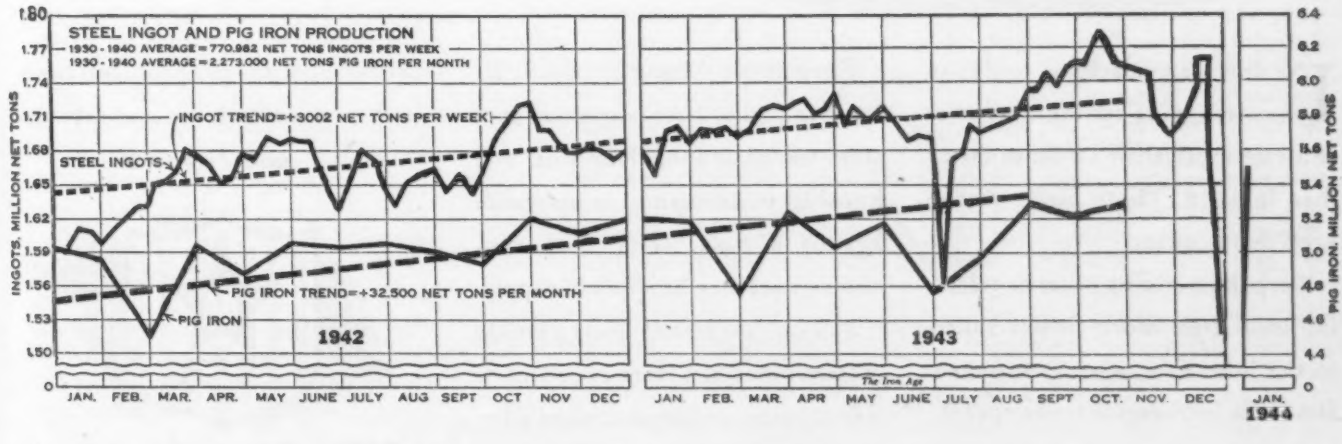
Appraising 1944 business prospects for the machine tool industry, expectations are that total dollar volume will be $350,000,000 to $375,000,000 including some $50,000,000 worth of Lend-Lease contracts. This is a very sharp decline from the $1,200,000,000 figure of 1943. By mid-1944 shipments and new orders may be equal.

Meanwhile, the attention of the machine tool industry is centered upon the 1944 tax bill at Washington, which contains a renegotiation amendment that is reported to be in disfavor with the Administration. Under the Senate version of the bill, exemption of machine tools and other industrial equipment from renegotiation seems to depend upon the facts in each individual case.

BEFORE long, the Baruch report on contract termination and surplus goods disposal is expected to be an important mile-post indicating an orderly route for the government to follow in 1944 and later. The situation Mr. Baruch has been asked to clean up such as rubber, manpower, terminations and surpluses, should never have happened. Prices which the War Department is said to be approving in the sale of steel inventories amount to dumping. For instance, according to the War Department, the contract of one steel consumer was terminated who had 5000 tons of uncut steel rods and bars. On the average the steel costs $56 per ton. It was sold for $30 per ton. The government took the loss. If this general practice if followed very long, mill prices on new steel may be undermined.

The national steel ingot rate this week snapped back to 97.5 per cent of capacity from last week's revised rate of 84 per cent. Pittsburgh operations increased five and a half points to 96.5 per cent and Chicago output rose six points to 103.5 per cent. Youngstown gained 54.5 points to 95.5 per cent while Cleveland jumped 21 points to 92 per cent. Wheeling snapped back to 96 per cent, a gain of 39 points. With Pencoyd out, Philadelphia's operating rate dropped two points to 91 per cent.

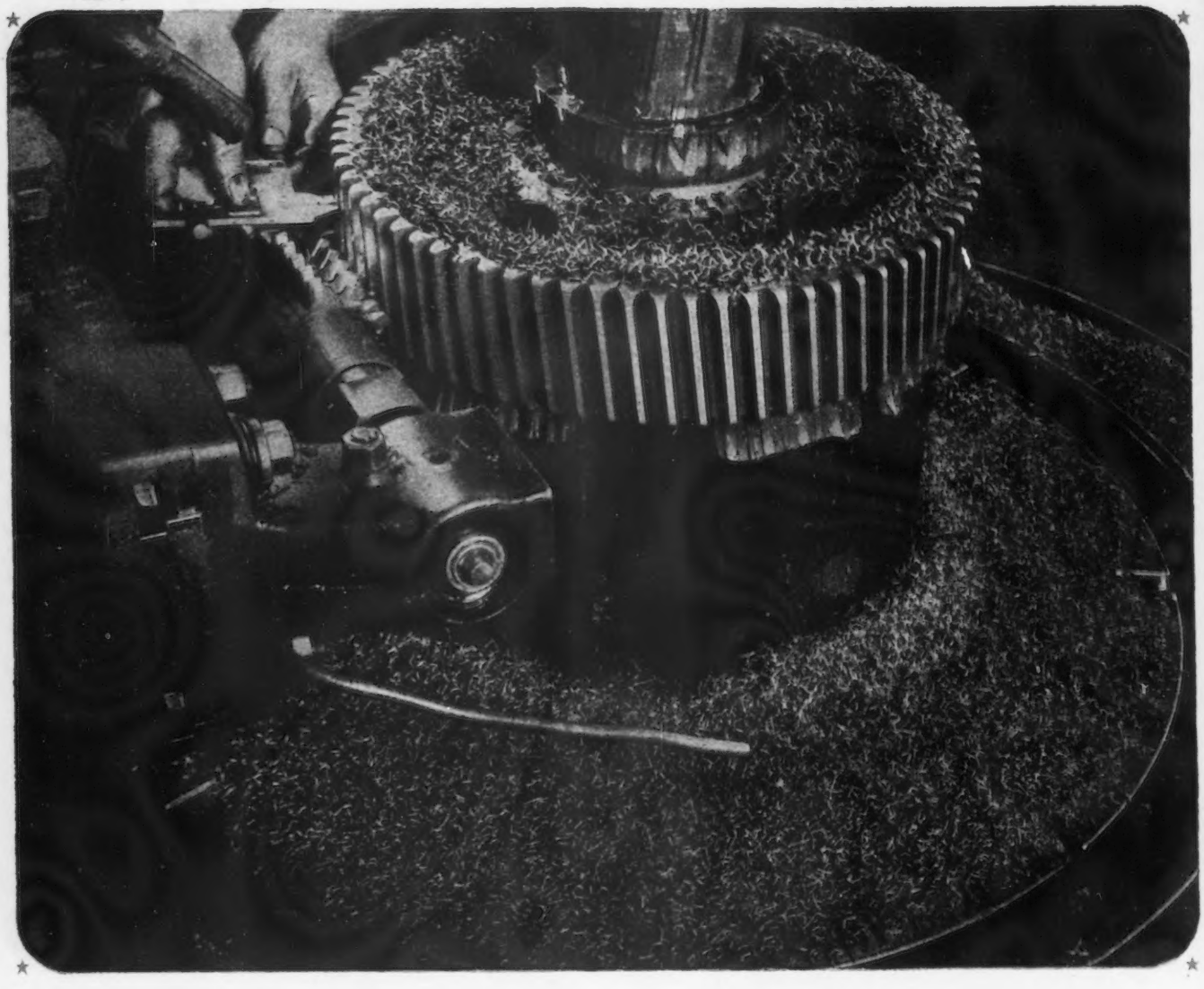
The Iron Age



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 30	91.0	97.5*	41.0*	93.0	71.0*	84.0	57.0	99.0	81.0*	95.0	97.0	108.0	95.0	84.0*
January 6	96.5	103.5	95.5	91.0	92.0	99.5	96.0	99.0	104.0	95.0	97.0	103.0	95.0	97.5

* Revised



KEEP 'EM CUTTING . . AND SAVE THE PIECES

IN this war, machine tools on the average are cutting away steel at a rate more than 12 times faster than in 1918. That's production—keep them cutting!

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Exemption of Machine Tools Varies Under Senate Version of 1944 Tax Bill

Washington

• • • **The answer to** the question of whether machine tools and other industrial equipment are exempt from renegotiation under the Senate version of the 1944 tax bill, according to legislative experts of the Joint Tax Committee, depends upon the facts of each individual case.

It appears that special purpose tools manufactured after Jan. 1, 1940, and/or sold at prices higher than those in effect on Jan. 1, 1941, by not more than one manufacturer may be subject to renegotiation when the tools are purchased direct by the Government from a prime contractor.

General purpose tools sold direct to the Government and all machine tools sold to suppliers for use in manufacturing end products or components, going into articles of military procurement, are exempt apparently from renegotiation, under the Senate bill.

Since the tax bill does not specifically exempt from renegotiation machine tools bought directly by the Government, Joint Tax Committee attorneys say that reference must be made to the bill's definition of standard commercial articles which are all exempt from the renegotiation law.

Machine tools sold to manufacturers performing war contracts are exempted under the definition of "Subcontracts" says the Joint Tax Committee. The tax bill says:

"The term subcontract means—A component article means any article which is to be incorporated in or as a part of a contract item."

Obviously the tools used in making a war product are not a part of the end item. Consequently, machine tools in the hands of suppliers and bought by them in performance of their contracts, are exempt from renegotiation under the bill.

The House Ways and Means Committee bill had substantially the same definition for standard commercial articles, but exemption of the articles from renegotiation was discretionary with the procurement agencies. The Senate bill makes exemption mandatory.

There is vigorous opposition to the renegotiation amendment in the Senate tax bill and it may be greatly modified or entirely rewritten. This opposition is said to include President Roosevelt himself and it is reported that he may come out against the amendment in his forthcoming message to Congress. There is also a powerful group in the Senate who want to either kill or widely change the Finance Committee's amendment. Prominent among this group are Senator Walsh, Democrat of Massachusetts, chairman of the Naval Affairs Committee. Joining are such Senators as Hatch, Democrat of New Mexico, and La Follette, Progressive of Wisconsin. Objection made by the Administration and other forces to the amendment is based on the allegation it would leave too much profits for war contractors.

Proposals for a change include higher or even 100 per cent excess profits tax. Also suggestions for a flat limit on war profits but this has been attacked because of difficulty of administration.

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Debate Slows Wage Negotiations

Pittsburgh

• • • **Steel companies** and Phil Murray's steel union, last week, were stalemated—not on the question of wages, which is to go to the WLB. but on the make-up of a supplemental contract. Despite the War Labor Board ruling calling for continuation of production under contract terms and a retroactive wage date, in accordance with the Roosevelt telegram of two weeks ago, the union is insisting that the steel companies sign a supplemental contract, embodying WLB decision.

After more than 180,000 steel and steel fabricating workers returned to their jobs last Tuesday and Wednesday, union representatives immediately began a series of meetings to obtain a signed supplemental contract. The major meeting—U. S. Steel Corp. subsidiaries and the USWA—adjourned beginning last week until Thursday of this week, after a fruitless attempt to arrive at a supplemental agreement satisfactory to both sides. The union insisted on suing the WLB decision, which officially refers to the President's telegram but does not quote in detail that part of his message which indicates that any wage adjustments eventually arrived at shall be within the framework of the anti-inflation setup and the "Little Steel" formula.

Steel companies, on the other hand, it is believed, are insisting that the President's telegram, or at least those paragraphs covering the "hold-the-line" reference be part of the supplemental contract. The union has referred to this attempt of the steel companies as adding "extraneous material" to their suggested contract.

The union position in asking for a signed supplemental contract, including the complete text of the War Labor Board directive, is based, according to it, on "traditional practices followed by labor organizations and employers. The steel companies, while not making an official statement, apparently hold to the view that the WLB decree is in itself an order, binding on both sides, without the necessity for a supplemental agreement. It is believed, however, that practically all steel companies will, or would, sign a supplemental agreement, which specifically embodies that part of the President's telegram restricting wage adjustments to the "hold-the-line" program. It may possibly be that this one paragraph, over which there is so much disagreement, and which was not included officially in the WLB decision, will be a bone of contention for some time.

The steel loss encountered because of the steel strike last week, which affected five integrated steel mills and numerous steel fabricating plants, amounted to approximately 170,000 tons—the bulk of the loss being in Ohio and Chicago plants.

Canada's War Production Up 37%

Ottawa

• • • **Canadian war** production for 1943 increased 37 per cent over the preceding year to a record total of $2,776,000,000, according to estimate by C. D. Howe, Minister of Munitions and Supply. For 1942 production totaled $2,023,000,000; for 1941, $805,000,000 and for 1940, it was $307,000,000. Production figures for the year under review are further increased by the expenditure of $217,000,000 on defense construction and capital assistance, a part from the wartime housing program of $186,000,000, which brought outlay to the grand total of $3,179,000,000 compared with $2,452,000,000 in 1942. Since Aug. 1, 1939, Canada's total expenditure on war account, directly and indirectly, totaled approximately $7,500,000,000.

Mr. Howe stated that indications that wartime industrial expansion tapered off in 1943 is found in a slight reduction—$2,000,000—in defense construction and to a greater extent in expenditures on capital assistance account, which fell $24,000,000 below the 1942 total. Largest increases in production during the year were in shipbuilding, instruments and communication equipment and small arms ammunition, all of which were almost doubled. In only one item listed in the breakdown was there a reduction—gun ammunition, including bombs.

Although war production in Canada was at an all time record last year, there were indications of reduced operations in the closing months of the year, when many contracts were cancelled or output greatly reduced. The curtailment was chiefly in production of cargo ships, ammunition, shells, guns, war tanks, aircraft and explosives. According to announcements from Government and other sources further contract cancellations and slowing down in war production in this country are pending for the early part of 1944. How extensive the curtailment will be has not been announced, but it is stated that many thousands of workers will be released from present war jobs during the first quarter.

With the slow down in war production there are definite indications of increased activities in civilian manufacturing activities, and already plans in this respect have been reported on a rather broad scale. During the past couple of months a number of controls have been abandoned on steel and other materials and permission has been granted for several firms to return to their original peacetime production. Among the first of the consumers' goods to be produced will be washing machines, electric refrigerators, farm implements and several other similar products. Announcement was made at the year-end that production of electric motors up to two horsepower may be resumed and that steel will be available for various types of household furniture. Barbed wire and bobby pins and hair pins also are scheduled for immediate production in this country.

Curtailment in the war production program has been reflected in reduced demand and slowing down in production of iron and steel in Canada. For the month of November pig iron production dropped to 142,249 net tons from 146,794 tons in October and 170,578 tons in November, 1942. Production of ferro-alloys at 16,169 net tons in November compares with 16,843 tons in October and 16,733 tons in November last year. Output of steel ingots and castings during November amounted to 259,444 net tons compared with 271,976 tons in the preceding month and 270,812 tons in November last year.

For the 11 months ending Nov. 30, production of pig iron in Canada totaled 1,621,009 net tons compared with 1,810,633 tons in the corresponding period of 1942; output of ferroalloys totaled 201,649 tons against 194,069 tons in 1942, while steel ingots and castings amounted to $2,769,156 net tons down from 2,851,527 tons in the 1942 period.

The following table gives a graphic picture of Canada's iron and steel production covering the years 1923 to 1943 inclusive, in net tons:

YEAR	Pig Iron	Steel Ingots	Steel Castings	Ferro-Alloys
1923	985,620	940,475	50,467	33,545
1924	664,186	700,196	28,576	29,624
1925	638,844	835,016	21,100	28,794
1926	826,003	877,917	37,338	64,305
1927	792,624	972,079	44,475	62,977
1928	1,162,254	1,332,801	50,084	50,267
1929	1,220,961	1,466,688	78,562	89,611
1930	838,839	1,072,321	60,830	73,049
1931	470,442	744,605	41,501	52,375
1932	161,425	349,843	25,664	18,100
1933	254,592	441,346	17,830	33,737
1934	455,789	827,041	23,116	37,055
1935	678,302	1,016,814	35,123	62,182
1936	759,618	1,211,334	38,337	87,678
1937	1,006,717	1,496,575	74,652	91,931
1938	789,710	1,238,078	56,636	59,720
1939	846,418	1,266,056	60,997	85,531
1940	1,309,161	2,177,973	77,899	151,661
1941	1,528,054	2,578,063	123,250	213,218
1942	1,975,015	2,942,921	178,440	213,636
1943 (x)	1,771,000	2,876,780	155,860	217,650

(x) Production figures for December 1943 estimated.

Union Discovers Idle Capacity

Pittsburgh

• • • **The Steel Workers of America early this week called upon WPB chairman, Donald Nelson, to either use the nation's steel capacity for war, or turn back that part not needed for war to essential civilian requirements. According to the union's calculation, 64 open hearths and electric furnaces have been idle in the past few weeks, representing, according to them, a weekly capacity of about 87,000 tons.**

"The nation either needs the complete steel capacity for war or it doesn't," Philip Murray told Nelson. "The steel industry's record of close to 90 million tons of steel shot at the enemy in 1943 gives little psychological comfort to the enemy," Murray said.

The steel union sent a copy of this telegram to General Marshall who, the steel union said, ought to know the true facts in the steel industry "instead of vicious conjecture."

Grey Iron Founders Exempted from Reports

• • • **According to** the steel division of WPB it has been decided to exempt producers of grey iron castings, from reporting shipments for August, September and October, 1943, which averaged less than 100 tons per month of grey iron castings. Producers have hitherto been required to make a monthly report of shipments, unfilled orders, production, and monthly capacities on Form WPB-971.

Bethlehem '44 Shipbuilding Program To Top '43 Record, E. G. Grace Asserts

• • • **The Bethlehem Shipbuilding** program for 1944, as now scheduled, is even larger than in 1943, according to E. G. Grace, president of Bethlehem, who at a celebration in New York Dec. 31, reported that the company produced a world's record total of fighting and cargo ships in 1943—a fleet characterized by Secretary of the Navy Frank Knox as "bigger than most nations could boast before the war."

Mr. Grace spoke from aboard a new U. S. destroyer at the Bethlehem Staten Island, N. Y., shipyard. His speech was broadcast to the company's 300,000 employees.

Mr. Grace disclosed in his speech and at a press conference preceding it that:

1. Production of Bethlehem's shipbuilding division was equivalent in value to more than 1000 Liberty ships—which would represent more than 10,000,000 deadweight tons, or a total in excess of 50 per cent of the nation's entire merchant shipping output for 1943. He explained that for reasons of military security Bethlehem's naval tonnage could not be disclosed.
2. The division's yards serviced, repaired or converted more than 7000 ships—a total representing almost 25 per cent of all the ocean-going ships in the world prior to the war. Since outbreak of the conflict Bethlehem yards have handled more than 21,000 ships, or two-thirds of the pre-war world merchant fleet.
3. Bethlehem's Navy and Maritime Commission program of combat and cargo ships embraces 38 different types, from super-battleships and aircraft carriers to trawlers.
4. The company's production of 13,000,000 tons of steel established a new peak and was sufficient to build 3500 Liberty ships. Output in 1942 totaled 12,500,000 tons and in 1939 less than 8,000,000 tons.

Secretary Knox, in a message to Mr. Grace, extended the "congratulations of the Navy Department to the employees and management of Bethlehem for their magnificent 1943 shipbuilding achievement. Rear Admiral Emory S. Land, chairman of the Maritime Commission, lauded the "remarkable record" of Bethlehem.

Mr. Grace said "a battleship is equal to 40 Liberty ships. That is, the hours it takes to build a battleship, using the same number of men, are 40 times the hours needed to build a Liberty ship. A big combat aircraft carrier (like the *Wasp*) equals 29 Liberty ships, a heavy cruiser about 18 Liberty ships, and—as a good overall picture—the value of the production of the shipbuilding division of our company in the year just closing is equivalent to more than 1000 Liberty ships."

". . . I believe," he said, "that Bethlehem was able to handle this enormous shipbuilding job because of the way we are set up—as an integrated company. By 'integrated' I mean we are a company which produces materials all the way up from the ore in the ground to the completed ship."

He asked employees to remember that "we are all working for Uncle Sam," praised the Navy and Maritime Commission for their foresight and judgment, which, he declared, have been prime factors "in averting disaster and turning the tide to victory," and promised Bethlehem's 67,000 men and women in the armed forces that the company would "everlastingly" exert its utmost efforts to provide them with the "supplies you need, when you need them."

He concluded his broadcast by asking Bethlehem's employees "to join me in dedicating our efforts in 1944 to our country and its glorious flag."

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Four Aluminum Pot Lines Closing; Alcoa Cites High Production Attainments

Washington

• • • **The WPB on Friday** ordered the immediate closing of four aluminum pot lines, two in New York City (Queens County), and two in the Burlington, N. J. area.

This action was taken, WPB officials explained, to relieve the stringent coal shortage and also to lighten the transportation load entailed in hauling alumina to these plants from the Mississippi Valley. The saving in coal will be 70,800 tons a month, WPB officials said. In view of the ample production of aluminum ingots at this time, the output of these four plants can be dispensed with, officials explained.

The four pot lines which are closing had a total output of 12,000,000 lb. of aluminum per month. They are owned by Defense Plant Corp. and operated by the Aluminum Corp. of America. Employees of the plants are being given a week's notice, but the plants will shut down immediately in order to save a full month's charge for electric current. Power contracts provide that when a plant shuts down after the first day of any month it must pay for a full month's supply.

• • • **The aluminum industry** last year attained an annual production rate of 2,100,000,000 lb. of metal, seven times the nation's peacetime production, according to Roy A. Hunt, president of the Aluminum Co. of America. He said that it is one and one-half times the production of the entire world before this war and that it is far in excess of what the combined Axis countries can produce.

"What this vast aluminum expansion will mean in terms of jobs will become clearer as the metal is released for civilian consumption," Mr. Hunt declared.

Alco's price for alminum ingot at the time priorities were imposed was 20c a pound; several price reductions since that time have brought it to a record low of 15c at a time when the prices of many competing materials were rising.

"How well employment levels in the aluminum industry may be maintained depends upon a number of things, among them: Whether or not restrictions are more completely removed on aluminum for civilian uses; whether there is to be an accumulation of large metal surpluses, which could conceivably come back to demoralize the industry at a later date; and the degree of success aluminum achieves in finding post-war uses."

About Those Charts

• • • "Carbon steel shipments by products" is the correct title for the two uppermost charts on page 86 of the Dec. 30 issue. "Alloy steel shipments by products" is the title of the two lower charts on the same page. All controlled steel products were included, in thousands of net tons. Further conversion and producers' interchange were excluded. The titles were omitted through error by the chart maker, who redrew for this magazine charts of the WPB Steel Division.

Inventory Limits on Aluminum Products Extended

• • • **Inventory limitations** on aluminum forgings, pressings, upsettings and impact extrusions were extended from 60 days' to 120 days' supply when WPB issued Inventory Direction 14 under CMP Regulation 2.

Restrictions Removed on Sales, Deliveries of Four Critical Metals

Washington

• • • **Reflecting** an easier supply situation in several of the products which have been critically short in the past, the WPB on Thursday removed delivery and sale restrictions on vanadium, cobalt, tungsten and molybdenum.

In modifying general preference M-23-A, applying to vanadium, WPB specified that vendors of more than 500 lb. of the material in any month will still be required to make a report of all sales during that month on form WPB-3454.

General preference order M-39 applying to cobalt was amended in a similar manner except that the requirements for a monthly report applies to vendors selling in excess of 1,000 lb. in any one month.

A steadily increasing stockpile of tungsten plus an excess supply of the material over current use enabled the war agency to revoke its general preference order M-29. No provision for monthly reports was contained in the revocation order.

Much the same supply and demand situation exists with reference to molybdenum with imports and production exceeding the amount used, WPB announced. The agency has amended its general preference order M-110, but inserted a provision that all sellers of more than 2,000 lb. a month are to make a report on sales.

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Minerals Go Under Single WPB Head

Washington

• • • **All metals and** minerals were placed under a single WPB vice chairman last week when the new Office for Metals and Minerals was created. This completed the reorganization of the former Office of Operations Vice Chairman. Arthur H. Bunker was appointed as vice chairman for Metals and Minerals. In this office Mr. Bunker will assume the direction of the Steel, Copper, Aluminum and Magnesium Divisions, the Minerals Bureau and the Minerals Resources Coordinating Division and its related committees.

It was pointed out that the new Office of Vice Chairman for Metals and Minerals will have new and important problems to deal with, arising from the fact that there are developing in many metals surpluses beyond direct and indirect military needs.

Mr. Bunker has been associated with war production since Dec. 16, 1941, when he was appointed Chief of the Aluminum and Magnesium Branch of the Office of Production Management. Since June, 1943, he has been Director of the WPB Aluminum and Magnesium Division.

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New Copper Inventory Group Named

Washington

• • • **The WPB Copper** Division has organized the Copper Recovery Inventory Branch, located on the forty-third floor of the Empire State building, New York, which replaces the Copper Recovery Branch, formerly located at the offices of the Copper Recovery Corp., 200 Madison Avenue, New York, whose affairs have been concluded. The corporation purchased idle copper inventories for remelt purposes and directed a redistribution.

In addition to the program it plans, the Copper Recovery Inventory Branch will perform the functions that were carried on in the past by the Copper Recovery Branch. The Copper Recovery Branch, since its inception, arranged for use "as is" of approximately 112,000,000 lb. of copper and copper-base alloy material.

The Copper Recovery Inventory Branch is staffed with men who were connected with the Copper Recovery Branch. A V. Nappy, former chief of the Copper Recovery Branch, is chief of the new branch.

Any manufacturer or other person using copper and copper-base alloy material in primary forms may have in surplus inventory items urgently needed by others and should make these surpluses known at once, the Copper Division said.

CMP Developments

• Dir. 14 under Reg. 2 extends inventory limitations on aluminum forgings, pressings, upsettings and impact extrusions from 60 days' to 120 days' supply. (Release No. WPB-4749)

•

• Dir. 40 to Reg. 1 rules that beginning with January frogs and switches, which have been classed as controlled materials, will hereafter be classed as "B" products.

Restrictions on Use Of Steel Drums Tightened

• • • **Restrictions on** steel drums were tightened with WPB issuance of Order L-197, as amended. Under the amended order, products are classified in three categories. Those in the first category cannot be shipped in steel drums, those in the second category cannot be shipped in new steel drums, and those in the third category can be shipped in new drums only when authorized by WPB, but may be shipped in used drums.

Priority Changes

L-170-a—Amended order permits use of copper in farm tractor radiators and power take-off gears which heretofore have been prohibited. (12-28-43)

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L-287—Amended order removes weight restrictions on the amount of metal which may be used in the manufacture of portable conveyors. (12-23-43)

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M-1-d—Amended order removes from the definition of aluminum scrap, residues containing less than 50 per cent recoverable aluminum. (12-23-43)

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M-1-g—Amended order relaxes restrictions on the use of aluminum paint. (12-24-43)

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M-21-a—Dir. 2 has been revoked. (12-23-43)

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M-38—Amended order permits lead consumers to make quarterly rather than monthly reports hereafter. (12-23-43)

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M-61—Amended order removes graphite from allocation and places it upon a restricted use basis. (12-28-43)

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M-297—Revised order relieves a number of types of users of coal tar of the necessity for filing monthly applications for allocations. (12-23-43)

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P-56—Amended order makes many changes in the original order relating to mines and smelters. (12-23-43)

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P-58—Revoked. (12-23-43)

•

P-73—Revoked. (12-23-43)

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Reg. 13 has been revised in order that all regulations issued prior to Dec. 22, 1943, shall have no effect on redistribution of such materials. (12-27-43)

•

Dir. 1 to Reg. 18 has been revoked. (12-27-43)

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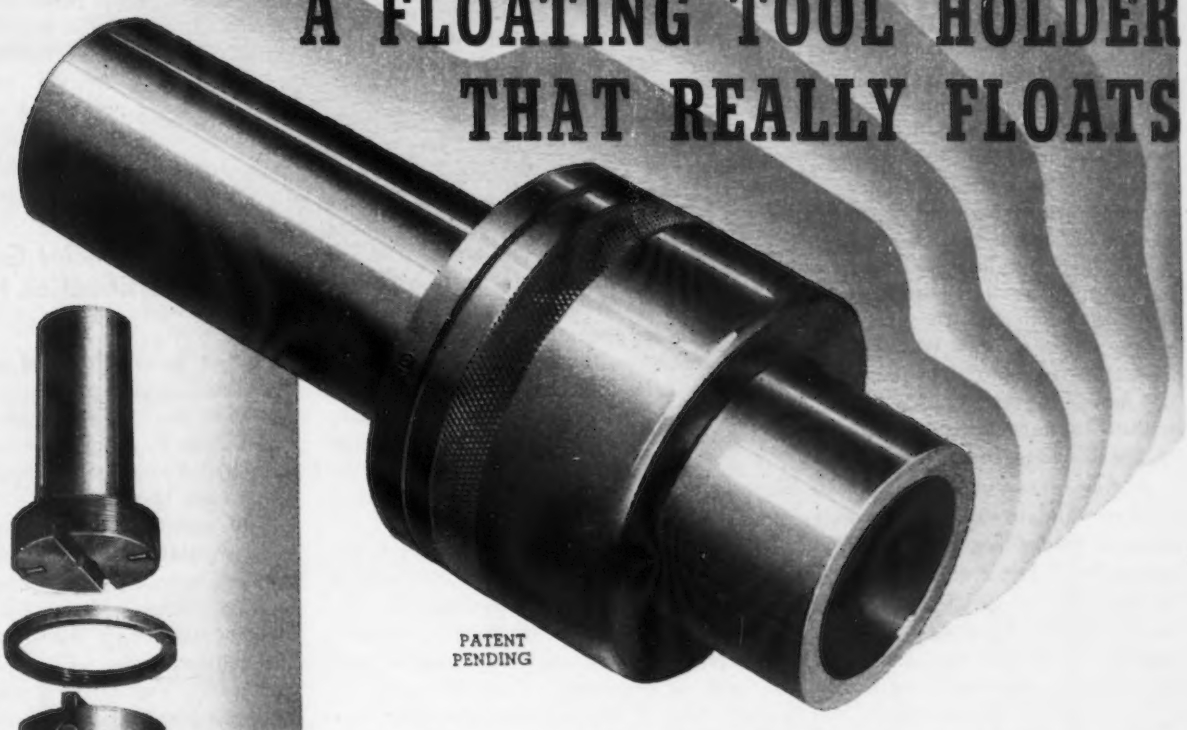

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WPB Reports 1½ Million Tons Excess Steel

Cleveland

• • • **According to** T. S. Fitch, special assistant of the War Production Board Steel Division, there are no less than 1,500,000 tons of steel now available for redistribution. Through information obtained by the WPB regional offices, the Surplus Inventory Branch of the Steel Division will correlate inter-regional activities to aid in the redistribution of this material. No catalogs will be issued, but significant items and quantities will be publicized through the regional offices in the War Production Bulletins. Items of five tons or more not moved by the regional WPB office within 30 days will be turned over to the Surplus Inventory Branch.

A new form, WPB-3320, will be used to validate ex-allotment sales of distress stocks reported to WPB. A recent WPB letter clarified procedure to be followed in the purchase of these stocks. It outlines two alternatives: First, the manufacturer may be willing to buy the steel within his allotment, in which case his allotment number and appropriate certification must be furnished to the holder of the steel and the sale does not require further WPB permission. On the other hand, if the manufacturer wishes to buy the steel ex-allotment, he or the holder must apply to the WPB on form WPB 3320 for permission to make the transaction. The name of the manufacturer's claimant agency and the program number must be furnished, but this is for identification only. The steel need not be charged against his allotment.

Priorities Regulation 13 which governs sales of surplus steel is being revised. The amended order will make explicit the rules applying to the transactions in which allotments are not used. Free movement of small items is also in prospect.

At the end of the war, there is expected to be about 10,835,000 tons of surplus material according to Mr. Fitch. Much can be used in regular civilian production while another part can be exported.

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New Rules on Sales of Excess Set

Washington

• • • **WPB has revised** Priorities Regulation 13, governing special sales of idle and excess materials, in order that all regulations issued prior to Dec. 22 shall have no effect on redistribution of such materials. The only exceptions to this general rule are Directive No. 16, governing aircraft inventory transfers, and Order P-98-c, governing special sales in the petroleum industry.

To find the rules governing a special sale of idle or excess materials, there is no need to refer to any order or regulation other than Priorities Regulation 13, outside of the two stated exceptions. However, in this regard, it is pointed out that orders issued after Dec. 22, which may specifically indicate that Priorities Regulation 13 has no effect, shall govern special sales of items that they may cover.

The regulation points out that special permission to sell idle and excess controlled materials for any permissible use under WPB orders and regulations may be granted by the WPB regional offices. Permission may be granted for sales of such controlled materials either to persons who have no allotments or to persons who have allotments but desire to acquire controlled materials in excess of the amounts included in the allotments they hold.

•

WPB May Still Allocate Under Amended Order M-17

• • • **Under Order M-17**, as amended, which removes pig iron from allocation on Feb. 1, WPB specifically retains the power to issue specific directions with respect to production and delivery, in order to take care of individual critical cases.

The order, issued Dec. 21, 1943, also states that while producers will be required starting Jan. 1 to file simplified monthly reports on production, shipments, and inventory enabling WPB to keep a check on whether requirements are being met, consumers are no longer required to file reports. Each producer, however, must continue to file monthly reports with WPB on Form WPB-3174.

Transactions in pig iron remain subject to the provisions of all other orders and regulations of WPB, except whenever the provisions conflict with the newly amended order.

COMING EVENTS

Jan. 10 to 14—Society of Automotive Engineers, Detroit.
March 14, 15—National Association of Waste Materials, Inc., New York.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

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Claimant Agencies Granted Special Certification Means

Washington

• • • **A special form** of certification for the use of procuring Claimant agencies has been included in CMP Regulation 7, which provides optional standard forms of certification, WPB announced last week.

The regulation points out that if CMP regulations require an allotment number, symbol, or preference rating to be included in a certification, such identification may appear either on the delivery order or on the certification itself. Formerly, it was required that the identification be endorsed on the delivery order.

•

Railroad Frogs and Switches Become Class B

Washington

• • • **Railroad frogs** and switches became Class B products, rather than controlled materials, under CMP beginning Jan. 1. WPB announced this change last Thursday through the issuance of Direction 40 to CMP Regulation 1.

This means that frogs and switches are now available to users on preference rated orders rather than on authorized controlled materials orders. Persons who have ordered frogs and switches on the basis of authorized controlled materials orders for delivery after Dec. 31 must furnish their suppliers with preference ratings before their orders may be filled.

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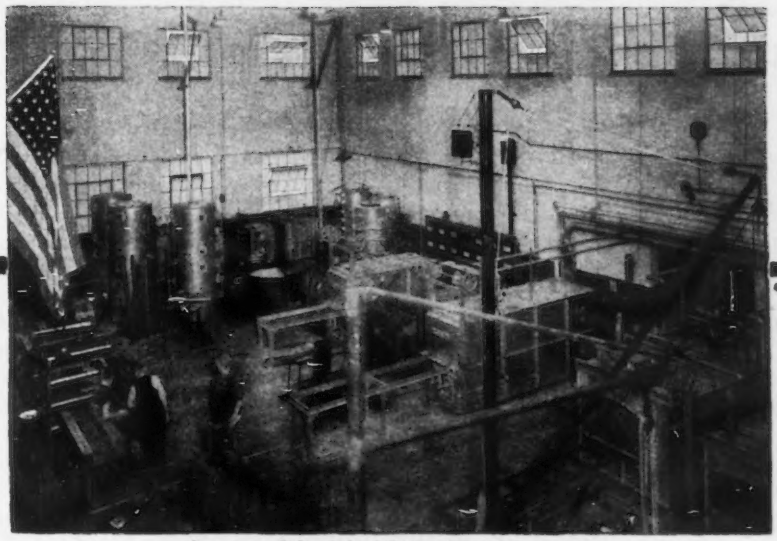
Pure Tungsten and Molybdenum Still Controlled

• • • **The action of** the WPB announced Dec. 31, removing restrictions on purchases of certain steel alloying elements in "small orders," is specifically not extended to pure tungsten and molybdenum ingot, wire and sheet, since these are still critical. The action was a continuation of M-369.



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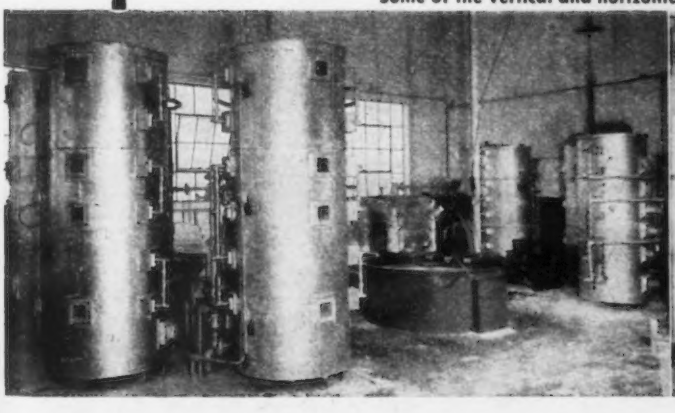
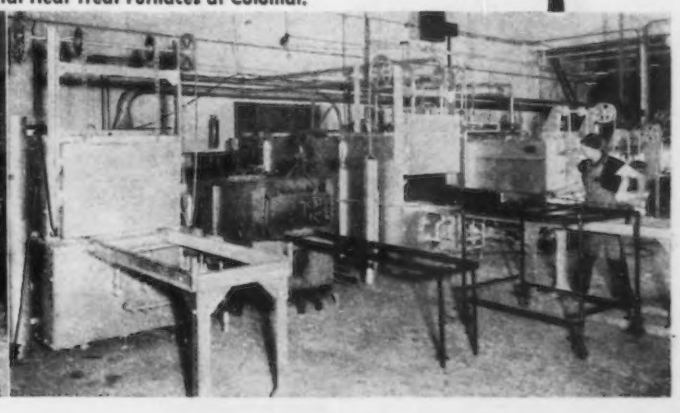
Some of the vertical and horizontal Heat Treat Furnaces at Colonial.





How Large and How Small Can Manganese Steel Castings Be Made?

The answer, in terms of what has been done, is "From many tons down to less than a pound." We show a few examples.

Picture 467 shows a 25,000 lb. one-piece manganese steel crusher mantle made for a gyratory crusher manufacturer. No. 330 shows a section of a barking drum used in paper mills. The manganese steel girth gear is over 15′ outside diameter and weighs 16,000 lbs. The two manganese steel tires are 13′ outside diameter and weigh 9,500 lbs. each.

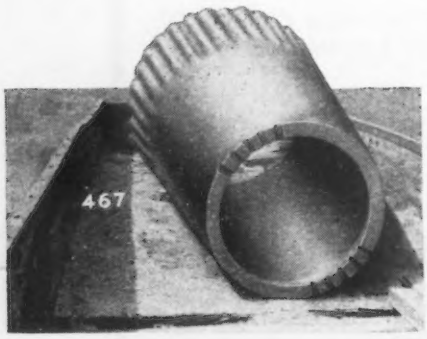
R-409 shows part of an order of bolster hanger key gib bearings for subway cars. Each casting weighs 7/10ths of a pound.

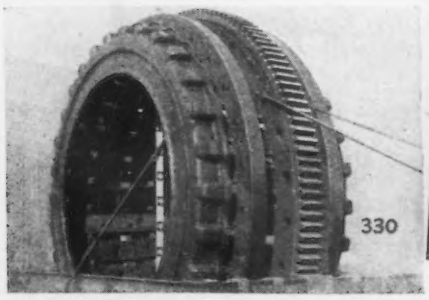
In all three of these applications, manganese steel was selected for its toughness to resist fracture and its ability to work-harden under impacts, friction and pressure.

Manganese steel castings, ranging from a chain link weighing a few ounces to a dredge pump shell 12 feet high, exhibit uniformly the high tensile strength, ductility and work-hardening property of "the toughest steel known."

By no means is manganese steel adaptable to every industrial use where a casting is required. But the range of sizes and successful applications suggests its consideration for your problem of breakage and wear.

Send for Catalog 59, describing all the uses for manganese steel.





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Assisting Planning; Enemy Seized Patents

• • • **Each week,** starting with the issue of Nov. 4, this magazine in its news section has been publishing lists of patents seized by the U. S. Government from enemy and enemy-occupied nations, available to firms which obtain a license from the Alien Property Custodian.

Full information covering the rules and procedures accompanied the Nov. 4 presentation, and additional helpful data appeared in several succeeding issues. Seized patent applications were listed July 8.

In the items below, the sub-class number appears first, followed by the patent number, description, inventor's name and nation, and the date the patent was issued. The patent description in full may be obtained from the government as outlined in the Nov. 4 issue.

Class 24—Clasps, buckles, etc.

(115) 2,007,913. End connections for wires, cables, and the like such as used in airships where such cables are fastened to girders by means of gusset plates or similar elements. Ludwig Durr and Wilhelm Stegmaier, Germany. 7-9-35.

(126) 1,867,043. Clamping means to be employed for the securing in position of electric conduits or cords. Eduard Wirschitz, Germany. 7-12-32.

(123) 1,642,314. Joint for wires and wire ropes in which the ends to be joined are clamped in a double muff. Albert Stecke, Germany. 9-13-27.

(136) 1,642,243. Cable-supporting clamp to be used as a permanent fixture in electric power plants by means of which the live wire or cable can be readily mounted or dismounted. Heinrich Hinzer, Germany. 9-13-27.

(3) 1,992,623. Fastener for wrist watches to be carried in button hole of coat lapel. Geyza Karlovszky, Hungary. 2-26-35.

(3) 2,074,643. Device for holding ornaments, etc., by means of simplified clamping arrangement. Mauriz Domenego, Austria. 3-23-37.

(7) 1,732,684. Napkin holder for the purpose of attaching napkin more securely to the clothes of the wearer without injury. Johann Kessel, Germany. 10-22-29.

(11) 1,812,536. Clip for securing articles to cloth. Theodor Kovacs, Germany. 6-30-31.

(11) 1,823,673. Cap with a clip for fountain pens. Asahi Watanabe, Japan. 9-15-31.

(15) 1,692,527. Sleeve holder for shirt-sleeves. Albert Wiegel, Germany. 11-20-28.

(18) 1,722,908. Twine seal or lock. A punched-out piece of sheet-metal provided with suitably shaped and located recesses and slots. Heinz Geiseler, Germany. 7-30-29.

(18) 1,959,720. Device for knotless tying of packages wherein the tape-hole is arranged between the thumb-aperture and the clamping disk. Ludwig Koezi, Austria. 5-22-34.

(19) 1,849,948. Hose clip insuring a better fitting on the cross-section to be embraced. Fritz Muchler, Germany. 3-15-32.

(23) 1,787,949. Box-closing device making use of band iron and a sleeve surrounding the ends of the iron. Werner Loblich and Helmuth Loblich, Germany. 1-6-31.

(27) 2,019,570. Wire strapping for packages with twisted tie. Oscar Kind, Germany. 11-5-35.

(30.50) 1,625,772. Sack closure consisting of two wire bows of practically n-shaped form. Gustav Moller, Germany. 4-19-27.

(30.50) 1,720,152. Wire-tier for sacks consisting of a wire doubled upon itself midway and bent so that at the bend a round eye is formed. Friedrich Sigmund, Germany. 7-9-29.

(31) 1,615,176. Belt fastener wherein the pins or cotters are located in edgewise disposed connecting links of a pliant material. Karl Kovarik, Austria. 1-18-27.

(31) 1,852,732. Joint for endless bands such as felts used in the manufacture of paper. Adolf Bong, Austria. 4-5-32.

(33) 2,202,094. Fastener for joining belts and conveyer bands which consists of a wire which is bent into the form of an open tri-

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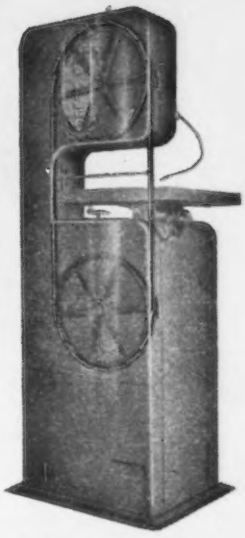

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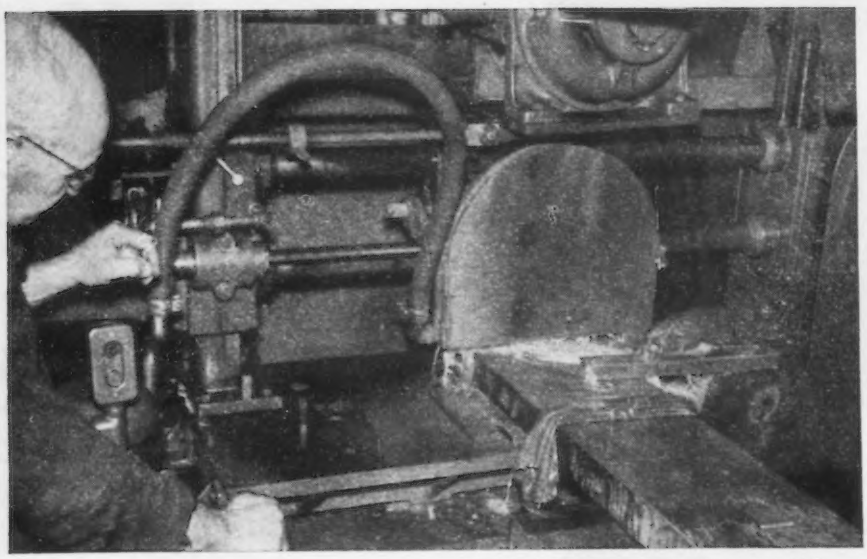

No. 302 Campbell Abrasive Cutting Machine cutting 18/8 Stainless Steel forging blanks from slab 2⅝" x 10" x 14'

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State materials, shapes and sizes you are cutting. Give lengths of stock, lengths of cut-off pieces and production rate required.

The data worked up for you will be based on actual experience. Remember CAMPBELL manufactures the only complete range of Abrasive Cutting Machines—including 8 types and 19 models. These machines are currently cutting all grades of steel, annealed and unannealed, non-ferrous alloys, plastics, glass and ceramics. Solid bars, tubular and flat stock.

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angle and thus avoids the destruction of the belt or band. August Daum, Germany. 5-28-40.

(33) 2,224,532. Connecting hook for conveyer bands and the like which provides a hook which will not pull out when the belt is suddenly stopped, caught, reversed or subjected to other rough treatment as in mining operations. Hans-Joachim Ziller, Germany. 12-10-40.

(39) 1,710,431. Belt fastener wherein the spirals or other joining means of the strap-joint are drawn through the ends of the strap and at the same time through plates fastened on the ends of the strap. Hugo Schlehan. 4-3-29.

(40) 1,879,903. Closing device for collar buttons comprising a circular cup-like head provided with a bent lever or handle. Kurt Kleiber, Germany. 9-27-32.

(56) 1,729,266. Tie holder. Joseph Gompertz, Germany. 9-24-29.

(61) 1,626,937. Neck-tie holder made of bent wire. Arno Kaufmann, Germany. 5-3-27.

(69) 1,636,869. Bracelet fastener especially for wrist watches. Karl August Schaefer, Germany. 7-26-27.

(61) 1,889,339. Collar stud and necktie retainer. Ernst Weiss, Germany. 11-29-32.

(64) 1,962,015. Necktie holder. Stefan Haugg, Germany. 6-5-34.

(66) 1,615,179. Paper clip. George Steinmetz, Germany. 1-18-27.

(66) 1,765,880. Clamping device for holding non-perforated papers in files, etc. Fritz Pohl, Austria. 6-24-30.

(66) 1,790,325. Paper table or pad holder. Caterina Sage, Italy. 1-27-31.

(71) 1,990,385. Bracelet extension device which can be slipped on and off in closed condition, and held tightly on the arm of the wearer. Georg Kurz, Jr., Germany. 2-5-35.

(71.30) 1,702,331. Stretcher for fence wire. Georg Angel, Germany. 2-19-29.

(77) 1,713,358. Connecting ring for the belt of breathing appliances wherein the ring is serrated on the outside, removing the danger of the ring slipping away from under the fingers. Hermann Stelzner, Germany. 5-14-29.

(78) 2,148,585. Clasp for bracelets, wrist watches, belts, etc. Ernst Oskar Schlesinger, Austria. 2-28-39.

(79) 1,780,931. Garter or hose supporters. Walter Konigsberger, Germany. 11-11-30.

(81) 1,775,011. Fastening for wearing apparel consisting of an improved double clip. Albert Wichmann, Germany. 9-2-30.

(81) 1,867,107. Corner bracket for connecting glass plates and mirrors in show cases. Johann Schmidt, Jr., Germany. 7-12-32.

(83) 1,987,826. Show case clamp for combining rods and plates into a frame. Gustav Heumann, Germany. 1-15-35.

(85) 2,108,950. Clip for the adjustable attachment of partitions in showcases and the like. Albert Stober, Germany. 2-22-38.

(87) 1,633,681. Fastener particularly for bandages. Richard Schuftan, Germany. 6-28-27.

(97) 2,105,287. Collar stud to be sewn on the neck band of the shirt without impeding washing and ironing. Hermann Lewy, Germany. 1-11-38.

(101) 1,984,640. Collar-button which may also serve at the same time as a neck-tie holder. Otto Grotewold, Germany. 12-18-34.

(102) 2,184,230. Cuff link which enables the shirt sleeve to be pulled up over the forearm. Alfred Sudmann, Germany. 12-19-39.

(103) 1,718,858. Detachable button wherein the pins are of angular shape and are so fixed on the button that either one or both pins are rotatable around the axis of the inner arm. Georg Frank, Germany. 6-25-29.

(104) 1,888,169. Press button. Karl Hollerer and Adolph Kadletz, Austria. 11-15-32.

(136) 1,841,857. Blocking device for cables put under tension comprising a metal box. Umberto Terzoli, Italy. 1-19-32.

(143) 1,673,327. Lacing for apparel, particularly for shoes. Paul Hahan, Germany. 6-12-28.

(148) 1,723,892. Display stand. Moritz Schonberger, Austria. 8-6-29.

(150) 1,700,628. Dress fastening. S. Danielli, Italy. 1-29-29.

(161) 1,732,216. Improved construction of pin stem for jewelry. A. Beutelspacher, Germany. 10-22-29.

(194) 2,028,530. Clamping buckles for varying the operating length of straps for suspenders, belts, etc. L. Steiner, Hungary. 1-21-36.

(201) 1,926,804. Lock clasp for jewels and similar articles. G. Desouches, France. 9-12-33.

(205) 1,639,392. Fastening device comprising in combination, a number of fastening elements fixed on the opposite edges of the parts to be fastened. R. Wittenberg, Germany. 8-16-27.

(205) 1,709,827. Separable fastener for

Battery of Bullard Vertical Turret Lathes working 24 hours a day in the plant of a midwestern maker of valves.

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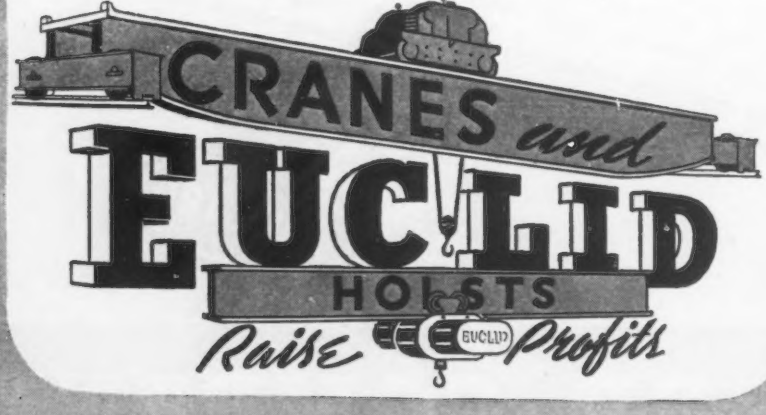

garments, etc. L. Bauer, Germany. 4-23-29.

(205) 1,823,913. Zip or lightning fastener for clothes, boots, bags and the like. W. Pietsch, Germany. 9-22-31.

(205) 1,831,570. Sliding fastener with an improved sliding cam. M. Krakowsky, Germany. 11-10-31.

(205) 1,923,262. Fastening device wherein the casting slide consisting of two parallel plates are interconnected by a wedgelike stud. B. Goebel, Germany. 8-22-33.

(205) 2,032,858. Separable fastener in which the locking elements are covered by a fabric. W. Schaper, Germany. 3-3-36.

(205) 2,070,753. Sliding clasp fastener for fabric edges joining in a curved line. F. Schatzky, Germany. 2-16-37.

(205) 2,120,924. Separable fastener for garments, underwear and other purposes wherein two pliable stringers carrying fastener members are locked and unlocked by movement of a sliding member. S. Stillschweig, Germany. 6-14-38.

(205) 2,124,206. Dust, gas, and waterproof sliding clasp fastener for boots and other articles. A. F. Mulka, Germany. 7-19-38.

(205) 2,217,571. Endpiece for stringers of separable fasteners. A. Susskind, Germany. 10-8-40.

(205) 2,251,078. Zip fastener differing from the known fasteners by the special kind of securing the closing members to the carrying ribbon. M. Stein, Germany. 7-29-41.

(205) 2,257,954. Slide-fastener links which are provided for coupling purposes with an elevation and a depression, as also two fixing lugs whereby they are fixed to the edge of a band. K. Henkels, Germany. 10-7-41.

(205.50) 2,125,698. Separable fastener which attains its object by providing the elements to be connected with the stringer with channels and slots preceding therefrom. O. Ulbricht, Germany. 8-2-38.

(206) 1,945,266. Fastener for bracelets adjustable in size. R. Einsele, Germany. 1-3-34.

(206) 2,035,031. Adjustable fastener for belts, garments, etc. G. von Koczian, Germany. 3-24-36.

(206) 2,061,421. Button fastening device for strap shoes. P. Friedrich, Germany. 11-17-36.

(220) 1,682,290. Connection device especially for jewelry. A. Kuhnle, Germany. 8-28-28.

(224) 2,049,869. Button of the type which comprises two separate members adapted to be brought in locking engagement with each other by pushing action. J. E. Rohrs, Germany. 8-4-36.

(230) 1,825,357. Disengageable coupling device for any purpose such as for closing clothes, connecting belts or cords. L. Lasselsberger, Austria. 9-29-31.

(231) 1,802,224. Coupling for chains and the like used in agriculture and navigation. F. Steigenberger, Germany. 4-21-31.

(236) 1,622,062. Unsoldered hook element for watch bracelets. F. Speidel, Germany. 3-22-27.

(239) 2,124,276. Connection for straps, chains, or the like. F. Steigenberger, Germany. 7-19-38.

(239) 2,157,288. Attaching hook for watch wristlets. E. Gauss, Germany. 5-9-39.

(243) 1,654,838. Branch terminal for overhead lines. W. Schroeder and J. Nolte, Germany. 1-3-28.

(245) 1,778,285. Hose or stocking supporter. W. Vorwerk, Germany. 10-14-30.

(245) 1,792,133. Hose supporter, W. Vorwerk, Germany. 2-10-31.

(245) 1,828,041. Garter construction. W. Hamacher, Germany. 10-20-31.

(245) 1,849,230. Stocking suspender. Wilhelm Greineisen, Germany. 3-15-32.

(245) 1,915,189. Garter clasp. H. Koehl, Germany. 6-20-33.

(246) 1,851,787. Tab for hose or stocking supports. W. Vorwerk, Germany. 3-29-32.

(252) 2,095,785. Device for connecting the ends of a neckerchief. M. Ziegenbein, Germany. 10-12-37.

(261) 2,051,174. Clip consisting of a wire loop with two clamping arms that are bent inwardly for use in connecting a sock with the pants. M. Levigard, Germany. 8-18-36.

(255) 1,797,984. Sleeve-length-adjusting device. F. Hirschwald, Germany. 3-24-31.

(265) 2,089,638. Device for connecting bands to wrist watches. W. Becker, Germany. 8-10-37.

(1) 2,177,567. Method of fixing fastening pieces to metallic cables. G. Imbault, France. 10-24-39.

(19) 1,778,504. Universal clamping-screw collar employing a non-perforated band. J. Malleville, France. 10-14-30.

(19) 1,821,980. Tightening collar with gradually braked winder. R. Machat and A. Mathieu, France. 9-8-31.

(19) 1,786,107. Clamping collar for the at-

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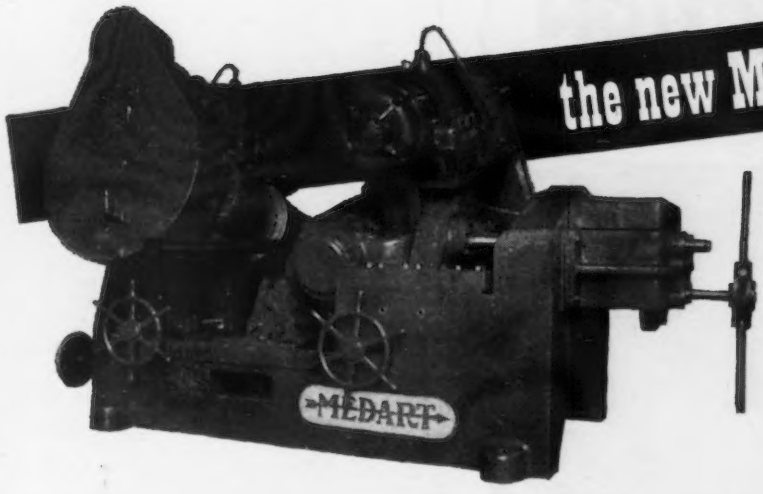

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tachment of tubular bodies. V. A. de Vulitch, France. 12-23-30.

(19) **1,910,116.** Means for automatic tightening of fastening hoops. J. Malleville, France. 5-23-33.

(19) **1,915,720.** Clamping collar for the attachment of resilient tubular bodies on rigid tubular bodies. V. A. de Vulitch, France. 6-27-33.

(19) **2,073,294.** Hose clamp comprising a flexible tie such as a band or strip curved to form a loop around a hose or similar object to be clamped and a screw engaging through suitable portions of said band. M. Caillau, France. 3-9-37.

(23) **2,084,063.** Metal seal for connecting the ends of a metal band binding a package. A. Robichon and S. Sicard, France. 6-15-37.

(30.5) **1,776,050.** Tying means for bags and the like. S. Szoke, Slovakia. 9-16-30.

(30.5) **1,979,508.** Clamping member for clamping the one end of a cord which is fixedly fastened to the clamping member with the other end. J. G. van den Bel, Netherlands. 11-6-34.

(33) **1,659,883.** Belt fastener wherein a connecting or linking element is secured to the belt ends by spurs or points driven into the material of the belt. J. Lorentz, Norway. 2-21-28.

(33) **1,676,083.** Fastening device for transmission belts. C. E. Faure, France. 7-3-28.

(33) **1,948,411.** Endless belt and seam construction therefor. E. V. Asten, Belgium. 2-20-34.

(33) **2,068,826.** Belt fastener of the kind comprising U-shaped belt lacing hooks. A. Timmerbeil, Netherlands. 1-26-37.

(33) **2,097,108.** Device for connecting the ends of belts, straps, and the like. A. Timmerbeil, Netherlands. 10-26-37.

(37) **1,737,167.** Belt fastener for joining the ends of driving belts of the type in which the ends of the belt, bent at right angles, are pressed between two rows of plates joined in pairs. L. Montigny, Belgium. 11-26-29.

(57) **1,667,679.** Device for supporting ties made of any kind of wire but capable of acting as a spring. J. Roura, France. 4-24-28.

(68) **1,869,462.** Stretching and fastening device for ropes. O. Burheim, Norway. 8-2-32.

(71.3) **1,643,199.** Stretching device for wires and the like. L. Clemencet, France. 9-20-27.

(81) **2,304,348.** Bow-tie clasp of the type that may be attached to the front flaps of a fold-over shirt collar. E. Firon and A. Firon, France. 12-8-42.

(90.5) **1,802,885.** Safety button adapted for the closing of the inside pockets of garments. A. Eguren, France. 4-28-31.

(102) **2,049,082.** Cuff link. J. Sanger, Austria. 7-28-36.

(104) **1,899,313.** Button fastening of the type not requiring sewing. A. Coquette, France. 2-28-33.

(104) **2,130,263.** Collar button with detachable head. H. Christophersen, Denmark. 9-13-38.

(106) **1,965,514.** Collar stud of the type consisting of a tubular socket and a stud each being fixed on a small plate. C. Tolk, Netherlands. 7-3-34.

(106) **2,136,161.** Button in two parts which can be fixed to its support without sewing. Karel Vesely, Czechoslovakia. 11-8-38.

(110) **1,911,935.** Fastening device for jewels and other ornaments. Andre Vidal, France. 5-30-33.

(117) **1,806,005.** Fastening device for the bands or straps of shoes or other articles. A. Thomas, France. 5-19-31.

(120) **1,844,223.** Inserting and protecting device for shoe laces. O. Kircher, France. 2-9-32.

(123) **1,656,578.** Clip for transmission cables with crossties. V. Dutkiewicz, France. 1-17-28.

(124) **1,883,530.** Tightening device consisting of two cooperating complementary parts each being formed with a screw thread proceeding respectively in a right and left handed direction. A. Buisset, France. 10-18-32.

(126) **1,729,945.** Wire clamp to be used in clamping the end portion of a cable in the form of a loop. C. Holm, Norway. 10-1-29.

(126) **1,923,812.** Tensioning device for wires, cords, or metal rods. J. Chobert, France. 8-22-33.

(136) **1,781,080.** Device for gripping cables, wires and the like. J. Ring, Czechoslovakia. 11-11-30.

(143) **1,856,374.** Method of tagging laces, strings, and the like. R. Chasselon, France. 5-3-32.

(157) **1,814,290.** Self closing clasp for brooch pins. L. Cartier, Hungary. 7-14-31.

(160) **1,702,107.** Fastening device for watches and other articles of jewelry. L. Cartier, France. 2-12-29.

(191) **2,001,618.** Buckle designed for use on

By the Army, the Marines and the Navy too

This 11-inch ball-bearing SHELDON Precision Lathe has been selected by the Army for its Mobile Machine-Shop Units, by the Marine Corp. for its trailerized shops and as the ideal maintenance lathe for several types of shops by the Navy.

This lathe and bench unit comes with a SHELDON E-type, 4-speed Underneath Motor Drive, a Draw-in Collet Attachment (1" collet capacity), a Telescopic Taper Attachment, Full Quick Change Gears and a Double-wall Apron with Power Cross Feed. The steel bench completely houses the underneath motor drive in its left pedestal and provides 5 fitted drawers for tool attachments, etc.

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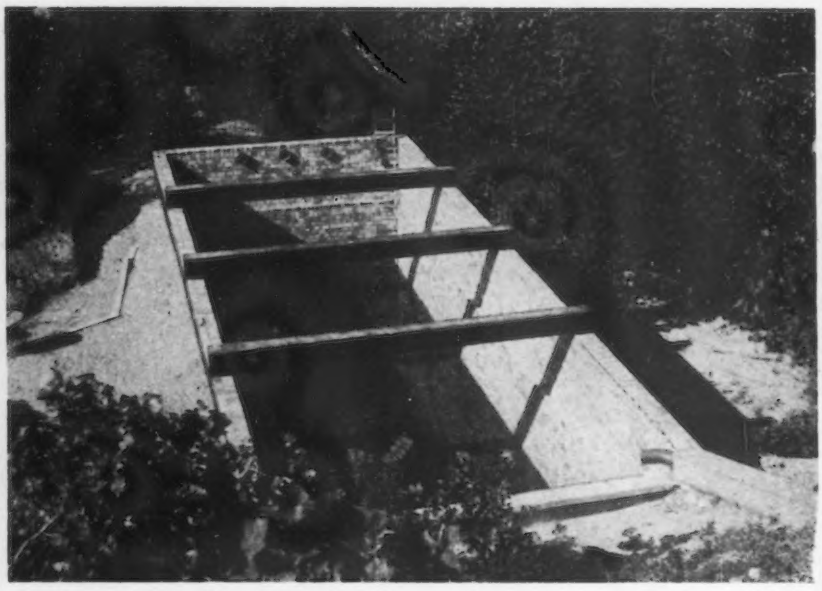

2500 gallons of waste pickling acid are dumped every 24 hours into this 90,000 gallon acid disposal tank installed 3 years ago for a large wire mill in the Mid-west.

Tank is 60' long x 20' wide x 12' deep, constructed of reinforced concrete shell, lined with TORONTO Acid Brick and acidproof jointing Cement, BASOLIT.

There are many hundreds of rubber lined steel and reinforced concrete pickling tanks, acid storage and neutralizing tanks and acid floors, sewers and pits, where our BASOLIT construction has contributed to long life and efficient operation of modern pickling equipment.

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garment suspenders, garters, etc. A. Laurain, France. 5-14-35.

(200) 1,636,925. Buckle designed for attaching belts, girths or various ribbons. P. Ravigneaux, France. 7-26-27.

(205) 1,896,012. Slider operating closures of the type consisting of two flexible strips which are provided with rows of fastening elements. A. Raymond, France. 1-31-33.

(205) 2,221,759. Slide fastener to be used in connection with ladies' clothes, handbags, and the like. G. Erard, France. 11-19-40.

(206) 1,823,043. Clasp for bracelets, necklaces and other uses of the type which acts as a lengthening and shortening organ. H. Heugas, France. 9-15-31.

(211) 1,666,582. Fastening button adapted for use upon automobile carriage bodies for securing curtains, canvas or leather covers and the like. A. Raymond, France. 4-17-28.

(211) 1,688,272. Spring-pressure button wherein its two component parts may be readily separated and without strain upon the attaching means. L. Fouletier, France. 10-16-28.

(221) 1,608,337. Two-head rotatable fastening device. A. Raymond, France. 11-23-26.

(221) 2,216,385. Rotatable fastening device suitable for securing inspection doors, panels and the like used on aircraft, various vehicles and machinery. J. Chobert, France. 10-1-40.

(230) 1,728,905. Snap clasp for jewelry. H. Heugas, France. 9-17-29.

(230) 1,823,229. Separable fastener wherein two members are detachably engaged by catch devices. P. Balbaud, France. 9-15-31.

(230) 1,853,111. Multiple disconnectible clasp chiefly for necklaces and the like pieces of jewelry. J. Bienenfeld, France. 4-12-32.

(233) 1,616,350. Hook for breast collars adapted to be secured by means of screws. P. Clavier, France. 2-1-27.

(242) 1,836,107. Safety hook for hoisting machines. J. Bruel, France. 12-15-31.

(245) 1,836,770. Garter buckle constituted partly of plastic material and partly of metal wherein the so-called buckle is formed by a bent rod of plastic material. A. Pugniet, France. 12-15-31.

(246) 1,832,566. Securing device for suspenders, belts and the like. A. Lenief, France. 11-17-31.

(248) 1,629,779. Fastener for attaching together two ribbons or two pieces of garment such as shoulder straps. F. Degueldre, Belgium. 5-24-27.

(251) 1,692,917. Gradual clamping clip for braces, sock suspenders, and such like. P. Allenic, France. 11-27-28.

(261) 1,637,936. Holder for paper money. C. Gross, France. 8-2-27.

(265) 1,738,579. Wrist-watch fastener which can be automatically opened when released by a manually controlled button. H. Heugas, France. 12-10-29.

(205) 2,157,828. Sliding clasp fastener in which the fastening members of one row are staggered longitudinally of the fastener relative to the fastening members of the opposite row. J. Kuna, Czechoslovakia. 5-9-39.

(217) 2,100,635. Snap fastener for fastening of wall-boards to wall. A. de Vries, Netherlands. 11-30-37.

(205) 2,142,770. Sliding fastener consisting of a flexible, elastic perforated strip and of a second strip of similar material on which pressed out lugs project. E. Wied, Czechoslovakia. 1-3-39.

(205) 2,093,174. Pressure fastening device of the continuous type. R. Podolsky, France. 9-14-37.

(205.5) 2,313,579. Sliding clasp fastener with automatic locking means. V. Puc, Czechoslovakia. 3-9-43.

(245) 2,074,272. Hose supporter in which the button and its base form a single rubber unit. P. Pugniet, France. 3-16-37.

(221) 2,011,472. Fastening and assembling device for doors, partitions, floors and the like structure, aeroplanes, automobiles and the like. J. Chobert, France. 8-13-35.

(245) 1,950,064. Grip fastening for suspenders for hose. P. Pugniet, France. 3-6-34.

(205.5) 2,270,221. Sliding member of sliding clasp fasteners. V. Puc, Czechoslovakia. 1-13-42.

(211) 2,211,586. Locking means for securing members together in a manner rendering them readily collapsible. R. Schwarz, Latvia. 8-13-40.

Class 207—Plastic metal working

(1) 1,689,572. Lead cable press having a tool holder adjustable by rotational movement. P. Wieghardt, Germany. 10-30-28.

(1) 1,689,573. Vertical lead cable press having a divided press head the division surfaces of which lie parallel to the tool holder axis. P. Wieghardt, Germany. 10-30-28.

(1) 1,705,057. Method of forming a tele-

Plants at Chicago and Elgin, Illinois
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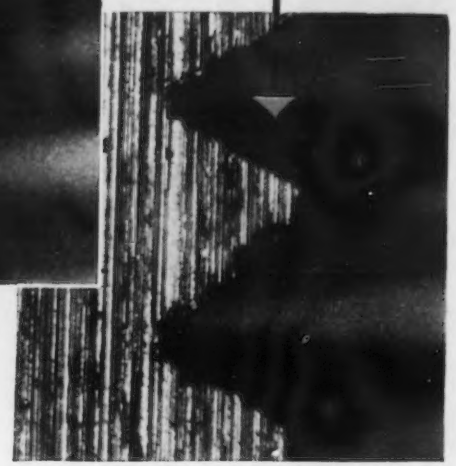
Stronger.. BECAUSE IT FITS Tighter!

THE SCREW WITH THE "BUILT-IN" TAP!

Photomicrographs showing:

- Typical snug-tight fit of Type Shakeproof Thread-cutting Screw.
- Typical loose fit of ordinary machine screw in pre-tapped hole.



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THREAD-CUTTING SCREWS

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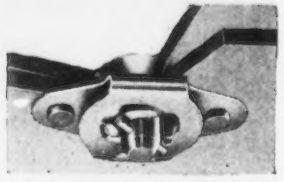

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Pre-assembled Shakeproof lock washer and screw.

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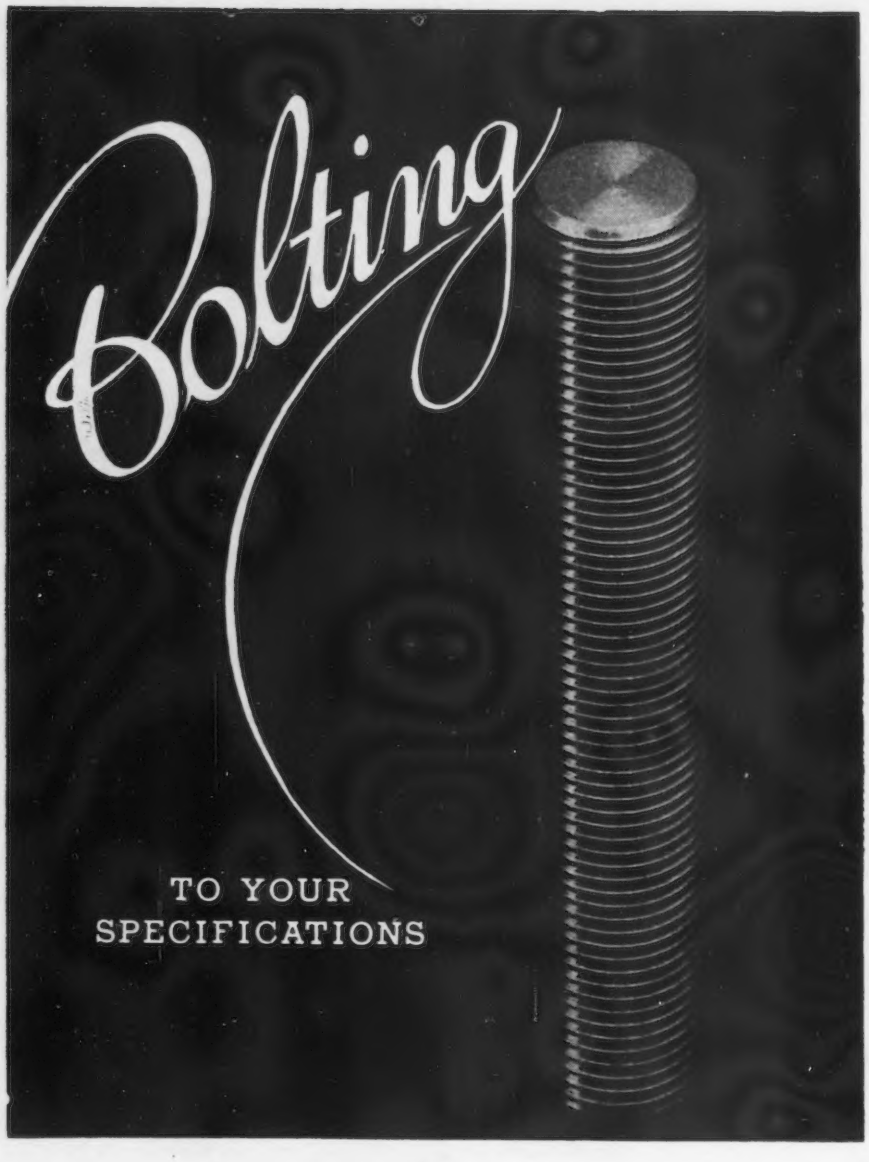

ALLOY STUDS

Erie Alloy Studs are manufactured in diameters from ½" thru 2½" in lengths to order, either continuous threaded or threaded each end. These are made to customer specification of material—heat treating and thread fit. Wherever pressure temperature or corrosion are determining factors in bolting we invite your request, for our experience is in this specialized type of bolting and any other out-of-the-ordinary type of bolt, stud or nut.

ERIE BOLT & NUT CO
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phone cable armor capable of excluding magnetic stray fields from the cable strands. E. Brandus, Germany. 3-12-29.

(1) **1,737,773.** Lead cable press. K. Schrott, Germany. 12-3-29.

(1) **1,940,085.** Device for filling the receiver of pipe presses, particularly of lead cable presses. F. Hanff, Germany. 12-19-33.

(1) **1,948,400.** Apparatus for centering blocks in the holders of metal extrusion presses. O. Schlensedt, Germany. 2-20-34.

(2) **1,654,109.** Plastic metal working press comprising a die, a stationary member for supporting the die, a movable container for receiving the metal ingot and a plunger for forcing the metal through the die. A. Born, Germany. 12-27-27.

(2) **1,664,976.** Machine for making metallic tubing or for pressing a seamless metallic sheath around cables. F. Hanff, Germany. 4-3-28.

(2) **2,165,711.** Extrusion press. A. Kreidler, Germany. 7-11-39.

(3) **1,661,594.** Extrusion press in which the metal, preferably being in a heated state, is forced through a die and by which solid or hollow bars, rods and the like are formed. A. Born, Germany. 3-6-28.

(3) **1,670,336.** Extrusion press having a stationary hollow die holder, a movable hollow container and a plunger adapted to cooperate with the container so as to squeeze the plastic metal through the die into the hollow die holder. A. Born, Germany. 5-22-28.

(3) **1,859,473.** Metal-extrusion press. O. Schlenstedt, Germany. 5-24-32.

(3) **1,935,286.** Extrusion press for the production of rod or tube-shaped bodies. A. Born, Germany. 11-14-33.

(3) **1,976,447.** Hydromechanically operated tube extrusion press. K. Keck, Germany. 10-9-34.

(4) **1,838,606.** Press with at least two press cylinders for the production of metal sheathings and tubes. G. Zapf, Germany. 12-29-31.

(4) **1,978,976.** Manufacture of lead tubes and cable sheaths. G. Zapf, Germany. 10-30-34.

(4) **2,025,666.** Extrusion device for the manufacture of metallic tubes. F. Hanff, Germany. 12-24-35.

(6) **1,726,300.** Mechanical press for producing metal tubes. L. Hinkel, Germany 8-27-29.

(9) **1,663,331.** Extrusion press for the manufacture of articles of any desired length and of any desired cross section from blocks of material such as heated metal blocks. A. Born, Germany. 3-20-28.

(9) **1,675,676.** Press for the cold extruding of tubes from metal disks. E. Walther, Germany. 7-3-28.

(9) **2,040,653.** Upright extruding press for producing tubular lead sheaths or the like. F. Hanff, Germany. 5-12-36.

(10) **1,771,620.** Process of forming compound metal bodies. F. Ehrmann, Germany. 7-29-30.

(10) **1,774,384.** Process of preparing homogeneous alloys of lead. G. Kranzlein, R. Muller, F. Brunntrager and H. Janz, Germany. 8-26-30.

(10) **1,895,950.** Shaped body having a predominating percentage of tungsten or molybdenum and process of producing it. H. Voigtlander and O. Kaufels, Germany. 1-31-33.

(10) **1,948,242.** Method of and means for pressing metal articles. E. Schubarth, Germany. 2-20-34.

(10) **2,099,449.** Method of making dry cells. O. Metzger, Germany. 11-16-37.

(10) **2,207,004.** Method of producing a metallic shell by extrusion. H. Gruber and H. von Neuman, Germany. 7-9-40.

(17) **1,918,858.** Matrix for the backward extrusion of metals. O. Metzger, Germany. 7-18-33.

(1) **1,696,646.** Process of manufacturing valves and like devices. L. Saives, France. 12-25-28.

Class 110—Furnaces

(1) **1,750,065.** Furnace having a traveling grate and a combustion chamber and an auxiliary chamber extending into said combustion chamber over the grate, said auxiliary chamber having openings therein to permit access to the combustion chamber and grate and means for normally closing said openings. L. Steinmuller, Germany. 3-11-30.

(1) **1,899,464.** Powdered fuel furnace having a furnace chamber approximately rectangular in plan, said chamber having walls curved outward to permit expansion by heat. C. Hufschmidt, Germany. 2-28-33.

(14) **2,071,835.** Process and apparatus whereby crude rubbish, including all kinds of industrial, domestic or other waste, is dried in a

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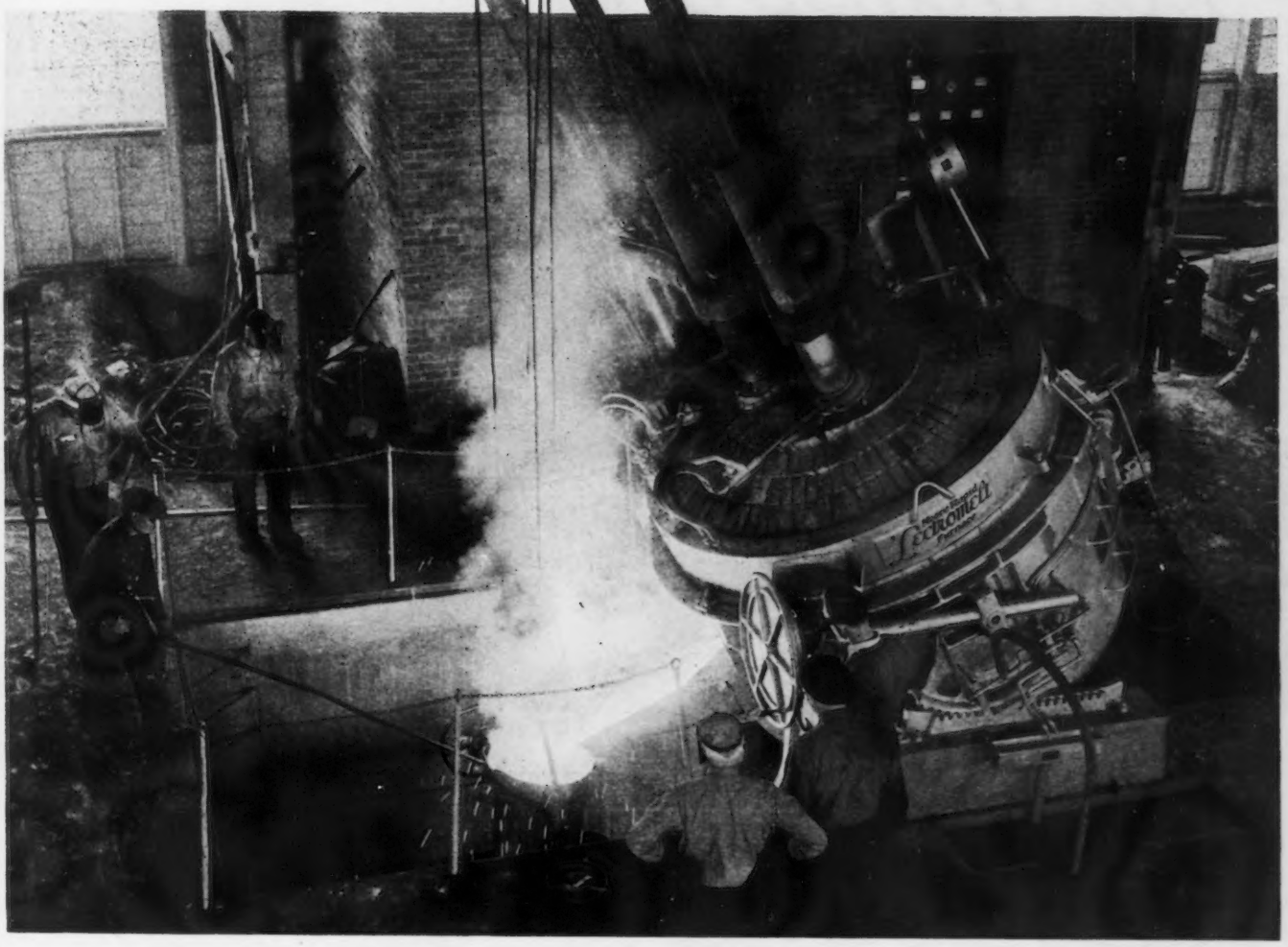
Lectromelts ARE POURING STEEL

For War Today . . . For Peace Tomorrow



The outstanding performance and reliability of Moore Rapid Lectromelt Furnaces are assuring the fulfillment of our vital war requirements. These furnaces are producing increasing tonnages of carbon and alloy steel through their ease and speed of operation. Lectromelt's simplicity of design and rugged construction afford long, dependable service with minimum maintenance.

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ARMY E NAVY

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Pittsburgh Lectromelt Furnace Corporation
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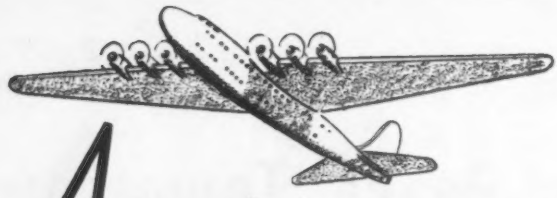
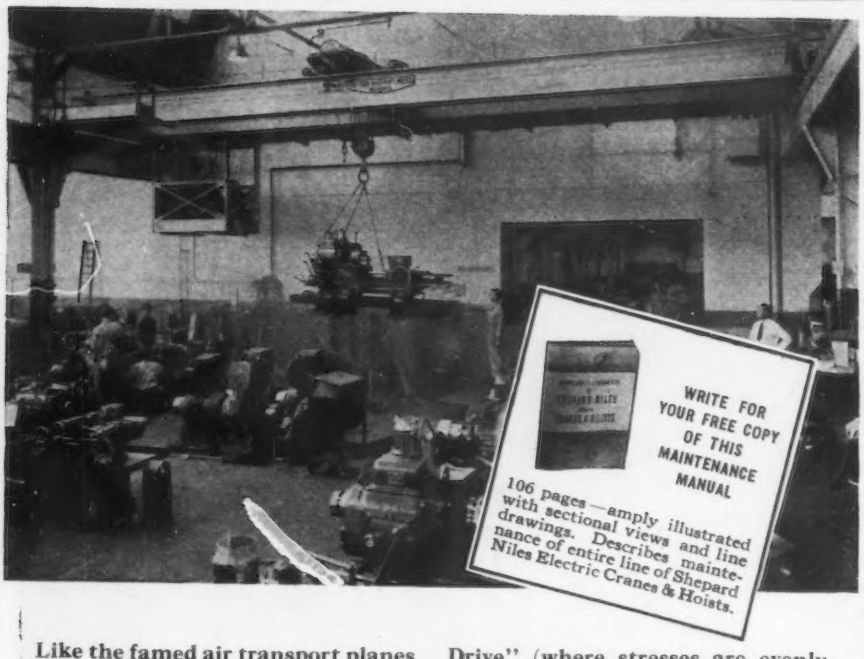
THE FURNACE OF TODAY AND TOMORROW



Air transport

minus the wings



Like the famed air transport planes of the armed services, Shepard Niles Overhead Electric Traveling Cranes depend upon faultless engineering and rugged construction for their ability to "pick-up-and-go" with heavy loads.

While tremendous stresses are put upon the crane girders, the heart of the entire installation is the crane trolley, or hoisting unit. Here is where the going is *really* tough. And *here* is where the time-proven, Shepard Niles - developed features, such as the "Balanced Drive" (where stresses are evenly distributed through the hoisting unit by means of the planetary gearing principle) and the "bath of oil" system (in which the entire gear train operates in a bath of oil) remove the danger of excessive wear.

Ask one of the Shepard Niles representatives in your locality to show you how these and other equally sound principles can be applied profitably to your problem.

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Overhead Electric Traveling Cranes are made in either welded or riveted box girder construction. Capacities: Welded box girder, up to 15 tons; riveted box girder, up to 450 tons.

Shepard Niles

CRANE & HOIST CORPORATION

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rotary furnace or hearth furnace and then incinerated, scorified and melted. L. Hermanns, Germany. 2-23-37.

(22) 1,605,844. Furnace employing adjustable furnace arches for increasing the size of the furnace chamber and for uncovering the supplementary fuel supplying means when raised and covering it again when lowered. E. Jurges, Germany. 11-2-26.

(22) 1,702,298. Burner for furnace which permits the supply of fuel gases or liquid or pulverized fuel to the furnace either alternately or simultaneously. F. Hetsch, Germany. 2-19-29.

(22) 1,760,050. Gas burner of the type in which the gas and the air to be admixed with the gas are ejected from rotary impellers. R. Eickworth, Germany. 5-27-30.

(23) 1,886,064. Furnace having in combination a main inclined grate and a secondary inclined grate arranged above the main grate for delivering incandescent fuel thereto, and means for supplying fuel to both grates so as to form a burning layer on the main grate on which fresh fuel is supplied. L. Steinmuller, Germany. 11-1-32.

(24) 1,756,096. Method of and apparatus for burning solid fuel consisting of a furnace comprising a combustion chamber having in its top a plurality of charging holes having removable covers, and vertical, tubular retorts disposed beneath and in correspondence with certain of said charging holes. F. Novelli, Italy. 4-29-30.

(28) 1,618,808. Apparatus for the burning of powdered fuel comprising a cylindrical retort having tangential slots through its cylindrical wall and forming an annular air space therewith, and annular partitions for dividing said air space into adjoining compartments. E. Burg, Germany. 2-22-27.

(28) 1,680,183. Furnace for utilizing powdered fuel and the like, in a rising current of gaseous fluid, comprising, an upright shaft having an open lower end and of upwardly increasing cross sectional area, a chamber positioned below the lower end of the shaft and having a cross sectional area greater than that of the open lower end. G. Szikla and A. Rozinek, Hungary. 8-7-28.

(28) 1,701,900. Coal-dust furnace consisting essentially in providing means for blowing coal dust into a furnace having an inclined stepped grate which is supplied with fuel, the blowing of said coal dust being accomplished at such a height that said coal dust will come in contact with the tips of the flames which are produced by the fuel burning on said grate. R. Uhlig, Germany. 2-12-29.

(28) 1,729,217. Powdered fuel furnace comprising a furnace chamber having secondary air inlets near the bottom thereof, inclined slagging walls above said inlets, inclined burners above said walls directed to discharge respectively along the upper surfaces thereof. C. Hufschmidt, Germany. 9-24-29.

(28) 1,800,281. Coal dust firing installation having a common coal dust and air supply conduit, a burner in which said conduit terminates, said burner having a face place provided with a large number of nozzles through which the mixture of coal dust and air is adapted to be blown. P. Buscler, Germany. 4-14-31.

(28) 1,808,120. Burner arrangement for pulverized fuel furnace for the satisfactory intermixing of the pulverized fuel and the air of combustion. A. Runkwitz, Germany. 6-2-31.

(28) 1,887,891. Method of and means for operating pulverized fuel furnaces, with secondary air of combustion, more particularly with locomotives. R. Roosen, Germany. 11-15-32.

(28) 1,896,139. Coal dust furnace intended for locomotives and having a burner that has the shape of a spray nozzle. G. Hayn, Germany. 2-7-33.

(28) 1,910,735. Burner for coal dust firing and process for operating the same. H. Zikesch, Germany. 5-23-33.

(28) 1,943,286. Burner for powdered fuel in which the fuel is delivered from the burners with whirling motion. E. Burg, Germany. 1-16-34.

(28) 1,944,086. Pulverized fuel furnace, more particularly on locomotives, having an improved arrangement of the ignition space of such furnaces. W. Kempf, Germany. 1-16-34.

(28) 1,946,011. Coal dust furnace for flue boilers, marine boilers and the like and consisting essentially therein that the combustion space is positioned within a refractory lining provided at the front part of the flue and that said refractory lining is constructed to form an air admission space which is in connection with said combustion space by means of slots or the like. E. Burg, Germany. 2-6-34.

(31) 1,627,425. Open-hearth furnace comprising a gas producer, a melting chamber, a gas port connecting the chamber and producer at the white heat zone of the latter and means

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MAXIMUM VICTORY PRODUCTION
NEVER INTERFERES WITH THE SINCERE RESOLVE OE EVERY WYCKOFF WORKER TO MAINTAIN CONSTANT PRECISION AND UNIFORMITY
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YOU CAN PUT IT ALL UP TO STRONG, *if you have a steel casting from 30 pounds to 30,000 pounds—or a size range of almost any conceivable shape or proportion. The sweep method shown above—typical of Strong's versatility—saves the customer the costly pattern making otherwise needed for this unusually shaped, 33,000 pound casting. Strong molding facilities range from small snap flasks to steel flasks 16 feet square. This size range is governed only by the size of Strong's largest annealing oven (15 x 19 feet). Be sure you know the modern art of steel casting, as Strong has developed it!*

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Strong

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to produce a cooling and obturating current of air across the ports. E. Bosshardt, Germany. 5-3-27.

(31) 1,671,549. Furnace for domestic heating plants for solid fuel. W. Schmidt, Germany. 5-29-28.

(32) 1,982,564. Apparatus for regulating or governing the speed of conveyors, and more particularly the feed speed of traveling grates, screw conveyers for coal dust furnaces, and the like. G. Brunsen, Germany. 11-27-34.

(33) 1,760,448. Case for books or the like in which an endless row of superposed shelves is supported by a pair of endless chains and can be raised or lowered by moving the chains so that each shelf can be moved in range of the eyes or hands of a person standing in front of the case. A. Steinschneider, Germany. 5-27-30.

(33) 2,043,719. Mechanically moved grate having a set of grate bars, supports for the grate bars, plate springs supporting the said supports in an approximately horizontal position, one end of each of said plate-springs being rigidly secured to one of said supports while the other end is loosely connected to the same. B. Telgmann, Germany. 6-9-36.

(33) 2,108,394. Horizontal grate, which can be constructed in any desired size and wherein the charging and stirring and removal of ash can be effected entirely automatically. L. Steinmuller, Germany. 2-15-38.

(36) 2,091,587. Revolving grate, particularly for the furnaces of steam generators or the like, comprising at least two superposed rotatable discs, one of said discs being rotatable about an axis which is out of alignment with the axis of rotation of the other disc, and means to rotate said discs. O. Engler and H. Peperkorn, Germany. 8-31-37.

(38) 1,644,953. Stepped furnace grate having in combination with a number of fixed grate bars, a number of movable grate bars arranged in a series of groups, movable carriage to support and reciprocate said groups of movable grate bars and means adapted to move the carriages of each group independently of the carriage of the adjacent groups. F. Seyboth, Germany. 10-11-27.

(38) 1,818,661. Furnace for heating boilers and the like and for similar purposes and in particular furnaces provided with stepped grates with movable steps. A. Weigel, Germany. 8-11-31.

(38) 1,908,992. Progressive feed grate consisting of a plurality of inclined grate units extending transversely of the grate, each unit resting at its upper margin upon an adjacent unit and pushing means hingedly engaging the opposite margin of each of said units. J. Martin, Germany. 5-16-33.

(38) 2,250,067. Driving device for mechanically reciprocated grates of furnaces, more especially to grates which are provided with a partitioned draft chamber below the grate bars. J. Martin, Germany. 7-22-41.

(40) 2,147,976. Traveling grate for flue-tube boilers. R. Giesau, Germany. 2-21-39.

(40) 2,257,416. Traveling grate especially for induced draught roasting and sintering or similar plants, comprising an endless circulating grate band including a plurality of cross bars arranged transversely to the direction of travel of the band and provided with grooves. K. Grethe, Germany. 9-30-41.

(43.50) 2,160,449. Apparatus for the starting and landing of aircraft adapted to be towed on the water or carried by a ship, comprising a platform having a central core of tenacious material. R. Weichardt, W. Freistadt and J. Hicke, Germany. 5-30-39.

(44) 1,829,275. Automatic stoker device for furnaces or the like comprising a circular

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grate divided radially into a plurality of retorts, and means for feeding fuels to said retorts. H. Gleichmann, and W. Gumz, Germany. 10-27-31.

(52) 1,754,586. Method for combustion on the grate, according to which method a portion of the flue gases is automatically deflected by the action of the kinetic energy inhering in the flue gases and to conduct this deflected portion of the flue gases backward to one or several points of the front portion of the grate surface. E. Volcker, Germany. 4-15-30.

(54) 1,813,921. Vapor power plant and more particularly means for regulating the furnace of such plants by controlling the supply of oxygen to the combustion air in dependence of the load in such a manner, that the supply of oxygen is increased when the load rises and decreased when the load drops. W. Gumz, Germany. 7-14-31.

(71) 2,164,262. Air distributor for furnaces or the like having a forced air feed beneath the grate thereof. J. Wagner, Germany. 6-27-39.

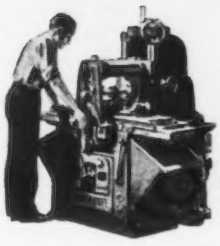
(72) 1,625,082. Method of producing high

What will your future I.P. *be?*

This is the First of a series of advertisements presenting "Industrial Par" and its importance to your company in all future planning. Save this and succeeding I.P. advertisements as the basis for discussion and as a guide to your planning program.

50% increased output per man-hour every 10 years.*

Will your production make this National †† Industrial Par?



RESEARCH reveals that in the 12 years, 1929-1941, the nation's output per man-hour increased 34%. The rate is 2½% per year compounded. And there is ample evidence accumulating that the rate will advance to at least 4%. War — the supreme national productive effort it calls for — accelerates man-hour output. Improved production techniques — developed in war — carry over into peacetime; the pent-up buying power released after Victory will tremendously stimulate production.

Thus manufacturers who intend to keep step with a high level of national prosperity — the volume production which means more goods for more people at lowest cost, and security of jobs and wages for the greatest number of workers — must strive to increase their output per man-hour 50% every 10 years.

To put it another way, American industry sets a definite national industrial PAR for man-hour output or production — 4% compounded per year rate of increase. The management of your company can determine its own competitive standing in terms of its ability to make or break this PAR.

Every industrial executive knows the key importance of machine tools in reaching production goals. Machine tools were basic to the phenomenal achievement of the American aircraft industry in attaining and surpassing the 60,000 plane quota set at the beginning of the war. The majority of the war industries — all machine tool users — were able to produce at a rate far in advance of the timetables set for them.

Manufacturing for peacetime markets is as much of a challenge as manufacturing for war. To make better products — faster — at lower cost — will call for the newest and finest machine tools — essential implements of production efficiency and the increased output that means security of jobs and wages.

Back the attack **BUY MORE BONDS**

Spotlight facts for your future I.P. *planning*

* Production methods — developed in wartime —increase man-hour output; pent-up buying power — released in peacetime — demands increased production.
* The rate of 2½% increase per year output per man-hour, established by a 12 year record of industrial production, can be expected to reach at least 4% per year — compounded.
* Manufacturers must set a goal of 50% increased output per man-hour every 10 years — to maintain a high level of national prosperity and achieve its benefits in terms of security of jobs and wages for the greatest number of workers and the volume production of more goods for more people at lowest cost.
* Machine tools — the most modern, most efficient — are recognized as the most effective implements of mass production and increased output at lowest cost — but only continual replacements with the newest and finest machine tools assures full productive capacity. *Such replacements yearly should be equal to 10% of the total machine tool investment — in keeping with increased output.*
* The cost of machine tools is insignificant in terms of their productive power . . . from 1927 to 1937, according to census reports, American manufacturers had only a total of about 2% invested yearly in machine tools in ratio to a total volume of 9 billion dollars' worth of production annually.

†† **Industrial Par** — *the constantly increasing output per man-hour equal to approximately 50% every 10 years.*

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Milwaukee Machine Tools

24-HR-A-DAY Operation

As one shift relieves another, Gusher Coolant Pumps are ready to go . . . and keep on going. Simple design — fewer parts to wear — make Gusher Pumps "steady performers". You get a copious flow of coolant when you want it and where you want it. There's a Gusher model for your requirements. Write.

GUSHER COOLANT PUMPS

MODEL 9040—Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally inclosed ¼ h.p. motor.

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1821 READING ROAD CINCINNATI, OHIO
LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

temperatures in a furnace which consists in spraying the fuel into the combustion chamber of the furnace and jetting air through multitudinous passages distributed throughout the walls of the chamber. F. Helbig, Germany. 4-19-27.

(72) 1,757,051. Apparatus for the regulation of combustion in furnaces comprising at least two burners and a fuel feed device in each burner for supplying fuel to the furnace. C. Klopfer, Germany. 5-6-30.

(73) 1,861,388. Fire bridge for furnaces comprising a support having an aperture therethrough, a casting mounted upon said support having passages through oblong in cross-section and communicating with said aperture at their lower ends and opening out of their upper ends approximately at right angles to the direction of the gases of combustion. C. Greve and W. Schwarz, Germany. 5-31-32.

(75) 1,762,505. Fireplace comprising a combustion chamber having its walls composed of blocks in longitudinal rows spaced from one another for providing passages for the admission of secondary air and means for supplying secondary air through said passages. E. Burg, Germany. 6-10-30.

(80) 1,747,738. Plane grate furnace comprising a plane grate, a fire door at one end of the grate and a fire bridge at the opposite end of the grate, and a set of steam nozzles in the proximity of the fire door and above the plane of the grate adapted to produce steam jets. H. Serog, Austria. 2-18-30.

(98) 1,684,691. Means for protecting the drums, and more particularly, the upper drums of water tube boilers from the strong or direction action of the hot gases or flames. L. Steinmuller, Germany. 9-18-28.

(99) 1,806,022. Ignition roof for traveling grate boiler plants. R. Poth, Germany. 5-19-31.

(99) 1,904,596. Arch for metallurgical furnace of the class wherein the arch or upper portion thereof is built up of fire bricks which present a relatively uniform and smooth face toward the interior of the furnace and exteriorly have projections which provide the furnace exteriorly with a profile which presents a series of peaks and depressions arranged either alternately or in varied order and size. W. Alberts, Germany. 4-18-33.

(99) 2,146,751. Furnace roof for high temperature industrial furnaces comprising an arched roof formed of individual refractory bricks arranged in an arc and suspended to span the furnace side walls freely thereof, and abutments at the margins of the roof for supporting the bricks in contiguous relationship with each other. W. Linder, Germany. 2-14-39.

(103) 1,709,801. Art of making metallic foils, films or leaves of extreme thinness. C. Muller, Germany. 4-16-29.

(104) 1,748,173. Production of high temperatures by means of finely subdivided and more especially pulverulent fuel. A. Helbig, Germany. 2-25-30.

(104) 1,762,982. Apparatus for burning coal dust or other finely sub-divided solid fuel and is particularly applicable for use with rotary kilns or the like which are employed for burning, roasting or clinkering cement or similar material. A. Hasselbach and F. Luther, Germany. 6-10-30.

(104) 1,890,542. Device intended to control coal-dust furnaces more particularly those of locomotives. G. Hayn, Germany. 12-13-32.

(104) 1,938,137. Adjustable burner arrangement for pulverized fuel furnaces, more particularly intended for locomotives. E. Dietzel, Germany. 12-5-33.

(104) 2,197,647. Burner for a mixture of air and fuel comprising a combustion chamber and a burner nozzle having an outlet mouth which flares towards the said combustion chamber and serves to conduct primary and secondary air to said chamber. C. Lorenzen, Germany. 4-16-20.

(106) 1,608,996. Means for cooling the masonry for coal-dust furnaces. H. Reiser, Germany. 11-30-26.

(110) 1,746,350. Control device for fuel feeding machanism, especially for coal dust furnaces and similar devices. G. Hayn, Germany. 2-11-30.

(113) 1,760,572. Mechanically-operated grate-feeding means provided with coal throwing shovels disposed in the stoking neck or stoking aperture of the furnace. A. Weck, Germany. 5-27-30.

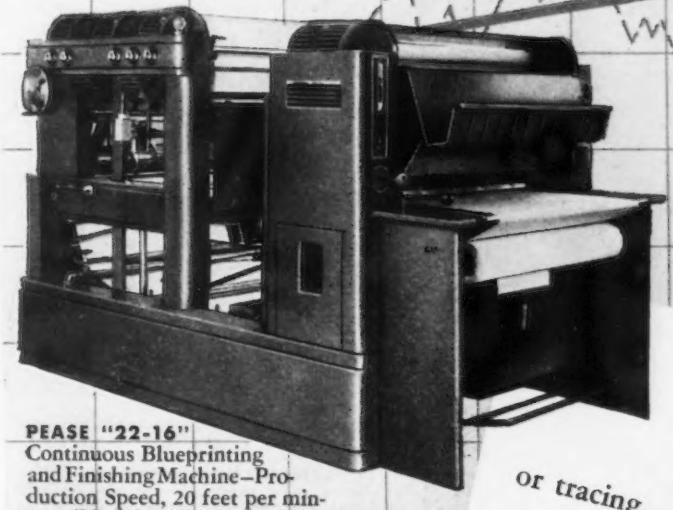
(118) 1,667,703. Apparatus for charging fireplaces with highly-inflammable loose fuel. E. Simon, Germany. 4-24-28.

(147) 2,047,071. Draft regulator for locomotives for controlling the introduction of steam and of overgrate air for smoke-consuming devices, more particularly for use on locomotives. O. Huwyler, Austria. 7-7-36.

(162) 1,681,677. Ship's smoke stack comprising a substantially cylindrical funnel, a double conical insert in and connected with

Blueprints

SMOOTH OUT PRODUCTION KINKS



PEASE "22-16"
Continuous Blueprinting and Finishing Machine—Production Speed, 20 feet per minute. (Model "22," not shown, has a Production Speed of 30 feet per minute.)

EXCLUSIVE PEASE FEATURES

- **Sliding "Vacuum-like" Contact** smooths out tracings, prevents errors in printing.
- **Three Speed Lamp Control** provides operation at 10, 15, or 20 amperes, minimizes running speed and dryer heat changes.
- **Actinic "No-Break" Arc Lamps** burn for 45 minutes without breaking arc, resume instantaneously.
- **Horizontal "Floating" Water Wash** floats prints free from tension and prevents wrinkles, stains, bleeding.
- **Quick Change Chemical Applicator System** very economically allows change from Blueprints to Negatives in 20 seconds.
- **Eight-inch Diameter Drying Drums,** thermostatically controlled, heated by gas or electricity, dry the prints "flat as hung wallpaper."

Blueprints are accurate, easy to read and faithfully reproduce every detail of the original engineering drawing or tracing... Blueprints remain legible and withstand the rough handling, dirt and greasy fingerprints of shop use... Blueprints produce good prints from poor, worn, or soiled tracings... That is why Blueprint reproductions of drawings and tracings are now used more than ever before.

Pease Continuous Blueprinting Machines are simple in operation and combine printing and finishing in one complete continuous operation. They smooth out "production kinks" with their own actual production speed of 30 feet per minute in the case of Pease "22" (not shown) and 20 feet per minute with Pease "22-16."

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Pease Blueprinting Machines A TYPE AND SIZE FOR EVERY REQUIREMENT INCLUDING DIRECT PROCESS PRINTING AND DEVELOPING MACHINES

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● Men responsible for *efficient production* in all types of industrial plants for a quarter century... have found T-J products "tops" for Tough Jobs!

Whether it's a job for Rivitors... hydraulic cylinders ...air cylinders... cutters... Clinchors... or air controls... you can count on T-J for unbeatable efficiency, accuracy and dependable performance! All T-J products built to precise standards of manufacture... rigidly inspected... backed by practical-minded experienced engineering. In planning a better production set-up for better products... specify T-J Quality! Write for bulletins.

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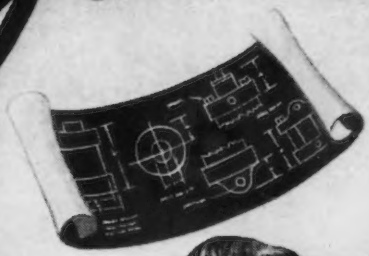
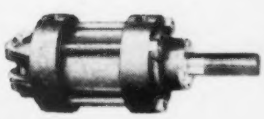
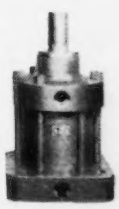


HYDRAULIC CYLINDERS





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RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

Architects: Dodge—Chicago Plant. Albert Kahn, Associated Architects And Engineers, Inc.

WHEREVER you go in America today, you'll find busy war industries in which CAREY Products make a notable contribution to *higher production efficiency.*

In aviation gasoline refineries . . . synthetic rubber units . . . power, food processing, textile, aluminum, steel, airplane motor, machine tool, and munitions plants . . . in Government buildings and on Victory ships—CAREY "Long Life" Products are helping to conserve fuel, step up kilowatt output, save labor and materials, speed production . . . win the war!

CAREY HEAT INSULATIONS are making possible maximum power production on minimum fuel. CAREY BUILT-UP ROOFS and CAREYSTONE SIDING are protecting valuable plants against fire and fumes. CAREYDUCT is maintaining high efficiency in air-conditioning systems. CAREY ELASTITE FLOORING is speeding plant traffic, saving time, money, manpower.

If it's "top" wartime plant efficiency and economy you're after, remember—you can depend on CAREY Products! Write Dept. 26 for details of CAREY Products.

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Roofing . . Siding . . Flooring . . Insulations . . Waterproofing Materials . . Expansion Joint . . Asbestos Paper and Millboard . . Air Conveying Systems . . Asbestos Oil & Grease Absorbent . . Asbestos Pipeline Felt . . Insulated Sheathing . . Rock Wool Insulation

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THE PHILIP CAREY MFG. COMPANY • Lockland, Cincinnati, Ohio

Dependable Products Since 1873

IN CANADA: THE PHILIP CAREY COMPANY, LTD. Office and Factory: LENNOXVILLE, P. Q.

on the front side and having a discharge opening and also having a downwardly sloping guiding surface for the coal. L. Rainchon, Netherlands. 4-7-31.

(29) 2,175,832. Heating apparatus, particularly suitable for domestic use but also applicable for the heating of large premises, and especially adapted for burning fuels, the combustion of which is ordinarily difficult or necessitates special arrangement, for instance fine fuel of any nature, coke and anthracite breeze, etc., as well as wood in all its forms. P. Demarcay, France. 10-10-39.

(32) 1,625,954. Furnace having a mechanical stoke and comprising as essential elements a grate portion having a large draft capacity, another grate portion having a much lower draft capacity, an underfeed device adapted to advance the fire bed on the grate portion with a large draft capacity and means for supplying supplementary air to the combustion chamber above the fire bed. A. de Bije, Netherlands. 4-26-27.

(32) 1,835,088. Apparatus for controlling the feeding of fuel to furnaces and more particularly to the regulation of the grate speed or the rate of supply of fuel in traveling or chain grate furnaces. E. Roucka, Czechoslovakia. 12-8-31.

(32) 1,835,089. Apparatus for controlling the feeding of fuel to furnaces and more particularly for the control of mechanical fuel feeding rate mechanism or the rate of supply of fuel in, for example traveling or chain grate furnaces. E. Roucka, Czechoslovakia. 12-8-31.

(32) 1,835,090. Apparatus for automatically feeding fuel to furnaces which burn solid fuel upon mechanical grates, such as chain grates or traveling grates which by their movements feel the fuel. E. Roucka, Czechoslovakia. 12-8-31.

(32) 2,113,831. Combustion device for solid fuel furnaces which is characterized by the utilization of the effects of gravity for automatically feeding a furnace by means of a thin layer o fuel and also by the relative displacement of the ignition zone with respect to the mass of burnt products. H. Dupuy, France. 4-12-38.

(32) 2,214,404. Furnace for solid fuels with forced draft wherein the fuel rests upon at least one inclined or slanting support, such as a slanting grate or dead-plate or sole, at the upper part of which an air inlet opening is provided. E. Coenen, Belgium. 9-10-40.

(38) 1,811,339. Automatic furnace comprising a mechanical stoking appliance of the type in which the coal is supplied over a grate and at the same time spread laterally over the grate, and movable grate bars mounted adjacent to the main grate and movable in such manner that they feed the coal and ash and slag in the same direction as that in which the coal is supplied by the said appliance. A. de Bije, Netherlands. 6-23-31.

(40) 1,670,866. Traveling chain grate for mechanical stoking comprising a mechanical chain grate partitioned off into separate air compartments with a view to suppressing the accumulation of coal dust in the compartments so formed while however keeping the compartments practically air-tight as is necessary for the satisfactory operation of the draft. E. Nicolini, France. 5-22-28.

(40) 1,689,675. Combination with a boiler furnace chamber of a traveling grate stoker therein and a pulverizer adapted to pulverize fuel and to inject it into the furnace so as to create a cloud of the fuel over the rear part of the stoker. W. Lulofs, Netherlands. 10-30-28.

(40) 2,092,080. Mechanically moved chain grate for small furnaces and more particularly a chain grate for house boilers having a small grate surface. E. Lemaire, France. 9-7-37.

(44) 2,105,988. Fuel agitator designed for use with furnaces in which the fuel is fed from underneath the firebed. H. Ridet, France. 1-18-38.

(45) 2,034,448. Mechanical underfeed stoker wherein the fuel is fed to the furnace from below in such a manner as to ensure the complete burning of any solid or pasty fuel therein. E. Sevellec, France. 3-17-36.

(55) 2,030,017. Automatic smoke preventer for insuring complete combustion of smoke in fireboxes, and wherein, for that purpose, a jet of live steam is brought to blow the heated air over the burning fuel with the effect that the carbon contained in the gases is completely oxidized. R. Mille, France. 2-4-36.

(56) 1,698,516. The combination with a smoke-tube boiler having uptake tubes and downtake tubes, of a removable member forming a return chamber disposed outside of the boiler, and in communication with all of said tubes for receiving combustion gases from the

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Dings High Intensity Lifting Magnet handling five 2,000 lb. castings.

FOR FASTER, MORE EFFICIENT HANDLING OF THESE JOBS:

Separation of Ferrous and Non-Ferrous Scrap—Dings builds a complete line of magnetic pulleys, pulley type separators, drum type separators and agitating type separators for handling *all* classes of scrap.

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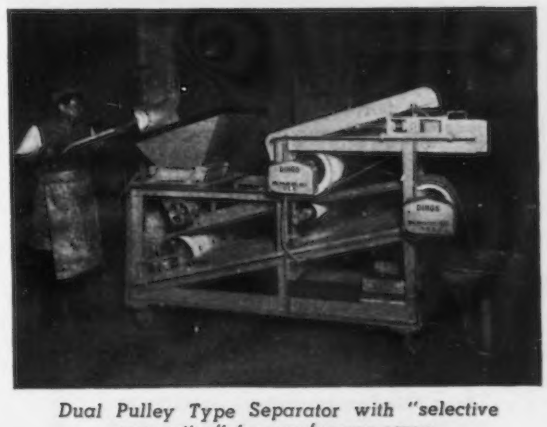
Pulley Type Separator for removing iron from foundry sand.



Dual Pulley Type Separator with "selective separation" for non-ferrous scrap.

High Intensity Pulley, installed in sand-handling system of large foundry.

Dings MAGNETIC SEPARATION HIGH INTENSITY

1. As is.. it's a Surface Grinder

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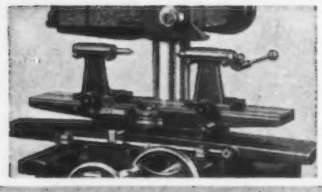
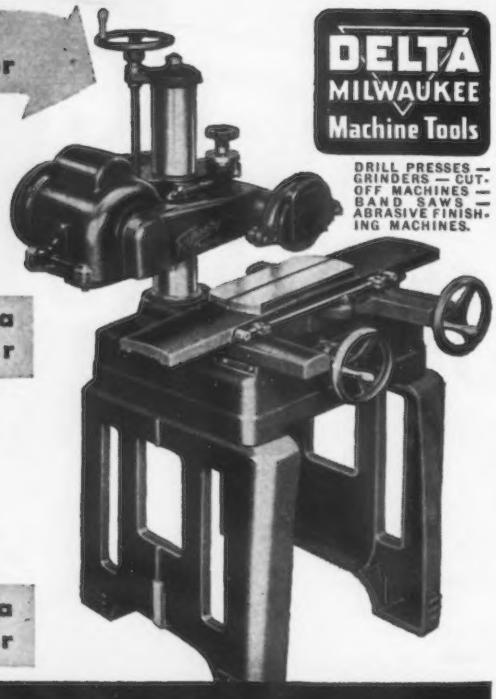


3. With the Unihead.. it's a Tool & Cutter Grinder



DELTA MILWAUKEE Machine Tools

DRILL PRESSES — GRINDERS — CUT-OFF MACHINES — BAND SAWS — ABRASIVE FINISHING MACHINES.

Delta *now offers you...*

3 accurate, dependable grinders...

Any one of these combinations — by itself — is "a heck of a lot of machine for the money." But take all three together, and you have a saving that no shop, large or small, can afford to overlook.

As a surface grinder, it's a husky, big-capacity machine—over 6 ft. high, weighs close to 700 lbs., grinds surfaces up to 13½" long, 6" wide. Designed for ease and speed of operation—with convenient controls, wide graduations on micrometer for close settings, many other latest features for accuracy and dependability.

As a Chip-Breaker Grinder, it gives exceptionally accurate results in grinding the chip-breaker groove on carbide-tipped tools. Equipped with the Univise, which holds the tool at any conceivable angle, may be reset at *precisely* the same angles as original setting without bothersome and often inaccurate measurements.

As a Tool & Cutter Grinder, it makes tool sharpening simpler, easier, cheaper, and extremely accurate. With the Unihead attachment, almost any conceivable angle can be ground.

For a real find that gives creditable results for years, investigate this modern, safe, good-looking machine. Consult your Delta industrial distributor (Delta sells only through distributors) or write for bulletins.

M-8B

Specifications

Wheels must have 1¼" hole.
Table surface 5¾ x 13".
Traverse feed, one graduation is .001".
Micrometer adjustment ⅜" range, each graduation is .0005".
Spindle speeds (with 60 cy. 1750 R.P.M. motor) 3200 and 4200 R.P.M.

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Surface Grinder.....$295.00
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Chip-Breaker Grinder 343.50
No. 24-305
Tool & Cutter Grinder 370.00

Priority required, A-1-A or better, under restrictions of Limitation Order L-237.

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THE DELTA MANUFACTURING CO.
705A E. Vienna Ave., Milwaukee 1, Wis.

Please send me your catalog and bulletins describing the Delta 3-in-1 grinder combination.

Name.....Position.....

Company.....

Address.....

City.....(.....) State.....

uptake tubes and delivering said gases to the downtake tubes. M. Treschow, Denmark. 1-8-29.

(60) 1,728,571. Apparatus for insuring complete combustion in industrial furnaces comprising essentially an injector with pressure steam jets whereby there is injected into the furnace a quantity of air calculated to effect complete combustion of the gases. J. Mille, France. 9-17-29.

(60) 1,758,304. Smokeless heat-economizing apparatus for furnaces of all kinds essentially constituted by one or several rows of injector nozzles designed to be housed in recesses made in one or several walls of the combustion chamber above the grate, at the back of same in the apparatus (boilers, etc.) and even in the flues. A. Winkler, France. 5-13-30.

(61) 2,310,903. Apparatus for effecting smokeless combustion in locomotive furnaces and the like wherein are provided a steam chest, a steam operated boiler blower and steam operated preheated air blowers. S. Wikarski, Poland. 2-9-43.

(74) 1,849,975. Grate for gas producers which is chiefly characterized by the fact that it comprises hollow bars which are placed side by side and are adapted to utilize the gas producing process in which air is insufflated through submerged channels into the water of the ash pit. P. Cousin, France. 3-15-32.

(75) 2,045,194. Apparatus for supplying heated air to a boiler furnace or the like in which a conduit is arranged above the bridge and, if desired, at the sides of the furnace, said conduit having lateral orifices of equal area, the arrangement being such that approximately equal quantities of air are discharged from the orifices. R. Luks, France. 6-23-36.

(97) 2,034,452. Boiler having a furnace flue, a nest of smoke tubes arranged beside said furnace flue, a combustion box or chamber into which open said furnace flue and said smoke tubes are disposed at one end of the boiler, and a substantially vertical baffle within said box or chamber. A. de Bije, Netherlands. 3-17-36.

(99) 1,683,963. Roof for furnace having a metal framework, a plurality of supports carried thereby and arranged in longitudinal alignment inclined from front to rear of the furnace. C. Duquenne, France. 9-11-28.

(104) 2,039,890. Fuel burner in which the fuel is conveyed to the burner by air under pressure. H. de Coster, France. 5-5-36.

(104) 2,055,331. Coal dust furnace comprising in combination a plurality of coal-dust burners, adjustable vanes associated with each burner and controlling the shape of the flame, a mechanically driven rotary coal-dust charging mechanism associated with each burner and a main air supply channel for all burners in common. W. Bredtschneider, Czechoslovakia. 9-22-36.

(104) 2,144,966. Regulator of combustion for thermic furnaces. P. Frion, France. 1-24-39.

(104) 2,146,618. Rotary means for mixing pulverized coal with air in connection with burners fed with pulverized coal. R. Boudrant, France. 2-7-39.

(104) 2,154,320. Pulverized fuel burner comprising a pipe supplying a current of primary air containing pulverized fuel, two rotary mixing devices in said pipe, each of said mixing devices comprising a helically bladed rotor adapted for revolving by said current. R. Boudrant, France. 4-11-39.

(111) 1,679,874. Feeding device for furnaces consisting in that the fuel, instead of being discharged adjacent the front wall of the furnace or boiler, is discharged into the proximity of the fire bridge, and pushed and spread towards the front wall of the boiler by means of spreaders. A. Pastrnak, Czechoslovakia. 8-7-28.

(99) 1,750,355. Ceramic or tile furnace in combination with lateral walls, a flat slab resting on said walls and serving as a continuous stay for the arch, refractory bricks arranged in rows forming a substantially flat roof for the oven and provided with transverse openings. A. Ragoucy, France. 3-11-30.

Class 253—Motors—Fluid

(16.50) 1,730,746. Steam or gas turbine composed of an integral outer element and an inner element, carrying a plurality of axially spaced circumferential rows of blades on its outer periphery. K. Roder, Germany. 10-8-29.

(16.50) 1,759,817. Steam turbine having rotors running in opposite directions and with preponderating axial admission, which is suitable for industrial application. K. Roder, Germany. 5-20-30.

(16.50) 1,845,955. Steam turbine having

(*Continued on Page* 180)

The Kellogg Division

of

American Brake Shoe Company

announces the purchase of

Crown Spray Gun Manufacturing Company

Kellogg Division of American Brake Shoe Company has acquired the Crown Spray Gun Manufacturing Company of Los Angeles, California.

This adds to the Kellogg-American line of air compressors a complete range of spray equipment including guns, booths, exhaust fans and paint containers.

Kellogg also makes car lifts and high-speed car washers. With the purchase of Crown's production and research facilities, service in the fields where Kellogg-American is widely known and used will be expanded.

Products of the Crown plant, which will continue to be made at Los Angeles, will be distributed in the future under the name Kellogg-Crown. Each plant will benefit from the research and engineering divisions of both organizations, and from that of the American Brake Shoe group of technologists at Mahwah, New Jersey.

Kellogg Crown products and parts are available at

Crown Spray Gun Manufacturing Company, Los Angeles, California
Kellogg Division, Rochester, New York

AMERICAN BRAKE SHOE COMPANY, 230 PARK AVE., NEW YORK 17, N. Y.

8 DIVISIONS, 59 PLANTS SERVING INDUSTRY AND TRANSPORTATION

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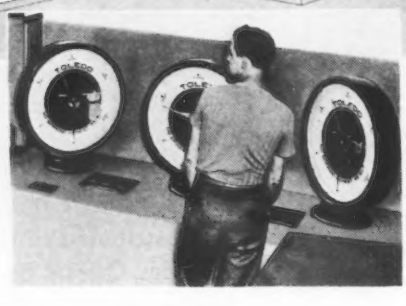
Ramapo Ajax Division	*New York City*	**American Forge Division**	*Chicago, Ill.*
American Manganese Steel Division	*Chicago Heights, Ill.*	**Southern Wheel Division**	*New York City*
Brake Shoe and Castings Division	*New York City*	**National Bearing Metals Corp.**	*St. Louis, Mo.*

HERE WEIGHT AND BALANCE MUST BE RIGHT!

The LIBERATORS are rolling fast out of Willow Run. And Ford weighs each of them this way—on Toledos.



● Weight and Balance are vital factors in the battle-power of these air-giants. They must be weighed and balanced ACCURATELY. Yet Time is vital too; they're needed at the Fronts.

So the platforms under each wheel are electrically raised or lowered to level the plane; or to check load-and-balance characteristics. These platforms ride on sensitive levers, which transmit the load-force to primary dials, below ground.

To speed the work, each wheel's load also is shown on an electrically connected secondary dial in the floor level control room, where the operator has dials and plane in one line of vision. Thus both Accuracy AND Speed are achieved in this final checking operation—where production ends and performance begins.

TOLEDO RESEARCH backed this war-development. The pre-war know-how of the scale industry's greatest research organization was ready for this special weighing-for-war problem, as it has been for hundreds of others.

And Toledo Research will be ready also, when weighing-for-peace brings its new assignments.

Toledo Scale Company, Toledo, Ohio.

TOLEDO SCALES

TIP FOR TOMORROW *PRINTED Weight Records will be the universal weight-control practice after the War. Hundreds of war plants are using them now. We are at liberty to send you complete information at once, if you wish it.*

Release of Steel For Construction In 1944 Predicted

• • • **Construction** of the nation's war manufacturing plant was virtually completed early in 1943, according to Robert T. Brooks, executive vice-president, American Institute of Steel Construction.

"All-time highs have been reached by the steel construction industry in speed and efficiency of building," he said. "Such obstacles as shortages of steel and other building materials and of manpower had been covercome. The war factories are up, they are in operation and this industry has performed the greatest task in its history.

"There still was important work to be done. The steel construction industry promptly turned its facilities, skill and know-how into new channels. It adapted itself to manufacture of a long list of heavy war materials. They included ship sub-assemblies, invasion barges, pontoons, tank assemblies and portable bridges and airplane landing fields. This work, an important achievement of 1943, continues.

"Looking to 1944 and the postwar period, it appears likely that construction steel will be released in increasing quantities, for much needed industrial and commercial building construction here at home. It will include highways, bridges, railroads, public and private buildings. It will involve modernizing of plants and facilities, eventual reconversion of many to peacetime manufacturing. We also believe many factories will be relocated to meet current economic and population changes.

"The steel construction industry has a capacity of 5,000,000 tons of building a year. Its facilities will be ample for postwar demands, just as they proved in the war emergency."

(*Continued from Page* 178)

rotors adapted to revolve in opposite directions, a shaft connected to each of said rotors, gearing between said shafts, and clutching means whereby a third shaft may be rotated in forward or reverse direction. A. Bonom, Italy. 2-16-32.

(16.50) 2,006,683. Blade segments for radial flow machines. U. Meininghaus, Germany. 7-2-35.

(16.50) 2,006,684. Blade ring for radial flow machines like steam or gas turbines. U. Meininghaus, Germany. 7-2-35.

(16.50) 2,276,695. Steam turbine in which not only the rotor but the element corresponding to the usual stator also rotates. E. Lavarello, Italy. 3-17-42.

(16.5) 2,312,995. Gas turbine system for utilizing the energy of a motive gas under pressure. R. Anxionnaz and R. Imbert. France. 3-2-43.

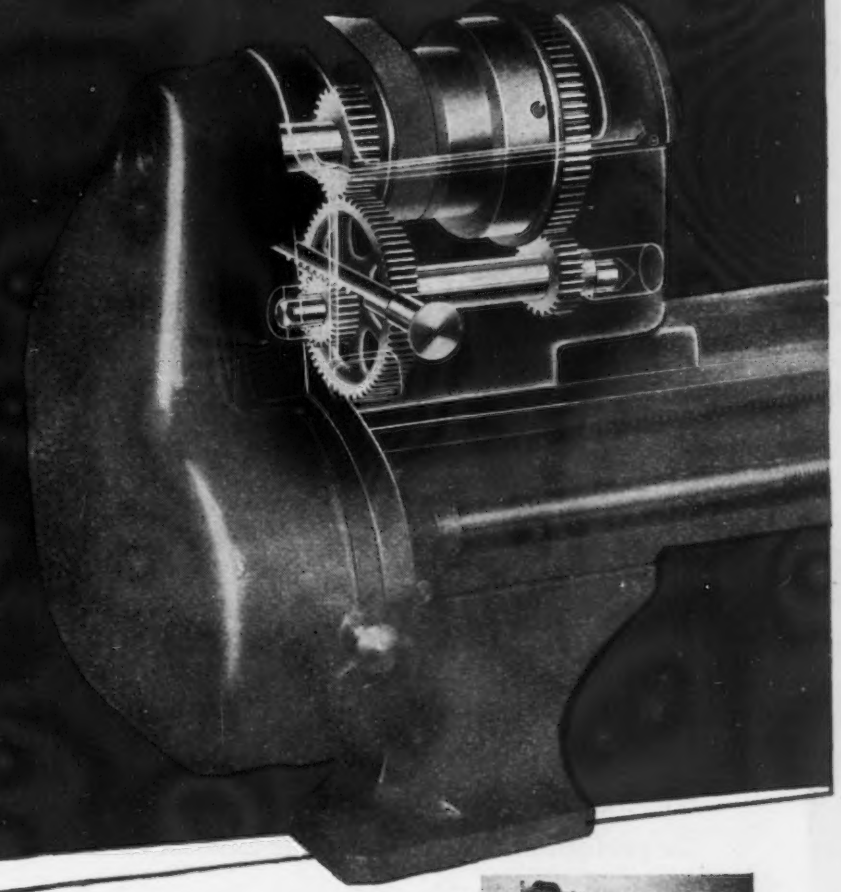
(22) 1,704,417. Hydraulic engine built in a siphon piping. K. Zoll, Germany. 3-5-29.

(39) 1,923,251. Gas or steam turbine cas-

BACK GEARS ENCLOSED IN HEADSTOCK

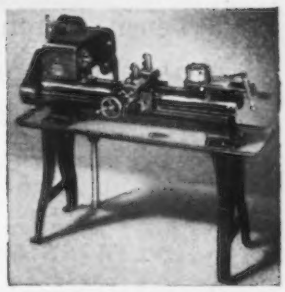
With Patented Shifter Rack

Finger Tip Control for Easier, Faster Back Gear Shifting

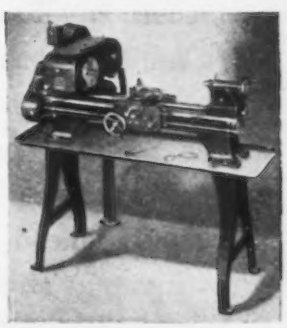


The advanced back gear design permits placing the patented back gear shifter rack where it belongs . . . at the operator's finger tips. No longer is it necessary to reach over the headstock to operate the lever which shifts power to back gears. Not only is the position of the back gear shifter rack safer and more convenient, but it also saves valuable seconds every time the shift is made. Finger tip accessibility of the back gear shifter rack is just one of many reasons why you find Logan Lathes in shops with outstanding production and safety records. Note the wide and durable semi-steel back gears. Write today for information on all models of Logan Lathes.

Brief Specifications: **Swing over bed, 10½" • Between centers, 24" • Bed length, 43⅛". • Spindle hole, 25/32" • Precision ground ways; 2 prismatic V-ways; 2 flat ways • 12 spindle speeds, 30 to 1450 r.p.m. • Protected by ball-bearings or self-lubricating bronze bearings.**



No. 850 Manufacturing Lathe



No. 200 Back Geared Screw Cutting Lathe

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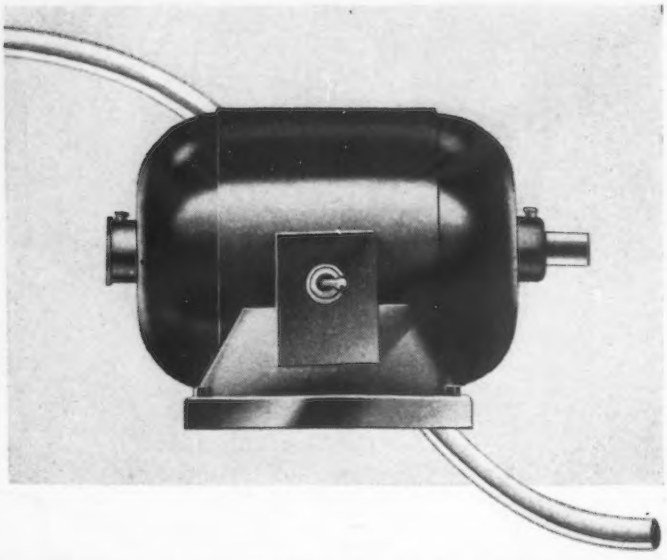
PAGE *Stainless Steel* WIRE



BINDING WIRE FOR ARMATURES

may be one of the prosaic uses of **PAGE STAINLESS STEEL WIRE**. But its higher tensile strength and non-magnetic qualities have added no little to the performance of modern war-time AC motors.

Tensile strength, corrosion resistance and non-magnetic qualities of Page Stainless Steel Wire have called for its use in Aircraft Control Cables in planes for the American air arm and for our allies.

And **PAGE STAINLESS STEEL SPRING WIRE** controls the mechanism of one of the most effective of modern small arms.

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ing with steam supply and exhaust conduits on the same side. G. Bauer and C. Schmieske, Germany. 8-22-33.

(39) 2,220,616. Packing for steam turbines. K. Roder, Germany. 11-5-40.

(44) 1,803,223. Blading for steam and gas turbines. R. Wagner, Germany. 4-28-31.

(46) 2,140,545. Production of lubricants, more particularly to the synthetic production of substances which may be used directly as lubricants or which may be added to other lubricants for the purpose of improving the properties of the latter. M. Pier and F. Chirstmann, Germany. 12-20-38.

(59) 2,051,109. Gas turbine constructed so as to produce a non-steady flow of the driving medium in the working channels of the rotor, that is to say, a flow the speed of which constantly varies at every point in the channels. E. Silbermann, Rumania. 8-18-36.

(68) 2,065,160. Rotary engine by which it is possible to employ as driving fluid combustion gases, superheated or usual steams. S. Strazzulla, Italy. 12-22-36.

(69) 1,809,666. Supply conduit for steam and gas turbines. G. Bauer and C. Schmieske, Germany. 6-9-31.

(69) 2,241,782. Multi-stage gas turbines. G. Jendrassik, Hungary. 5-13-41.

(70) 1,865,551. Reversing steam turbine with variable velocity. G. Belluzzo, Italy. 7-5-32.

(77) 1,710,561. Turbine engine particularly steam or gas turbine. J. Zagorski, Germany. 4-23-29.

(77) 1,837,439. Turbine blade for gas and steam turbines. H. Holzwarth, Germany. 12-22-31.

(77) 1,948,448. Special material for making steam turbine blades, shafts for large steam turbines and turbogenerators and other parts of machines to be subjected to similar kind of use. W. Rohn, Germany. 2-20-34.

(77) 2,020,793. Radial flow turbine. U. Meininghaus, Germany. 11-12-35.

(79) 2,099,699. Method and apparatus for assembling and dismantling turbo-machines whereby the shafts are shortened to an unusual degree and assembly and disassembly facilitated. U. Meininghaus, Germany 11-23-37.

(79) 2,102,637. Arrangement of radially traversed blades in rotary machines. U. Meininghaus, Germany. 12-21-37.

(87) 2,029,331. Apparatus for regulating turbo-machines. U. Meininghaus, Germany. 2-4-36.

(17) 2,081,137. Flying machine, more particularly a machine having a fuselage comprising at least two portions which are movably connected with one another, whereby the position of one portion with respect to the other portion can be changed. C. Dornier, Germany. 5-25-37.

(87) 2,081,148. Disk construction for radial flow machines. U. Meininghaus, Germany. 5-25-37.

(87) 2,115,031. Disk construction for radial flow machines. U. Meininghaus, Germany. 4-26-38.

(87) 2,200,288. Bladed disk for radial flow rotary machines. U. Meininghaus, Germany. 5-14-40.

(89) 2,081,150. Disk construction for radial flow machines. U. Meininghaus, Germany. 5-25-37.

(117) 1,822,778. High-speed hydraulic turbine. V. Kaplan, Austria. 9-8-31.

(117) 1,924,621. Cavitation free fluid joint. H. Mueller, Germany. 9-29-33.

(117) 1,939,229. Hydraulic turbines, pumps and similar apparatus with movable vanes for the prevention of entry of water into the runner head. C. Schmitthenner, Germany. 12-12-33.

(120) 1,650,475. Free-jet turbine. G. Trefz and F. Trefz, Germany. 11-22-27.

(124) 1,955,683. Reaction turbine without speed ring with a scroll case undivided by partitions. M. Reiffenstein, Austria. 4-17-34.

(124) 2,026,436. Control device for impulse turbines. M. Reiffenstein, Austria. 12-31-35.

(137) 1,777,450. Turbine for use with steam or water and consisting essentially in the provision of a blade wheel having a rim which presents, when viewed in axial direction, alternate circular and substantially V-shaped recesses forming blades of corni-form cross-section turned alternately in opposite directions. C. Rix, Germany. 10-7-30.

(141) 1,809,496. Siphon turbine comprising in combination an inlet pipe, a suction pipe, a box-shaped intermediate member adapted to establish communication between the two pipes, and a rotor in the admission opening of the inlet pipe. E. Suess, Austria. 6-9-31.

(141) 2,006,338. Impeller for hydraulic machine of the Kaplan type having movable blades so that machines of abnormal size can be manufactured and shipped to the place of installation. J. Baumann, Germany. 7-2-35.

(141) 2,006,339. Impeller for hydraulic ma-

25 YEARS AGO...

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This is one of the basic principles upon which our business was founded 25 years ago . . . principles which, like the laws of physics do not change.

Evidence that these principles have held through the years . . . that they still continue to operate . . . is found in the fact that our organization has satisfactorily consummated over 6,000 assignments for 500 clients since 1919.

And there is every reason to believe that such principles will just as efficiently apply 25 years hence and far into the future.

Management Engineering has not been successful because of spectacular planning or fly-by-night ideas, but because basic principles have been developed which not only govern labor controls, but inventory and material controls, planning and scheduling controls and all quality controls . . . and then, because these controls have been practically and wisely applied to all production processes.

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1919-1944

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chine of the Kaplan type having movable blades. J. Baumann, Germany. 7-2-35.

(141) 2,006,340. Impeller for hydraulic machine of the Kaplan type having movable blades. J. Baumann, Germany. 7-2-35.

(143) 2,115,890. Hydraulic turbine governor having adjustable vanes such as Kaplan-turbines and the like. D. Thoma, Germany. 5-3-38.

(148) 1,884,881. Safety device for wing type turbines, pumps and similar pieces of apparatus with movable vanes. C. Schmitthenner, Germany. 10-25-32.

(148) 1,955,929. Impeller in which the blades are so constructed as to prevent the formation of cavitation in the water joint between the outer edges of the blades and the casing. H. Muller, Germany. 4-24-34.

(148) 1,957,183. Hydraulic machine having adjustable blades in which the trunnions of said blades are mounted in a hollow hub containing lubricating oil. C. Schmitthenner, Germany. 5-1-34.

(148) 2,002,735. Adjustable blade runner particularly designed for use in connection with turbines and like centrifugal machines having runners of large dimensions and operating under comparatively high heads. C. Fuchs, Germany. 5-28-35.

(148) 2,015,332. Impeller or runner for hydraulic machine of the Kaplan type having movable blades. J. Baumann, Germany. 9-24-35.

(148) 2,055,196. Hydraulic machine of the type wherein the blades of the runner are adjustable to vary the angle and the area of the water opening through the runner. C. Fuchs, Germany. 9-22-36.

(148) 2,123,120. Turbo machine. M. Reiffenstein, Austria. 7-5-38.

(158) 1,722,158. Water power engine wherein a whirl-stream of annular cross-section and concentric to the runner strikes upon the entire circumference of the said wheel on entering it, the annular cross-section of the said whirlpool stream corresponding to the annular entry area covered by the admission-edges of the vanes of the runner. M. Reiffenstein, Austria. 7-23-29.

(165) 1,704,424. Radial turbine with two rotors turning in opposite directions. A. Bonom, Italy. 3-5-29.

(10) 1,818,066. System for recovering the energy of the movements of the sea. J. Jouy, France. 8-11-31.

(36) 2,108,652. Propelling device in which there is produced a suction zone in front of the body in motion on which the propeller is mounted, this suction being such that the body in motion is propelled under the influence of the atmospheric pressure existing at the rear of the propeller. H. Coanda, France. 2-15-38.

(36) 2,131,472. Motor operated by a fluid under pressure, and more particularly of the kind in which said fluid acts directly by escaping into the atmosphere. H. Coanda, France. 9-27-38.

(39) 1,688,933. Multi-stage disk-wheel turbine of the low velocity type. F. Losel, Czechoslovakia. 10-23-28.

(39) 2,296,862. Bladed disk for radial flow rotary machine. U. Meininghaus, Germany. 9-29-42.

(39) 2,297,508. Rotor for turbines subjected to varying temperature conditions, comprising a solid disk of ceramic material, blades on said disk and steel shafts, one projecting from each side of the disk. A. Schutte, Germany. 9-29-42.

(39) 2,305,767. Shearing resistant turbine disk. E. Gente and A. Bierend, Germany. 12-22-42.

(39) 2,305,768. Turbine construction comprising the provision of an improved elastic connecting member arranged between the disk and the shaft. E. Gente, Germany. 12-22-42.

(50) 1,958,333. Turbine wherein steam or any other fluid may be utilized on long passages and used up to do work instead of letting it flow out in free expansion. H. Danel, France. 5-8-34.

(53) 1,611,468. Elastic-fluid turbine in which carrier bodies are provided for the guide blades or disks and particularly turbines having auxiliary or additional admission intakes at the intermediate stages. F. Losel, Czechoslovakia. 12-21-26.

(69) 1,625,263. Elastic fluid turbine in which additional driving fluid is introduced into one or more intermediate stages. F. Losel, Czechoslovakia. 4-19-27.

(69) 1,632,907. High-pressure steam turbine and method of utilizing high-pressure steam therein. F. Losel, Czechoslovakia. 6-21-27.

(69) 1,666,625. Elastic-fluid multi-stage disk-wheel turbine of the type which has separate carriers for the diaphragms arranged within

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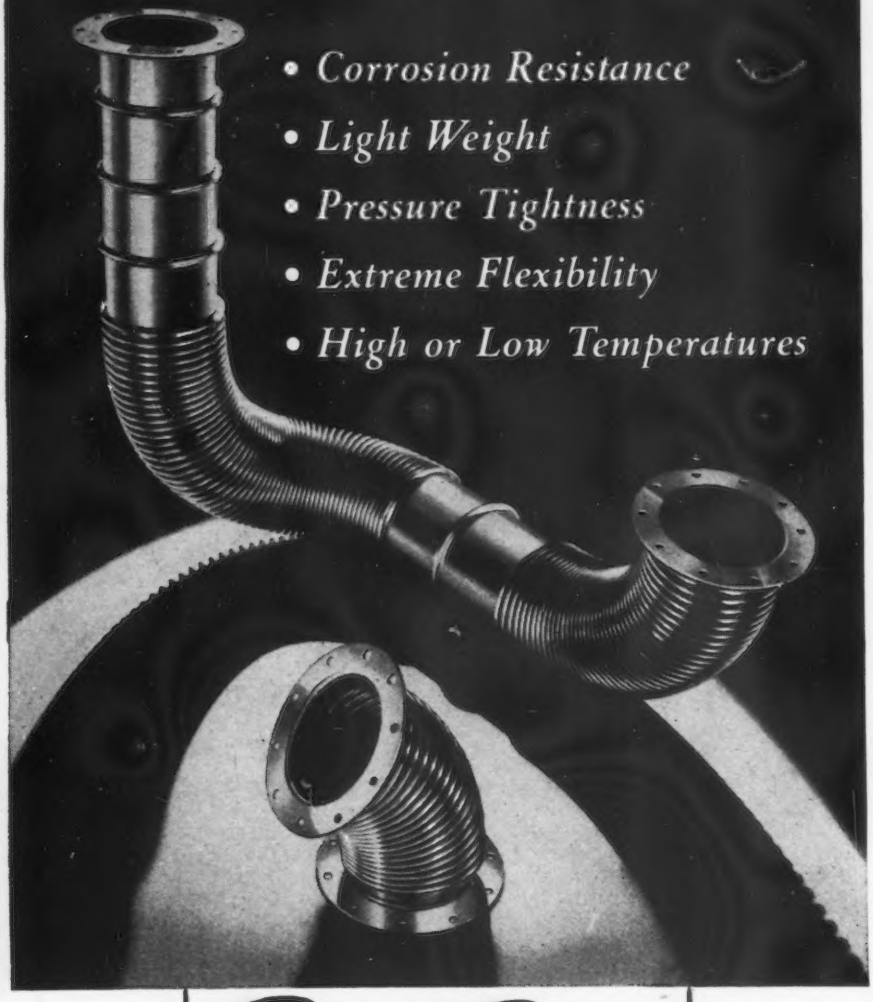

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Maywood, Illinois

an outer casing. F. Losel, Czechoslovakia. 4-17-28.

(69) 1,666,626. Elastic-fluid turbine for utilizing high pressure and high temperature fluids. F. Losel, Czechoslovakia. 4-17-28.

(69) 1,666,627. High pressure turbine casing or housing. F. Losel, Czechoslovakia.

(70) 1,618,596. Steam turbine for propelling motor driven vehicles, ships, and other moving craft. F. Losel, Czechoslovakia. 2-22-27.

(76) 2,111,878. Means for draining moisture from steam in steam turbines. H. van Tongeren, Netherlands. 3-22-38.

(78) 1,632,448. Stationary guide-nozzle construction and assembly for turbines. F. Losel, Czechoslovakia. 6-14-27.

(78) 2,019,694. Nozzle for the expansion of hot liquids. H. Reitlinger, France. 11-5-35.

(79) 1,990,059. Turbine for elastic fluids adapted for use as compressors. G. Bertin, France. 2-5-35.

(87) 2,297,210. Radial flow elastic fluid turbine wherein a blade-carrying disk is subjected to the action of said fluid and wherein different fluid temperature and pressure prevail at the two sides of said disk. E. Gente, Germany. 9-29-42.

(88) 1,798,566. Multi-stage turbine comprising an improved structure which is based on the fact that heat can be directly transformed into kinetic energy. J. Bossche, Belgium. 3-31-31.

(122) 1,945,901. Distributor for hydraulic reversing turbines. A. Huguenin, France. 2-6-34.

(122) 1,950,305. Distributor control for hydraulic reversing turbines. A. Huguenin, France. 3-6-34.

(122) 2,277,255. Hydraulic machine having adjustable guide blades, means for adjusting the position of said blades and rotatable spindles for supporting said blades. M. Rudert and R. Ungethum, Germany. 3-24-42.

(149) 1,716,134. Movable wheel for reversible rotary machines and particularly for hydraulic turbines. A. Huguenin, France. 6-4-29.

(148) 1,945,900. Arrangement of the shafts of the rotor wheels of rotary reversing machines. A. Huguenin, France. 2-6-34.

(This Feature Will Be Continued in an Early Issue)

SMART GIRL: *Victoria Abbott, a forewoman at a General Electric plant, used her head and devised a set of telescoping forms that enabled her to easily shape random wound coils.*

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Steel from Continental's own furnaces and rolling mills is made into wire from 34 gauge to ½ inch . . . in many standard and special shapes . . . and a wide range of finishes. Call on Continental for wire to fit wartime production or peacetime plans.

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Pumping Started in Steep Rock Lake Six Months Ahead of Schedule

Cleveland

• • • **With the water** inflow diversion completed by re-routing a river through a chain of lakes to the north of Steep Rock Lake, actual pumping has started to free the iron ore deposits under the lake. This inflow diversionary work was originally scheduled to require 15 months but has been completed in nine months, thus enabling the shipment during 1944 of what the Steel Rock Iron Mines, Ltd., terms as a "substantial" tonnage of ore.

Steep Rock ore reserves, one of the richest recent finds in the Lake Superior region, are proved in excess of 10,500,000 gross tons with more than 14,000,000 tons additional believed to be available. Of this 24,500,000 tons total, about 21,000,000 tons can be mined by open pit methods and the remainder by underground operations.

As compared to the price of $4.75 per ton delivered lower Lake Erie ports for Old Range Bessemer ore of standard grade and of $4.60 per ton delivered lower Lake Erie ports for Mesabi Bessemer ore, it is believed that the initial sales price per ton of Steep Rock ore delivered Lake Erie ports will be at least $5.30 per ton. Regular annual production contemplated is in the neighborhood of 2,000,000 tons. Tests of Steep Rock ore by the Battelle Memorial Institute indicated that ore of the quality of the Steep Rock deposits should be a "first quality open hearth charge and feed ore," suitable for use as an initial charge ore or as a feed ore added during the heat in open hearth steelmaking. Steep Rock ore runs very low in phosphorus, manganese, and silicon.

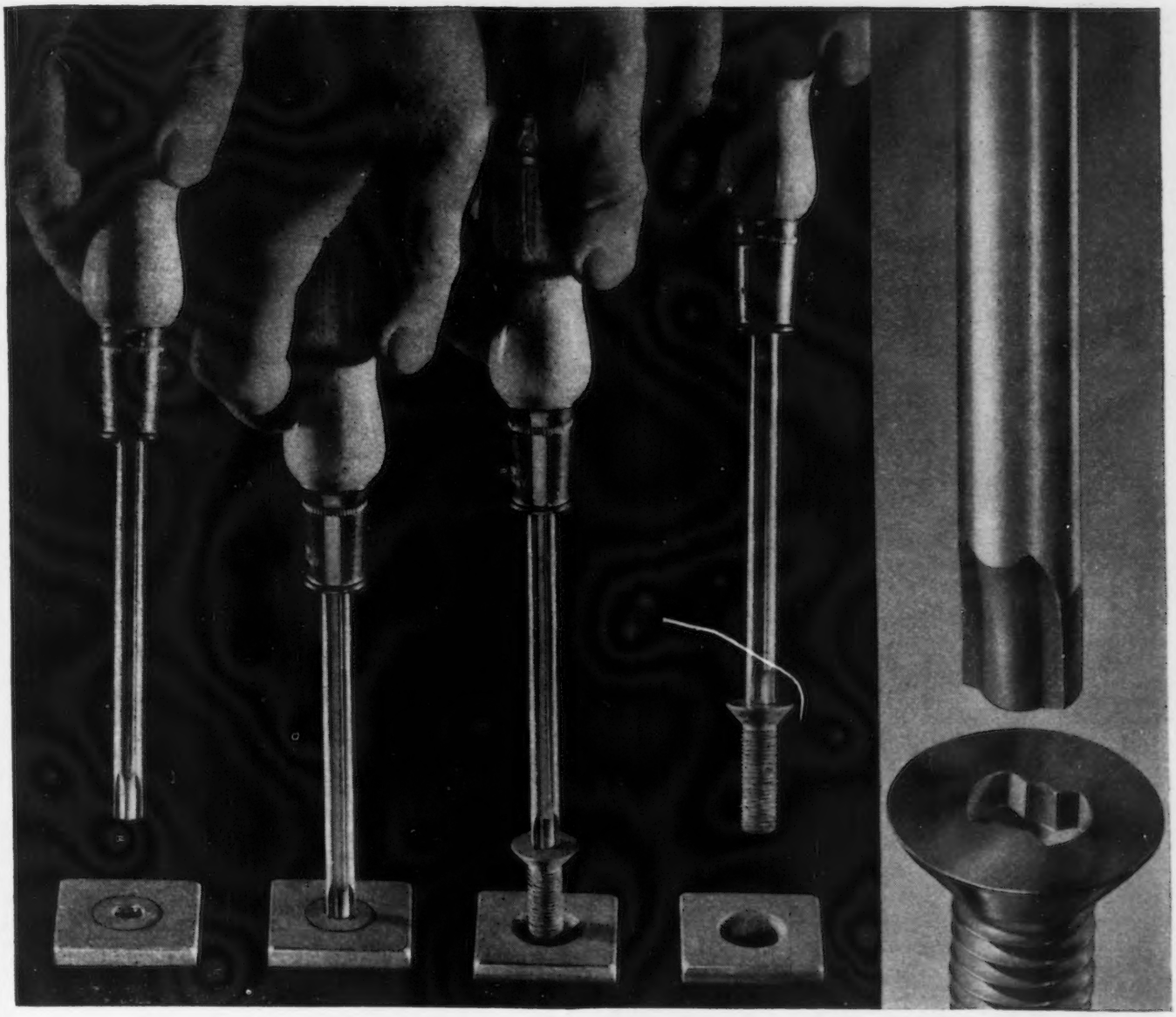
The Canadian government appropriated some $2,500,000 to be used by the Canadian National Railway for the construction of a spur line from Atikoken, Ont., to the mine and for the construction of loading and unloading facilities at Port Arthur. Surveys are now being made at Port Arthur for the construction of a high level pocket type loading dock, similar to those at Duluth and Superior.

The government of the province of Ontario, through the Hydro-Electric Power Commission of Ontario, completed in 180 days on Nov. 28 a power line from Port Arthur to Steep Rock. For the construction of this 120-mile power line, $1,000,000 was appropriated. Furthermore, the entire project was given the blessing of both the United States and Canadian governments for obtaining, as required, necessary machinery, equipment, and materials for mine development.

In pumping dry the lake, 14 Ingersoll-Rand centrifugal type pumps, mounted on seven steel barges are used. The combined pumping capacity of these units is 322,000 gal. per min. Steep Rock Lake is really two lakes connected by a narrow channel. These two parts are called the east and west arms. The channel connecting them is dammed, and it is the eastern arm that is being emptied. The water pumped from the eastern arm is discharged into a collecting basin that is connected with the west arm of the lake by a tunnel, so that the water will drain into the west arm. The barges on which the pumps are mounted are steel, completely housed and heated. The collecting basin can be covered over and heated to prevent freezing of the water during pumping.

The pumps are arranged for parallel operation and each barge installation can operate individually. Thus, as the lake level lowers, the pumps can operate in series, with one pump acting as a booster for another. It is estimated that 125,000,000,000 gal. of water will have to be pumped out of the lake for complete drainage, but mining operations on the largest ore body, designated the "B" ore zone, will commence when about 60 per cent of the water is removed.

MIGHTY MIDGET: *This aircraft heater weighs only six lb. yet heats the largest airplanes when outside temperatures range to 70 deg. below zero. Manufactured by Surface Combustion, Toledo, Ohio, it is already being used in United States and Canadian aircraft.*



When the job has to be "Un-buttoned" . . .

. . . when screws painted-in, rusted-in, or "frozen-in" have to be *removed, saved, and used again* . . . here is a tool that eliminates this serious problem of field maintenance. This rugged Center Pivot hand driver, as used with CLUTCH HEAD Screws, is the answer. Note its structure; its careful engineering to make a deep dead-center entry to engage the straight walls of the Clutch with a powerful torque that breaks the "freeze" of any screw for straight, easy, and *undamaged* withdrawal. More than that, this simple tool *saves the screw for re-use* because the withdrawal action automatically unites the screw and driver as a unit . . . to prevent trouble and possible danger arising from dropped and lost screws. In addition to speeding and simplifying normal field adjustments, this positive Lock-On feature frequently saves disassembling surrounding units by furnishing dead-sure access *to and from* these otherwise impossible or hard-to-get-at spots.

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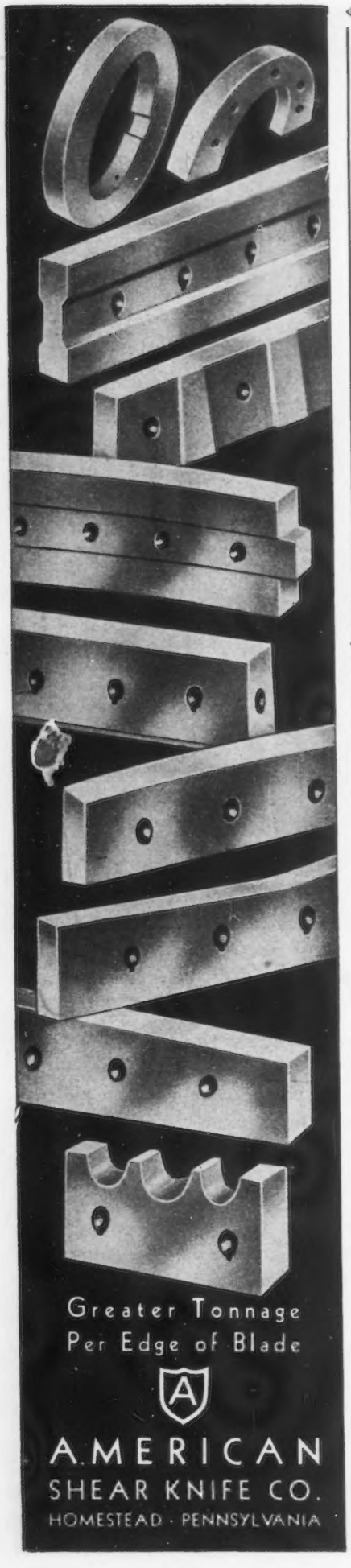


Omnibus Contract Termination Bill Proposes Settlement Director in OWM

Washington

• • • **A preliminary outline** of an omnibus contract termination bill calling for a Director of Contract Settlement under the Office of War Mobilization was submitted in the Senate last Tuesday by Senator James E. Murray of Montana, Senator Harry S. Truman of Missouri and Senator Chapman Revercomb of West Virginia. The bill outline is part of a report made to the Senate Committee on Military Affairs by a war contract subcommittee composed of the above Senators.

Three general conclusions are set forth: First, an omnibus contract termination act is called for—instead of "a host of separate, conflicting and ill-related acts. Second, the importance of constant Congressional vigilance over the administration of the legislation is stressed. Third, the legislation must be based upon "a declaration of policy that imposes upon the Government and the executive agencies the following responsibilities:

A. "To provide all business enterprises having claims arising from terminated war contracts, whether prime contracts, subcontracts or purchase orders, with (1) the opportunity to obtain quick, equitable final settlements and (2) adequate interim financing during the period between termination and final settlement;

B. "To protect the interests of small business in contract termination;

C. "To protect the Government's interest by preventing over-payments, recovering excess payments and vigorously prosecuting all cases of fraud."

The bill outline sets forth in great detail the powers and responsibilities of the Director of Contract Settlement. These include the formulation of all major administrative policies, the promulgation of uniform termination clauses for both prime contracts and subcontracts, the promotion of company-wide settlements, the establishment of appeals machinery, consultation with industry and the submission of quarterly reports to the Congress.

The existing authority of the contracting agencies to negotiate final settlements is clearly defined. The personal liability of contracting officers, in the absence of fraud, is removed. The General Accounting Office is given the power to avail itself of all records and the responsibility of reporting all cases of suspected fraud to the Congress, the Department of Justice and the agency involved. It may not withhold payment of funds.

With regard to subcontractors' claims, the contracting agencies are instructed to encourage the prime contractors to negotiate the bulk of the settlements. Where this is not feasible, the contracting agencies—with the consent of the prime—are to deal directly with the subs. Where, for one reason or another, the prime's consent cannot be obtained, the contracting agencies may purchase the claims of the subs.

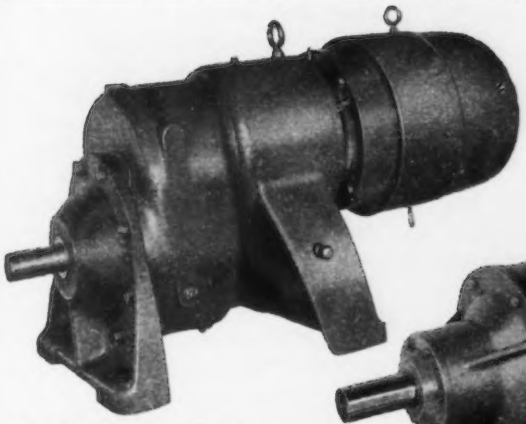
Policies to be followed with regard to materials on hand and goods in process are outlined in detail. Registration of released manpower with the United States Employment Service is required. Provision is made to coordinate contract settlement with renegotiation, to maintain the responsibilities of sureties, to protect the rights of assignees and to handle the problem of informal or defective contracts.

Mandatory advance payments of at least 75 per cent of the amount certified are to be paid to prime contractors within 30 days after application. The Director of Contract Settlement is to decide upon the information required in the applications and upon the type of investigation to be made by the contracting agencies before payment. Any overpayments are subjected to penalty interest rates. Both direct and guaranteed loans are authorized.

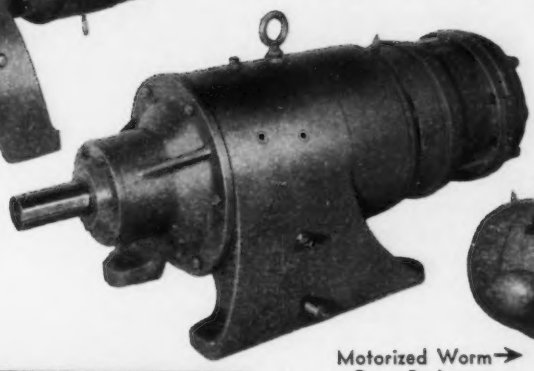
In order to implement the declaration of policy on protecting small business, the Smaller War Plants Corp. is given specific powers and responsibilities. These include the purchase of contract termination claims from small companies; the making or guaranteeing of termination loans.

A VISUAL GAGE, *manufactured by the Sheffield Corp., Dayton, Ohio, will measure dimensions of less than two millionths of an inch. C. H. Reynolds, vice-president of the company, watches while an operator checks one of the three original sets of master gage blocks made by the late Carl Johansson.*

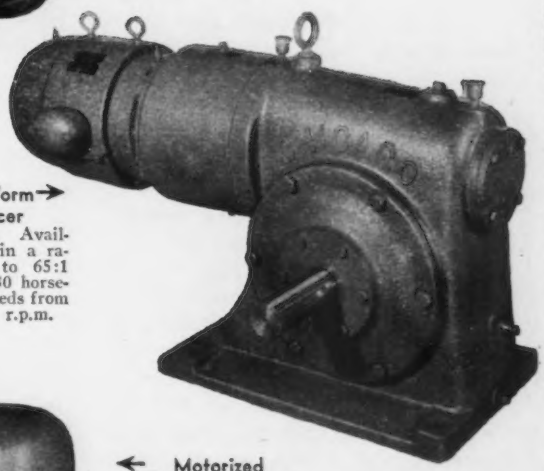
Your power saving requirements are capably handled by an organization making every type of gear reducer.



Motorized Helical Reducer
Horizontal drive. Available in 8 sizes in a ratio range of 1¼ to 9:1 and from ¾ to 50 horsepower. Driven speeds from 1458 r.p.m. to 128 r.p.m.



← **Motorized Planetary Reducer**
Horizontal drive. Available in 35 sizes in a ratio range of 10 to 1200:1 and from ¾ to 75 horsepower. Driven speeds from 172 r.p.m. to .74 r.p.m.



Motorized Worm Gear Reducer →
Horizontal drive. Available in 11 sizes in a ratio range of 6 to 65:1 and from ⅛ to 30 horsepower. Driven speeds from 310 r.p.m. to 25 r.p.m.

MOTORIZED REDUCERS

Motorized Worm ← Gear Reducer
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Right Angle Spiral Bevel ← Gear Reducer
Vertical drive. Available in 14 sizes in a ratio range of 1:1 to 6:1 and from .3 to 275 horsepower.

← **Motorized Planetary Reducer**
Vertical drive. Available in 35 sizes in a ratio range of 10 to 1200:1 and from ¾ to 75 horsepower. Driven speeds 172 r.p.m. to .74 r.p.m.

Motorized → Helical Reducer
Vertical drive. Available in 8 sizes in a ratio range of 1¼ to 9:1 and from ¾ to 50 horsepower. Driven speeds 1458 r.p.m. to 128 r.p.m.

BEVEL GEAR REDUCERS

← **Right Angle Spiral Bevel Gear Reducer**
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1943 · 1944

(CONTINUED FROM PAGE 70)

dustrial mechanism has a frightening load removed and life is pumped into commerce and the industrial recovery of other nations, particularly those nations already sentimentally tied to the U. S.

Since the froth of rich iron ore in this country has gone pretty flat under the impact of war, strategic stocking could well involve some millions of tons of iron ore from abroad, or, better yet, large quantities of synthetic scrap, or steel ingots based on the refining of the increasing accumulation of war scrap abroad. In other metals, the story is again one of liquidation of basic mineral resources at a deplorable rate, particularly in copper, and to a lesser degree in lead and zinc. Of tin the country has no output, and practically the same applies to tungsten, and the situation in chromium and manganese has been such that the bulk has continued to be imported despite the numerous difficulties involved in war-time ocean transport. In petroleum the serious inroads on reserves is now common knowledge, and inasmuch as synthetic rubber is based on petroleum, a natural rubber reserve might be more economically defendable than retention of all the new synthetic facilities.

So, in all the metals mentioned, the country could accommodate a protective reserve accumulation, and in oil attention could be given the possibility of importing large quantities for repumping into the natural storage reservoirs of dry wells.

Then comes the motif of the U. S. post-war dream world (6), which like a Phenix is going to rise on the wings of technology from the ashes of loss and cost engendered by the war. The era of dew and sunshine, the brave new abundant world of no diet deficiencies, no dishes to wash, no walking, no bugs, no deterioration, no accidents, no work, no-run hosiery, no cleaning, no wrinkles, no worries, no impotence, no thinking, no anything. So say the past year's advertising, in four colors, as harried copy writers with one hand tinkered around with the intricacies of electronics and synthetics and all the other fascinating flashing lights of the laboratories, and with the other hand probed into the innermost corners of technicians' imaginations.

Despite the great volume and the fantasy of the technological proselytizing, there is merit to the fundamental thought that in the 50 years of normal technological development compressed within several years of warfare the country possesses its most powerful lever for reconstruction. Perhaps the highlights of the dreams won't be filled in for a long time, perhaps there are a large number of moral and ethical values to be dusted off or rededicated as handmaidens to the new technology, perhaps technology was no stranger in 1932 when millions were without bathtubs or cars or sufficient food. But the dream itself is important, and a powerful catalyst indeed. Technology is miraculous, technology did lift man from the ragged edge of fighting for sheer existence, technology does offer the only answer to more and more employment, and the unexploited miracles of war technology are at hand to fuse the ambitions of business, of labor and of the entire nation if they are not abused or misused excessively. Any other conviction means economic death.

In the depression year of 1886, the first U. S. Commissioner of Labor insisted that the then existing set of "economic tools" were in overabundant supply. But, ahead of him were the bicycle, electric light, automobile, refrigerator, airplane, radio, and a multitude of other products to multiply the work and raise the standard of living of an expanding nation. In the depression year of 1933 President Roosevelt opined that "our industrial plant is built," and the retreat of everyone from reality was such that only the impact of war served to reinvigorate industry and release a flood of new inventions and application possibilities. Again, it is heard that the industrial plant is overbuilt, and perhaps a temporary period of digestion will be necessary to assimilate the tremendous burgeoning of effort of the past several years. But, there should be no retreat from the desire for new outlets for action, no retreat from the realization that idle plants are an economic drag, that idle men are nothing but downright economic waste. (The loss in manpower during the depression amounted to over $300,000,000,000; more than the entire war debt!)

Along with the general expectation of the flowering of technology after the war and intertwined with thoughts of the overbuilding of industrial capacity insofar as a peacetime economy is concerned, there always arises in the metals industry a discussion of the relative developments in steel, aluminum, magnesium and plastics. This set-up usually is referred to as the battle of materials, or the coming attack and counterattack for market supremacy.

With the distortions of war-use removed, all these materials will without doubt revert to practically the same relative positions of the prewar period. There will be little capturing of new markets for any one. Each, by a combination of cost, physical properties and fabricating characteristics, will reign supreme in certain areas of usage, and in those overlapping areas of competition with other materials the relative loss and gains through the interplay of technology and merchandising will have less over-all effect than a few points rise or fall in the Federal Reserve industrial index.

As for the metal group—steel, magnesium and aluminum—the relative post-war capacities will be some 90,000,000 tons for steel, 1,000,000 tons for aluminum, and 350,000 tons for magnesium. The weight-cost ratio of each will likely hold to an equivalent level, and any large cost reduction for any is unlikely in view of the certainty of high tax loads and probability of maintenance of wage structures. The price of steel will be in the neighborhod of 2 + c. a lb., magnesium alloy ingots of "A" purity around 20c. a lb., and aluminum ingots close to 14c. a lb. The great deal of talk regarding violent shifts in cost relationships after the war is founded primarily on guesswork. All the new magnesium plants in particular are devoid of a common denominator on which to determine production costs, what with figures in DPC and Government subsidized plants involved in political or regional ramifications, and with amortization policies varying according to who built the plant. Some rumor has it that a particularly low cost plant will offer magnesium after the war for as low as 9c. a lb., but the writer remains unconvinced and believes the price will shake down to about 15c. for the primary grade and 10c. for the secondary. Aluminum may drop as low as 10c. for the primary grade and around 6c. for the secondary. The tremendous post-war flow of secondary aluminum holds possibilities for

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SMITHway Welding Monitor *cuts the time of training welders as much as 33⅓%!*

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being troublesome to primary producers (or producer), as secondary technology has improved to the point of making the metal a reliable product. In magnesium, the secondary problem is of no moment.

To compete energetically with the primary light metals in overlapping spheres of application, brass ingot may have to be offered as far down as 3c. a lb., and cast iron in the neighborhood of 4c. If the competition is with secondary aluminum, as well it might be, brass ingot may have to move at 2c. and cast iron at 2 + c. Where the stainless steels and the low-alloy steels will elbow their way into this picture is hard to say at this time, but the steel industry has little doubt but what they can hold their own price-wise.

The plastics outlook can in no way be said to approximate the fantasies woven by Sunday supplements. Plastics right now are losing ground to metals as the latter come into more plentiful supply. Plastics capacity is at best 300,000 tons. The molding of plastics requires expensive presses, the largest single nozzle injection press has a capacity of less than 20 oz. and costs close to $1,000 per oz. of capacity. Compregnated wood may have some of the characteristics of mild steels, but for a specific gravity of 1.3 costs over 50c. a lb. All these factors are such as not to occasion much concern in the metals industries. Rubber, which may be considered a plastic, may have an output rate of 750,000 tons yearly late in 1943, but costs will be high, and this synthetic will have its own competitive troubles with the natural product unless the Government adopts a protective attitude through subsidies. And, if this is done, the effect on international trade and in turn on industry in general could well be serious.

(7) Evidence is abundant that popular imagination is again being kindled by the spirit of initiative and resourcefulness displayed by industry, and its willingness to take on a forbidding job of re-employment and readjustment under the banner of an unshackled free or private enterprise. Quite obviously the reaction to a decade of futility and lack of objectivity culminating in the limited "statism" of the past several years is of such proportions as to set a sympathetic stage for one more chance of private industry to create the luxuries of life as well as guarantee the basic security minima of food, clothing, shelter, health and education for all those able and willing to work.

Industry's superb ability to perform has been obvious to even the least discerning over the past year. What's of far greater importance, however, is industry spokesmen today are talking a two-syllable language of mutual benefit, understandable to all, and not discoursing in clever ambiguities insinuating a return to the status quo ante of the capitalism of complete laissez faire, eschewing collective bargaining and justifiable public regulation of competitive conditions, and striving for low wages, high profits and minimum turnover.

Gone is the inclination to dwell to a state of exhaustion on minutiae, to go flailing after every imaginary or actual spot of red, to dissipate energies in futile ideological witch-hunts. Rather, industry is learning to establish its premises on the basis of common gain, of boring through mazes of minor technicalities and conflicting factors to establish with clarity certain reasonable obligations. In return there is demanded a freeing of capital restrictions and contract, an elimination of confusion in capital markets, a chance of reward in relation to risks involved, clarification of certain long-range principles regarding the operation of a mixed economy of private and public enterprise thereby permitting establishment of certain assumptions and valid forecasts. Such a system of free choice can thus provide for social security and, despite certain vices of such a "capitalism," the animating principles and humanistic values involved are infinitely superior to some capricious form of collectivism which fuses labor and capital equipment at the end of a secret police truncheon.

The tenacity of certain existing bureaucratic controls in hanging on long after their need passes must not be overlooked. There is plenty of effort being expended in various quarters in preparing the ground for perpetuating the rudiments of the existing planned war economy into the peace economy. Frequently heard and frequently accepted is the statement that allocation of supplies, control of marketing and all the other interferences, either actual or implied, in the 800 or so limitation orders of the War Production Board will have to be extended through some long and indefinite transitional period of post-war readjustment. And it cannot be denied that many a man in industry has gotten so used to and flaccid under con-

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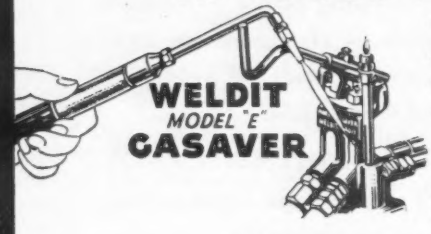

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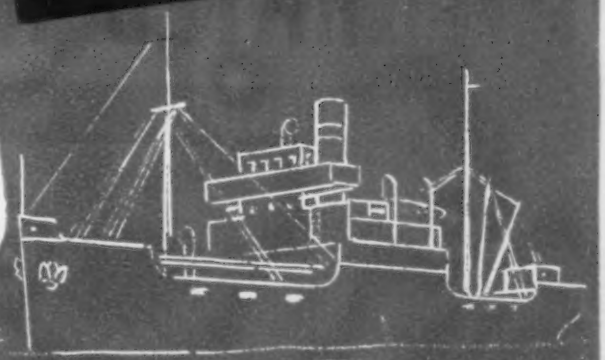

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trols over the past two years that, pronouncements to the contrary, they are exerting no particular pressure to ease them. Now that there are growing surpluses of raw materials it might be well for industry to insist that the WPB lift many M and L orders and permit greater and greater return to free enterprise just so long as no phase of the war effort is jeopardized. This freeing of certain limitation orders, now, may require a great deal of desk pounding as the Office of Civilian Requirements seems to be squaring away to a lot of elaborate, slow and futile market research to determine precisely how many bobby pins, flat irons, bath tubs, ad infinitum, are to be made and by whom. This use of war limitation orders to permit an agency, in this case not even a very skilled one, to entrench itself in a civilian economy has dangerous possibilities that would better be recognized. The actual and inferential controls written into the Controlled Materials Plan are a lot tougher than are generally realized, and in fact are a lot tougher than ever were necessary. The scope and complexity of CMP in this country are such to have shocked Sir John Duncanson, creator of the British CMP, and the sooner industry is free of it the more certain will be attainment of the professed desire to return to free enterprise.

Labor, of course, will have a major role to play in the post-war trial of free enterprise. The seeking of excessive protection without obligation could hamstring the whole endeavor. In a continuance of and extension of labor-management committees there may be the key to the ironing out of the multitude of minor irritations that ultimately fester into major flare-ups of trouble. A prominent military labor trouble-shooter in a major ordnance district recently stated that during the past year over 65 per cent of the work stoppages and wildcat strikes in his area was the fault of management, 20 per cent was the fault of labor, and 15 per cent were sparked by a multiplicity of outside influences. Management has probably never fully realized that it is the small misunderstandings and unfairnesses that alienate labor rather than the occasional large and more dramatic tests of power along the line of major wage increases and participation in policy control. Carefully selected men armed with authority and understanding may be able to function through labor - management committees to kill off many disturbing irritations at the source.

Still another factor that post-war free enterprise could give serious consideration would be a continuance of the current extensive sub-contracting. The war served to correlate the activities of thousands of small and scattered business enterprises into the framework of large corporation mass production. A retention of a wide base for mass production rather than a return to the conventional concentration of all facilities under one roof, could have many labor and social benefits. The fusing of the small entrepreneur with the mammoth mass producer has worked well in wartime, and if cost factors are not too out of line an extension of the practice into the peacetime economy could be of incalculable benefit to all involved.

Output of Steel in U. S. Far Exceeds Axis, Tower Says

• • • **Meeting** the needs of a nation at war, the steel industry of the United States in 1943, for the fourth consecutive year, exceeded all previous records for total steel production, according to Walter S. Tower, president, American Iron and Steel Institute.

"Approximately 89,100,000 tons of steel ingots and castings were produced in American steel mills last year—about 70 per cent above the estimated 1943 steel production in Axis Europe and Japan," he said. "Our production in 1943 was nearly 3,500,000 tons above our 1942 record and was 80 per cent greater than output in the best year of the first world war.

"October proved to be the high month for steel production in 1943, and may even turn out to be the peak month of the entire war period.

"Looking ahead, there are definite indications that military demands for steel in 1944 will be less than they were in 1943. Production of combat tanks and small arms ammunition has already been cut back, reflecting the virtual completion of those two programs. Cut-backs in these and certain other programs, notably steel for Lend-Lease, have been reflected in cancellation of some steel orders, and a few steel furnaces have actually gone out of production for lack of business."

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rown up again! And how!

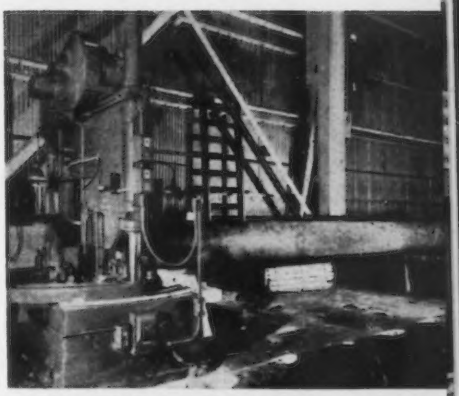
MARVEL Hydraulic Hack Saw No. 24

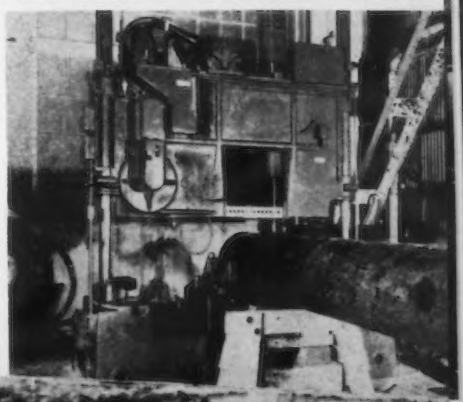
You can now cut off large billets, forgings, die blocks, etc., up to 24 inch round or square, with the same degree of economy as you have been cutting off your smaller size work. Yes, the new No. 24 MARVEL is actually a "hack saw", in spite of its mammoth size, since it employs a reciprocating blade. Of course, the blade it uses is much larger than any hack saw blade heretofore available (36" long, 4½" wide, ⅛" thick); but even its large blade is still an "inexpensive hack saw blade" compared to the cost of large capacity circular cold saw blades. And because the hack saw blade is comparatively inexpensive, users of the new giant No. 24 MARVEL machine will not hesitate or worry over cutting off the modern tough alloys in big sizes —a problem that has caused so many headaches heretofore, when only circular cold saws were available for such large size work.

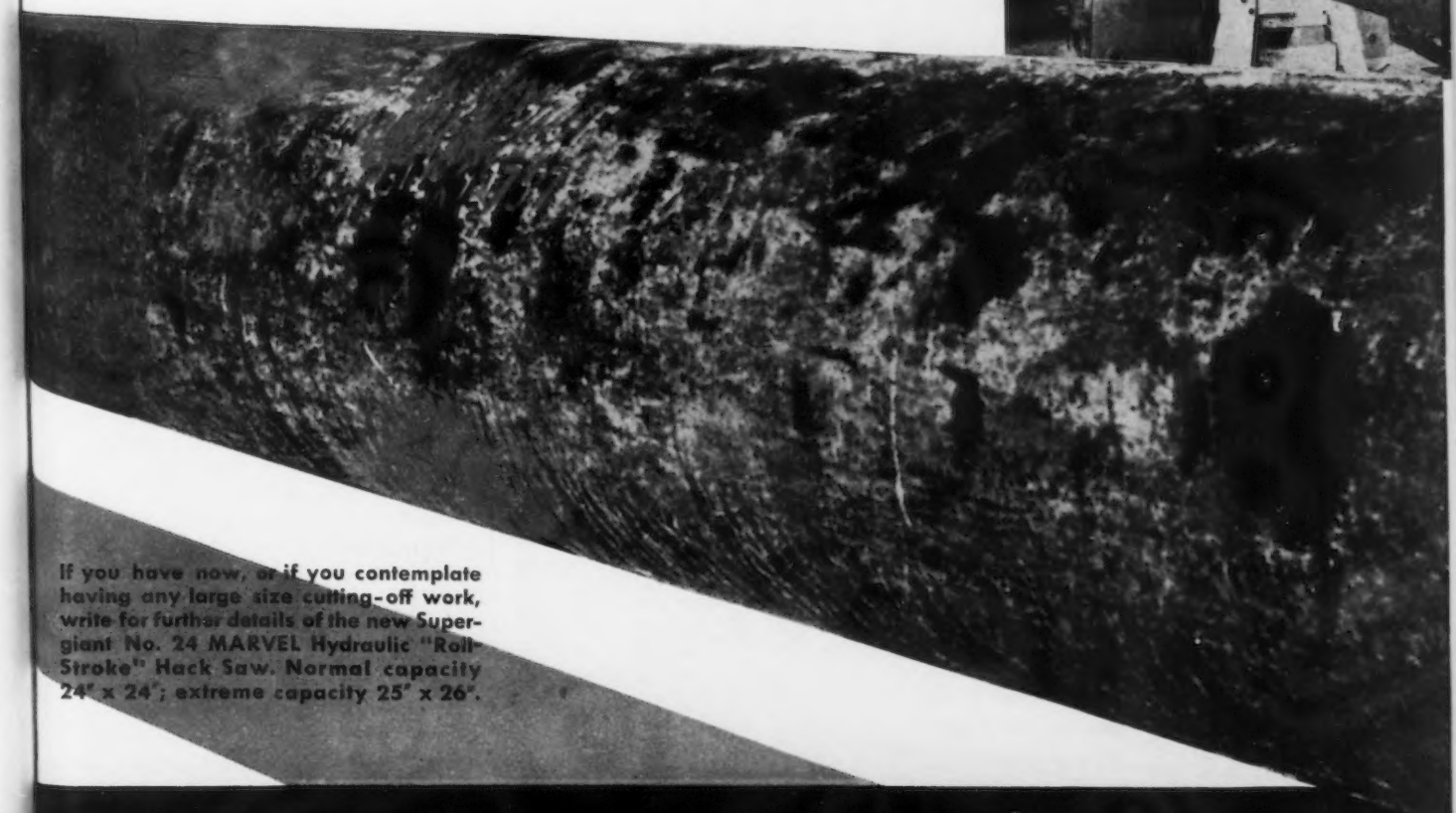
The photos shown herein were taken in the plant of Mesta Machine Co., Homestead, Pa.—one of the finest-equipped and most modern "heavy" machine shops in the world. The machine is shown cutting off a gigantic 24" round forging. Mesta now has three identical No. 24 MARVEL machines, and are very well pleased with them, for they are doing a fine cutting-off job on all sorts of large size alloys faster and cheaper, without "fuss", and without the nerve-racking howling and groaning of their previous circular saw methods.

How big is this machine? Judge from the man in the photo. Its weight, 16,000 pounds —8 tons! Twice the weight of the No. 18 MARVEL that has ***heretofore*** been "the world's largest hack saw!"

This giant saw bears no resemblance to any "small size" hack saw; it follows the modern, basic, exclusively "big saw" design of the No. 18 MARVEL (an 18" capacity "big saw" of which hundreds are in use). Any attempt to "stretch" an old-fashioned "small saw" design to such large capacity would be folly. It takes "big saw" design to incorporate the principles necessary for cutting off steel sections that may weigh many tons.







If you have now, or if you contemplate having any large size cutting-off work, write for further details of the new Supergiant No. 24 MARVEL Hydraulic "Roll-Stroke" Hack Saw. Normal capacity 24" x 24"; extreme capacity 25" x 26".

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Non-Ferrous Metals

[CONTINUED FROM PAGE 85]

supply of ferroalloys adequate to meet the needs of the war and avoid accumulations which would be costly both in dollars and manpower. In this connection, arrangements have been made for reducing the government purchases of certain ferroalloy minerals."

Not to be outdone in the phrase making battle of Washington, S. W., OPA came out on Nov. 3 with specific ceiling prices for various ferroalloys to supersede ceilings based on highest prices of individual sellers in March 1942, as provided by the General Maximum Price Regulation. With supply universally outstripping demand, the new ceilings should not be threatened.

Doin' the Tin Can Stomp

It remained for another second cousin of the steel industry, tin, to become mixed up in one of the juiciest tales of international intrigue of the year. With callouses on their soles from squashing tin cans, American housewives were whisked out of their humdrum existence by the report that this country had acquired a two year tin stockpile by virtue of being end-man in a three-way deal by which Japan had sold tin from its temporary empire to Russia who, in turn had traded it to us in lend-lease. Responsible officials, who should know, deny the story in its entirety, pointing out that Metals Reserve Co. is charged with responsibility for all tin imports, that Metals Reserve records show no such transaction, and that metallic tin does not lend itself to smuggling. There is good evidence, however, indicating that the tale garbled into reverse an actual transaction in which the United States assigned to Russia tin mined in China for which we had no means of accepting delivery. That WPB has become less apprensive over our tin supplies during the past few months is evidenced by easing of restrictions on the use of tinplate containers, high tin solders, and babbit. Despite all the tin cans which loyal Americans have been saving, the improved position is only slightly due to activities of detinning plants, although these plants have more than fulfilled the purpose for which they were intended. In some ways, the tin can salvage has become rather an embarrassment, for the grandiose plans for shredding plants and ballyhooed collection campaigns were in large part intended to furnish cans for copper precipitation. The copper industry, it seems, vastly overestimated its requirements. The shredding plant program has been quietly curtailed with government owned plants at Dallas, Houston, and Kansas City shut down, but so far no one has discovered how to tell the public of the reduced requirements without disrupting collections altogether and drawing the wrath of the bunion pad industry, which has been enjoying a thriving business. Ostensibly, Kansas, Missouri, and Texas cans will be hauled cross-country for detinning as long as the freight can be justified. About 65 per cent of the tin cans collected nationally are utilized by the detinning plant; the remainder are used for copper precipitation only. Contrary to popular belief, the secondary tin recovered from containers is refined to 99.85 to 99.995 per cent purity.

Bombs have not destroyed the Liverpool smelters, so the $6,300,000 Longhorn tin smelter, a DPC plant operated by Tin Processing Corp. never has reached full capacity, officially described as "more than 50,000 long tons of refined tin annually," since its initial operation in April, 1942. Had Liverpool been put out of the picture, the Longhorn smelter could have handled minimum United Nations requirements. The International Tin Committee quota for Bolivia, advanced about a year ago from 46,026 tons to 46,758 tons annually, is a purely hypothetical ceiling, according to the Tin Producers Association. In the past 9½ years Bolivia shipped only 283,742 tons against a quota of 380,511 tons, the Association states, and in only one year, 1941, when 42,209 tons was shipped, did shipments exceed 40,000 tons. Our contract, signed Nov. 4, 1940, calls for Bolivia to supply sufficient ore to yield approximately 18,000 tons of metallic tin annually. Milling technique on Bolivian ores still is far from perfect, present tin losses ranging between 25 and 50 per cent.

Nigerian production goes directly

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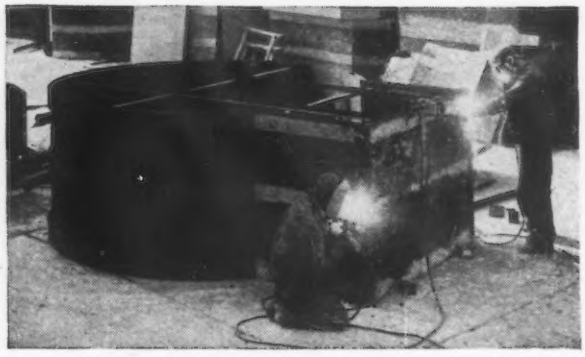

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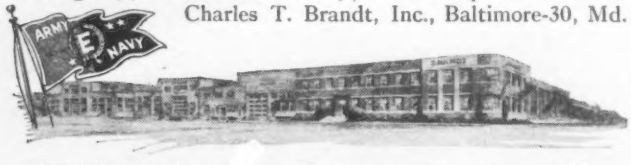

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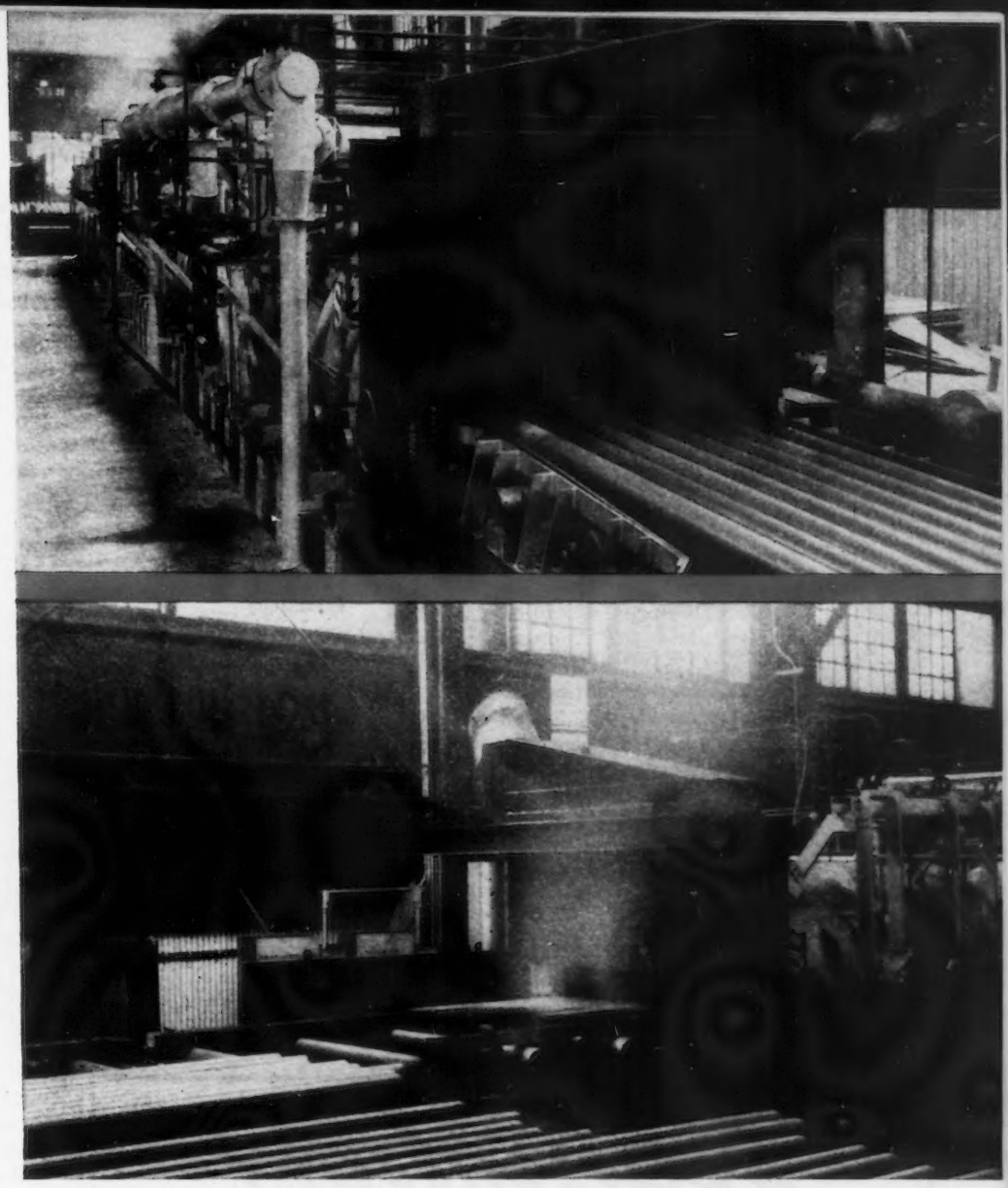

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This horizontal cylindrical furnace affords excellent heating uniformity over the entire temperature range between draw tempering and normalizing. It handles steel pipe 2 to 14 inches in diameter.

The contour of the heating chamber, which is more than 100 feet in length, eliminates many of the disadvantages with the conventional rectangular design. Above and below the roller driven hearth, burners fire tangentially into the chamber, providing a rapid, swirling action. These hot gases recirculate around the material a great many times, resulting in uniform and efficient heating without hot spots. . . . To raise the furnace from draw temperature to normalizing temperature requires one hour, and only two hours for the reverse cycle, high to low. When normalizing, the furnace heats about 20 tons of pipe in an hour and 18 tons when draw tempering.

Fuel economy is excellent. Other features include two 100 ft. roller tables at either end; five automatic recording temperature zones in the heating chamber; a rayotube instrument which continuously charts the temperature of all tubes being discharged, and two-man operation.

This new-type furnace, including all auxiliary tables, drives, and temperature controls, was designed and installed by Salem Engineering. We can build any type or size of heat treating furnace to your specifications. Write for complete data.

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to England. Production of the Belgian Congo, which is not as large as that of Bolivia but still very substantial, comes to the United States. There is some refining in the Congo, at Elizabethville.

It may be conjectured that brass and bronze has passed tinplate this year as the leading tin use, taking approximately 35 per cent. Tinplate probably took about 25 per cent, babbitt 13 per cent, and solder 13 per cent, with the remainder distributed among minor uses.

Tinplate production for 1944, according to preliminary schedules, approximates that of 1943. Approximately 15 per cent of total production is electrolytic. According to WPB, a silver-lead solder (92.5 lead and 2.5 per cent solder, 5 per cent tin) was used for 40 per cent of 1943 output of tinplate containers for goods, household products, and chemicals, for next year will be used for 70 per cent.

Projects to mine and mill veinlet deposits of cassiterite near Riverside, Calif., and Cima, Calif., continue to rank in the "noble experiment" class, but may be rated worth while if for no other reason but to silence cynics who proclaim loudly that large tin deposits at these points have been undeveloped solely because of efforts of the international tin cartel.

TABLE II

Antimony Supply and Demand 1943-1944

(In Short Tons)

	(Contained Antimony) 1943	1944
Supply of Antimony		
(a) Stocks		
Government, ore	1,384	14,800
Government, metal & products	11,279	13,000
Private, ore	4,789	4,500
Private, metal & products	4,614	3,790
(b) Imports		
Mexico	13,200	12,000
South America and others	19,500	1,250
Domestic production	5,124	4,000
Secondary production	18,000	12,000
Total Supply	77,890	65,340
Demand for Antimony		
Domestic primary	23,500	24,000
Domestic secondary	18,000	12,000
Foreign	300	500
Total Demand	41,800	36,500
Reserve		
December 31	36,090	28,840

In Case of Fire

The antimony picture is summed up in Table II.

Antimony consumption has been on the upgrade, rising sharply early in 1943. For the first seven months of 1943, 4896 short tons were consumed compared to 2742 short tons in the last seven months of 1942. The big new war use of antimony has been in the form of antimony oxide in flameproofing compounds, used in vast quantities during the past year, but with lesser quantities required in 1944. Batteries, bearings, tubes, foil and castings have been the other big end product consumers, usually in as a hardener of lead.

Bolivia has been the No. 1 ore supplier during the past year, practically its entire output going to America. The Bolivian ore is a sulphide. Mexico has been the No. 2 source, but its ore, an oxide, is more desirable. Texas Mining & Smelting Co. at Laredo, accounts for approximately 90 per cent of total metal production. China, the former world leader, has little hope of regaining its markets in the post-war period.

Yellow Pine mine, the Idaho tungsten bonanza, is the largest domestic antimony ore producer, spewing out from its mill a sulphide concentrate in large quantities. The Sunshine Mine in the Idaho panhandle, long pointed out as one of the few mines producing silver solely, and the Coeur d'Alene Mines Corp. have antimony in their concentrate.

On Dec. 4, OPA translated the existing ceiling of 14c. per lb., f.o.b. Laredo for 99.0 per cent metal, which prior to the general maximum price regula-

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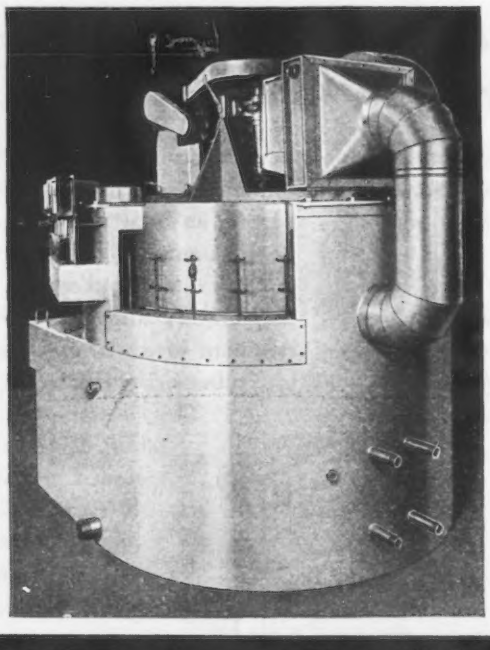

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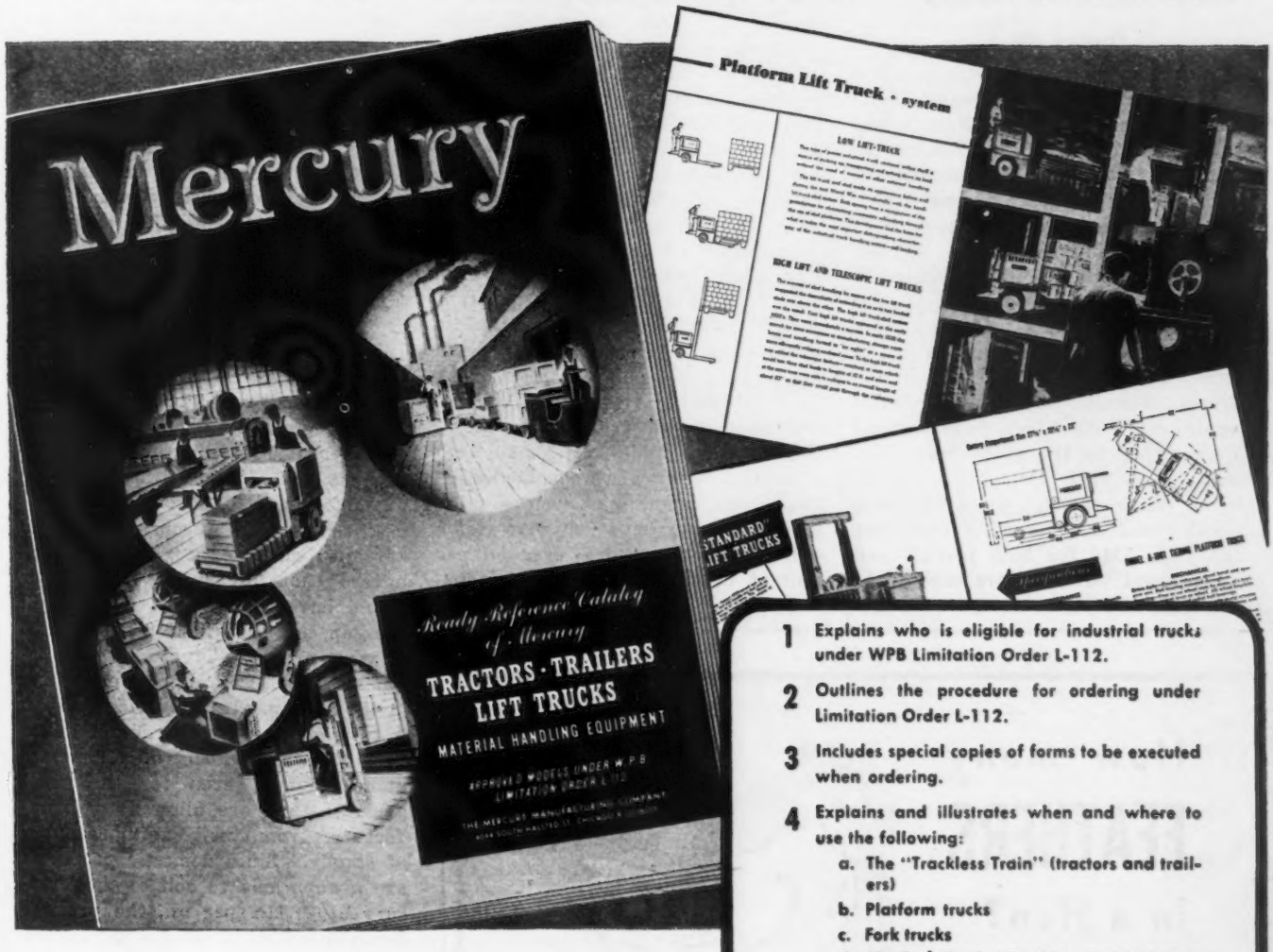

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tion had been set by voluntary agreement, into maximum price regulation 497, also blanketing in 15 antimony compounds. Antimony will be released from allocation after Jan. 1 through an amendment to WPB order M-112 but quarterly reports of consumption still will be required.

Passing the Axis

Mercury, which on the day war was declared was the only major metal in which the axis (Italy, Spain) held dominance, by the end of 1943 had become so plentiful that consumption controls were relaxed materially. Increased production, completion of Russian requirements and a safe stockpile culminated in amendment of WPB order M-78 opening up the use picture; decision not to finance more domestic mines; and cancellation of substantial Canadian purchase contracts. Turning off the water faucet again, top WPB policy makers wiped their hands on the guest towel, and included in their Oct. 27 announcement statement that "domestic production and imports of mercury for the year 1944 for both private and government purchase are each to be reduced to approximately 70 per cent of the 1943 amount." Government imports can easily be cut back, but it has not been explained just how private purchase of domestic production, which is the normal outlet for the principal mines, will be achieved without a restrictive production directive. Possibly a drop in market price, brought on naturally by abundant supply, will turn the trick.

Domestic output probably slightly exceeded 50,000 76-lb. flasks; Mexico contributed about 25,000, and new discoveries may have boosted Canada's total to nearly 20,000. Minor amounts came from Alaska, Peru, Chile and Venezuela. Of domestic production, California mines undoubtedly ran close to their usual 55 to 60 per cent proportion with Oregon dropping close to the common level of Idaho, Nevada and Texas. Some production came from Arkansas, Alaska and Arizona.

Among the individual producers, the New Idria mine, in a remote area of central California, undoubtedly led the parade, rounding out a production record running back 100 years.

As in former years, over 50 per cent of consumption was for industrial chemicals, principally for paint and medicine (not the least important use of which was for venereal disease control). The next most important use was for production of mercuric fulminate for detonating explosives. This use insofar as ammunition is concerned, has dropped greatly since the last war, being replaced by lead azite, which deteriorates less rapidly.

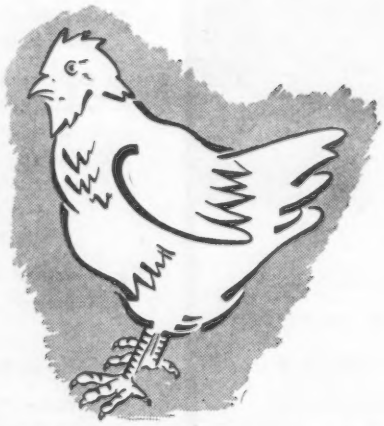
Heigh-Ho, Mr. Morgenthau

Silver, as is traditional, again was a political football for an East-West Big Game with crowded cheering sections led respectively by Senator Theodore Francis Green (R. I.), dubbed the "silverware senator," and Senator Pat McCarren (Nev.) carrying his familiar title of "sagebrush sage." By spring it had become apparent that the 1943 supply from domestic mines, imports, and secondary sources plus the small reserve stock of Metals Reserve Co. and "silver ordinary" in the Treasury, totalling about 162 million oz., would leave a deficit from the amount needed for essential and non-essential industrial consumption and foreign requirements. Everyone was agreed that Treasury "free" silver would have to be called upon to fill the gap, and the question merely was at what price the Treasury sell to industry. Use of foreign silver, selling in the open market at 44.75c. per oz. is restricted by WPB order M-199 to essential uses, cutting off silverware manufacturers, even for the small amounts they are allowed to manufacture, from their normal source of supply. Since domestic producers are always able to sell to the Treasury at 71.11c. per oz., the price of domestic silver is set at that figure.

When the tussle got hot, in April, a direct commitment had been made to the Army for 245 million oz. in addition to the allocation of 1000 million oz. to Defense Plant Corp. for the manufacture of bus bars, transformer windings and other non-consumptive uses, leaving only 43 million oz., or less than the Treasury's requirements for coinage purposes in the near future, of the Treasury's "free" silver. Everyone was quick to agree, however, that since no one was likely to walk off with a bus bar charged with several thousand volts, these bus bars could be used to back currency, thus leaving more "free silver" for the Treasury to sell than if all monetary backing had to be locked up at West Point.

Senator Green suggested that since essential silver users were paying 44.75c. per oz. for foreign silver they should not pay more than 50c. an oz.

How many
FEATHERS
in a Hen?



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for silver from the Treasury. The westerners threw up their hands at this, pointing out that since the Treasury has paid 71.11c. per oz. for the silver, it should be sold for not a cent less. Senator Green was accused of being a tool of silverware manufacturers anxious to reduce the cost of silver. The westerners, in turn, were charged with attempting to "hold up" essential industry. The 71.11c. price finally was incorporated into the Green bill, and it became law in July. But any hopes the silverware makers may have had were dashed by a WPB prohibition against use of Treasury silver for any but essential purposes.

Under the Green Act, WPB must recommend sale of Treasury silver, and by the first of December authorizations totalling about 25 million oz., a mere bagatelle, had been issued by WPB to manufacturers of engine bearings, brazing alloys and solders, and "official articles."

The Green act expires Dec. 31, 1944, unless extended, for it was intended purely as a war emergency measure. A plan is now being worked out whereby the Treasury will agree to repurchase its "free" silver from industry, subject to certain limitations, upon expiration of the emergency.

Early production estimates of about 40 million oz. of domestic silver for the year, and of 20 million oz. of imported silver, in the form of ore and base bullion for refining in this country, for the last half of 1943, proved to be fairly accurate. But an estimated requirement of 139 million oz. for essential industrial uses turned out to be about 39 million oz. too high. Less essential uses, such as jewelry and silverware, were held to approximately 30 million oz. An original estimate of requirements from 25 to 35 million oz. for engine bearings turned out to be much too high, although this use is increasing.

Silver requirements for coinage in the Middle East, India and elsewhere, due to increased war activity and the presence of large numbers of troops, has increased tremendously.

From Rings to Radar

Platinum and its by-metals—iridium, ruthenium, rhodium, osmium, and palladium — which normally are of prime importance to the bauble business, have turned out to be important war metals, and platinum stands at the very head of the list of all metals in point of scarcity. Platinum was carried up the ladder several rungs by the tremendous expansion of the electronics industry, with tremendous requirements for contact points, and added needs for catalysts, and spinerets for synthetic fibers. No use of platinum in jewelry is currently permitted, of course. Supplies have been shrinking, while production, which normally comes from Canada, Alaska and Columbia placers, in that order, and from the Transvaal hard rock mines, has not kept pace. Russia, incidentally, is popularly supposed to produce 100,000 oz. per year from placers in the Urals.

Osmium and iridium occur as a natural alloy (osmiridium) and are separated at the refinery by a complex chemical operation. South Africa normally is the principal source, with some from Alaska and Columbia, and the normal use is jewelry. But now, iridium is under complete allocation through WPB order M-49. The booming war use? Contact points. Placing of iridium under allocation had the effect of pushing consumers into a more complete substitution of ruthenium for contact points materially easing a tight iridium situation, but iridium is still available for a substantial portion of total magneto contact requirements. Use of ruthenium in jewelry manufacture, still permitted, is under curtailed control through the jewelry production order which limits the use of palladium, with which ruthenium is alloyed.

The rhodium supply position has eased materially during the year and it is hoped that some platinum may be saved by using a higher percentage of rhodium in the gauzes used in nitric acid manufacture. Use of rhodium in jewelry is forbidden. Palladium is in easy supply, and it is hoped to substitute it for platinum in the manufacture of contacts.

The Poor Cousin

WPB, which is charged with overall control of raw material production policy as well as with manufacture and distribution of finished products, has been handicapped on the top policy level insofar as mining has been concerned. A long parade of men have been tossed mining policy as a minor responsibility, usually in conjunction with several types of industrial production varying from steel to airplanes. Too often, lack of education in mining problems has been patched over by bluffing, trying to apply principles pertinent only to

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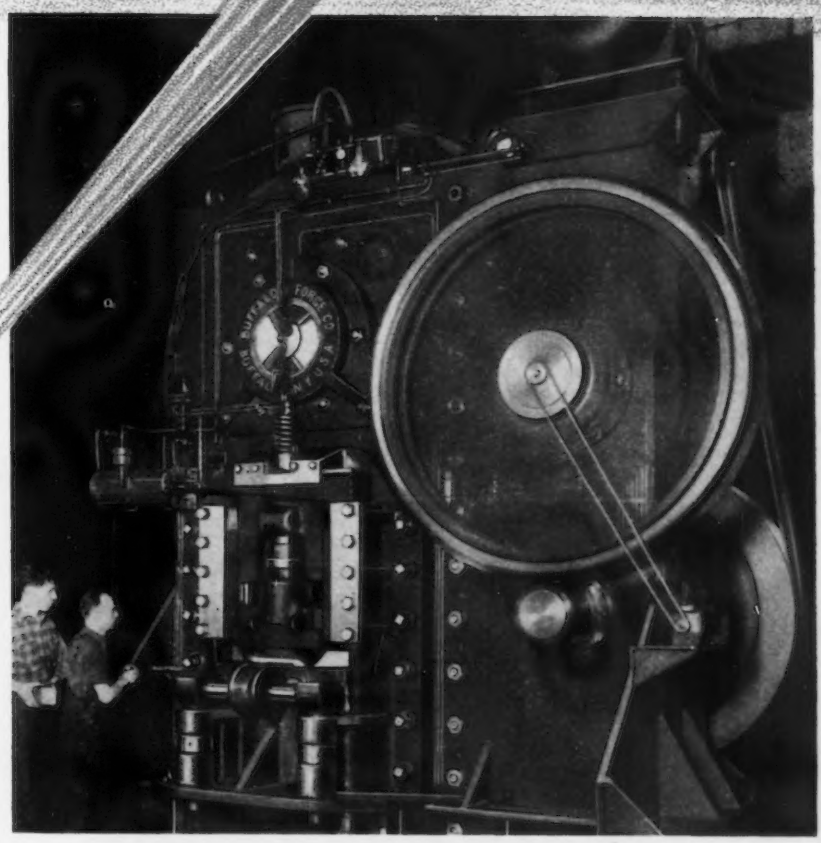

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ARMY E NAVY

"Buffalo" BILLET SHEARS

manufacturing, or listening to distorted versions pandered by nasty little boys from financial, insurance, or legal firms—or even from labor unions. Trying to reconcile the peculiar policies which have issued forth is worse than solving a Double-Crostic on Persian verse.

For instance, the first cherry the industry found at the bottom of its glass was the gold mine closing order, L-208, issued in October, 1942, which, by closing the gold mines, was supposed to channel large gobs of manpower and equipment to essential mining. It was a matter of both common and statistical knowledge at the time the order was issued that gold mining was on its last legs and wobbling badly by reason of rising material and labor costs and because of a general exodus of miners to the shipyards and construction work—but apparently the news had not reached Washington. No satisfactory accounting ever was given as to how little equipment was transferred from gold to other mines, and questions as to the number of miners transferred were always embarrassing. Donald Nelson said in April, 1943, that there were 1200, but no one wanted to embarrass him by asking their names. Some mine operators thought they smelled labor union influence in the order, for most gold mines were not unionized, while most base metal mines are.

Badgered for some definite statement of policy on minerals production, Donald Nelson on April 1 testified before the senate small business committee that "small quantities of raw materials are of the utmost importance. . . . Within the limits of our manpower and equipment possibilities, we shall pursue the extent of operating all producers, large and small, to the fullest extent." To carry out this policy he recommended "full detailed production planning with actual investments now of materials equipment and manpower to secure production . . . through the end of 1944, and for some minerals, when the preparation period is very long, for whatever period is necessary." About three weeks later, President Roosevelt personally endorsed a letter from Nelson repeating the same general policies. In this letter Nelson qualified his statement with regard to operating all mines—even the small ones—by stating "so long as existing equipment in operating mines is not fully manned, it is shortsighted to draw more labor from these existing operating mines for use in new projects." Thus, since large existing mines, with developed ore bodies, were gasping for manpower it appeared that the earlier statement with regard to small mines had been cancelled out. That seemed a clear and logical policy reversal. But, almost immediately, Charles E. Wilson, WPB executive vice-chairman, flopped the policy back to its original status:

"The scarcity of labor at this time or in any particular mining district will not be an influencing factor in guiding our policy to bring in new mines which produce metals so necessary in our war effort. The miners required in producing these metals will be made available from some source." Following that bit of abracadabra, Wilson did not bring the miners out of a silk hat, thus disappointing his audience greatly. Another four months passed before the Army, the only government outfit able to produce flesh and blood miner manpower, furloughed 4500 miners, not, of course, to the new mines being opened up, but to those which were operating and able to produce immediately.

By Oct. 27, the production and demand situation had changed to such an extent that, without getting the President to withdraw his endorsement, the plan of "actual investments of materials equipment and manpower to secure production . . . through the end of 1944" was scraped. The announcement of curtailment made reference to "greater need for marginal manpower than for marginal minerals." The reference to marginal manpower, apparently an implication that men released from curtailed mines would trot right over to the essential mines, came almost exactly a year after the gold mine closing debacle!

Fortunately, the actual minerals production men at WPB are experienced engineers, not given to shooting off conflicting policies machine gun fashion. There is no more able mining executive in the country than Howard I. Young, director of the Mineral Resources Coordinating Division. Through pick and shovel work of the individual mineral divisions, requirements have been met.

Button-Up Next Time

Post-war thinking in the industry revolves around the accumulation of national stockpiles of essential minerals so that the United States never

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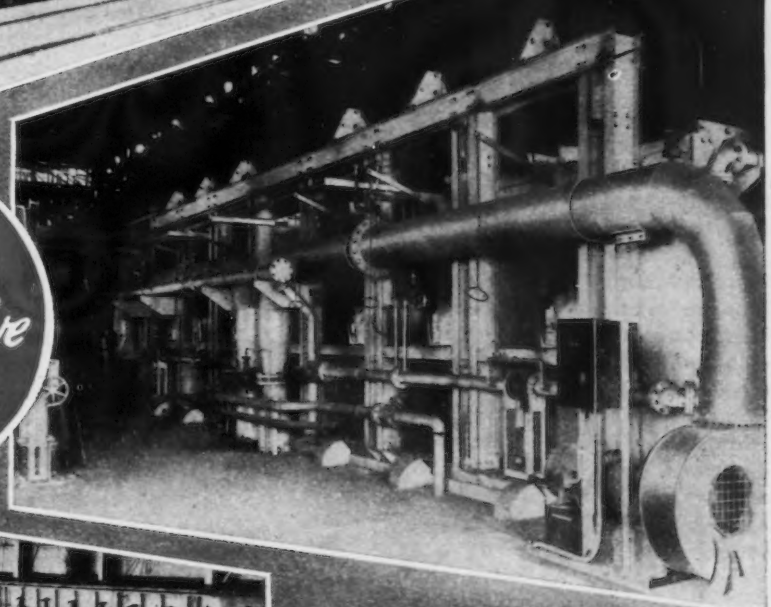

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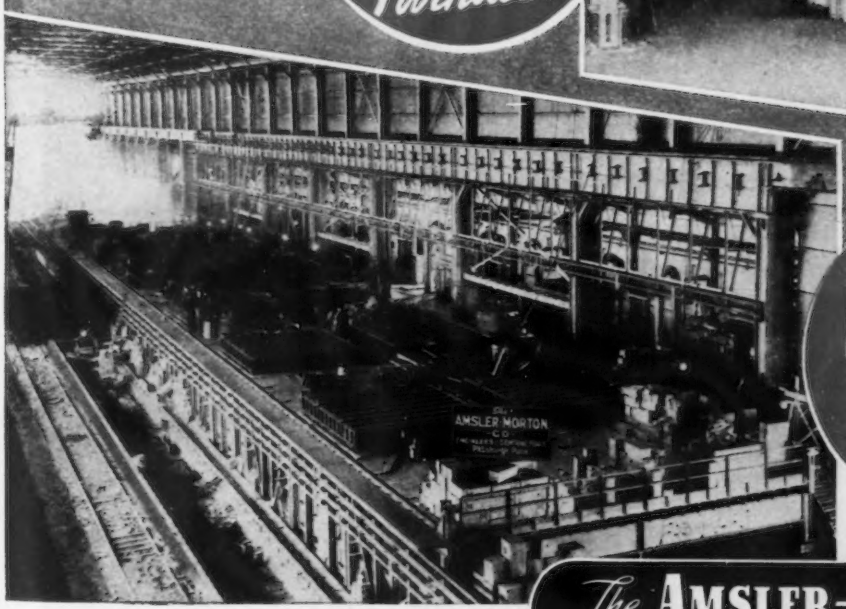

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CLARK

TOMORROW'S ACCURACY TODAY

HARDNESS TESTER FOR "ROCKWELL" TESTING

again will find itself in the same desperate plight as at the outset of the current war in Europe. Senator James G. Scrugham (Nev.), a former professor of mining at the University of Nevada, has introduced a bill by which, in the period following the war, stockpiles sufficient for three years requirements would be acquired by paying smaller marginal domestic mines current premiums for 12 months following the conclusion of hostilities.

Donald Nelson is quoted as having suggested "privately" to the Truman Senate Committee that it would be desirable, if appropriate arrangements could be made with foreign countries that would require them, particularly Russia, to accept our surplus machine tools in exchange for stockpiles of basic minerals.

The chances of success for Senator Scrugham's plan are limited by natural public repugnance towards paying a premium to small producers when the same material can be secured at normal prices from economically justified mines. Nelson's plan is handicapped by the fact that the richest deposits of most scarce minerals are located in southern Asia, South America, and Africa. Unless we want to give every Inca a turret lathe, and substitute a drill press for the Hottentot's bottle of milk, we are not likely to get very large tonnages of minerals. But, then, Nelson probably didn't stop to think of that in his enthusiasm for smashing platters to show his friendship for Russia in the Russian manner.

Renegotiation

[CONTINUED FROM PAGE 93]

ments, the comptroller general should act as a negotiator in preliminary review without power to veto or to audit.

(8) Procurement agencies should be authorized to make final negotiated settlements.

(9) Extensive audits should be avoided where the contractor is responsible and has an adequate accounting system.

(10) Settlement should be final except for fraud.

(11) Comptroller general may participate in final settlements but without veto power.

Suggestions offered by the National Association of Manufacturers provide for uniform policies and procedures to be followed by all major war agencies engaged in the settlement of cancelled war contracts and opportunity for contractors, subcontractors and suppliers to appeal to disinterested tribunals for review of adverse rulings or decisions of contracting officers.

A few industrialists have asked that inventories not cleared in 30 days after termination be turned over to a new and separate government agency with storage expenses met by that body. Some want overall claims settled rather than individual contracts since this would simplify checking of inventory and application of overhead distribution.

The recent appointment of Bernard M. Baruch as postwar adjuster is a hopeful sign that some order will arise from the waves of chaos.

But as the uncertainties of renegotiation recede, the complexities of contract termination will increase in 1944 to perplex the war contractor.

BOTTLENECK BREAKER: *Joseph K. Miller, foreman of the forge shop at the East Pittsburgh Works, Westinghouse Electric & Mfg. Co., inspects some shafts for Navy vessel generators made with a die that he designed. The die broke a production bottleneck and brought a $500 award from the company to Mr. Miller.*

Here is your answer

to these three questions:

1. *How Can I Cut Costs?*
2. *How Can I Save Space?*
3. *How Can I Reduce Accidents?*

The TURNER SYSTEM OF MATERIALS HANDLING

is engineered to do these jobs

In today's production crisis management in every American plant should know how the scientifically designed Turner System provides the most practical solution to important problems. At small equipment cost this remarkable system cuts labor, materials handling and storage expense. It saves up to 50% floor space by its mathematically 100% efficient method of handling and storing. It saves the cost of new buildings and the installation of expensive overhead equipment. It definitely reduces material handling accidents which comprise 40% of all industrial accidents.

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Built on the Principle of the Square

Already proved in many of America's largest plants, the Turner System is a completely standardized scheme of interlocking and interchangeable units which can be applied to every plant operation. Its foundation is the perfect square upon which is built an amazingly flexible and efficient materials handling and storing procedure.

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Application of Bin Section and two Shop Box Racks to Transport to provide portable stock or parts service.

FACTORY SERVICE COMPANY

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Steel Industry Insures for Future

[CONTINUED FROM PAGE 107]

time lost through attendance at approved evening classes, up to a maximum of three hours per evening or longer in special circumstances, at the discretion of the Works Education Committee. The maximum is three nights a week.

Attendance at day courses is facilitated, at the Committee's discretion, in special instances where a student has attained a satisfactory stage, and payment at time rates for time so spent may be made by the Corporation. One day a week is the maximum, and it must be shown by the student that there are no alternative evening courses.

A most important and interesting point is that tea is provided free to all employees attending approved courses who have worked the full day-shift on the day in question. All these arrangements apply to students of both sexes. Tea, it should be noted, is intended to convey not the mere beverage, but a substantial meal, what is known in Yorkshire as 'high tea.'

One consideration worth noting in this scheme is that the students have the advantage of the experience of the Corporation's administrative and technical staff in deciding what courses it is best for them to take to fit themselves for a particular career in the steel industry.

Recently, for example, the Secretary of the Corporation went to considerable trouble to map out for a young man in the accounting department a course of study to fit him for cost accounting in the plant. The chief metallurgist not only suggested courses in metallurgy suitable to the varied requirements of the firm, but himself gave, from time to time, informal lectures elaborating from the point of view of direct practical application the hard, bare facts learned in the study classes.

Each potential student is provided with an application blank, which he has only to fill in and sign for the machinery to be put in motion. It is also important that not only has the Corporation taken this action within its own sphere, but it is also actively co-operating with civic authorities and industry in planning a comprehensive improvement and extension of the entire city's educational services for young people of the school-leaving age.

Britain is awake to the needs of the future, planning new products, new methods, new skill.

TOUGH METAL FROM POWDER: *Dr. Paul Schwarzkopf examines one of the parts he makes from metal powder at the American Electro Metal Corp., Yonkers, N. Y.*

Construction Equipment for Britain Given AA-1 Preference

Washington

• • • **WPB has assigned** automatic AA-1 preference ratings to the Foreign Economic Administration for repair parts needed to rebuild and recondition used construction equipment to be shipped overseas for use in strip coal mining. Automatic AA-1 ratings are also assigned for spare parts that are shipped with the equipment. This action is taken by Direction I to Order L-192.

Standards Policy Committee Appointed at G.E.

• • • **A General Electric Co.** standards policy committee, headed by L. F. Adams, manager of the standards division, has been appointed by W. R. Burrows, vice-president in charge of general manufacturing matters, and R. C. Muir, vice-president in charge of general engineering matters. The committee will be responsible for the development and maintenance of sound design engineering and manufacturing standards and practices for use throughout the company.

The committee will work with and through existing committees having responsibility in their respective fields. American Standards approved by ASA and other nationally accepted standards developed by the AIEE, ASTM, and SAE will continue to be utilized without change in so far as they are applicable. It will continue to be the responsibility of the company's standards division to edit and distribute all new and revised standards and practices in one of the regular G-E standards series, following approval by the committee.

The membership of the Standards Policy Committee consists of Mr. Adams; H. W. Robb, secretary; P. L. Alger, T. D. Foy, the engineering assistants to the works manager, the general superintendent of each works and a representative of each of the appliance and merchandise, electronics and lamp departments.

NEW STEEL FOR VICTORY: *These rows and rows of steel ingots were produced at Henry J. Kaiser's new steel plant at Fontana, Cal.*

ARMSTRONG

Tool-up NOW for Greater War Production . . . . and Be Tooled-up for Post-War Competition

Equip every lathe, planer, slotter and shaper with a complete set of ARMSTRONG TOOL HOLDERS—with the correct types and sizes for every operation. While the extra strength and ready adaptability of ARMSTRONG TOOL HOLDERS make it possible to "get by" with a minimum of types and sizes the correct ARMSTRONG TOOL HOLDERS will permit greatly increased production on each operation—will permit speeds and feeds often double so-called "Standard" speeds and feeds, without loss of cutting efficiency.

Tool-up completely now with ARMSTRONG TOOL HOLDERS to increase your War Production and you will also be tooled-up for post-war competition, because each ARMSTRONG TOOL HOLDER is a permanent multi-purpose tool that will not only outlast the war, but with the change of a cutter, will be ready to start on post-war production.

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309 N. Francisco Ave. **Chicago, U.S.A.**

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"AT THE end of 5000 cycles of rubs—felt against felt and 2 rubs per cycle—the eighteen Booth felt specimens were measured for wear. Only 4 specimens showed greater than 3.4% decrease in thickness; and 5 showed less than 2.0%."—From lab. report.

Abrasion-resistance is but one of the many characteristics closely controlled in the manufacture of Booth "prescription" felts.

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APPLICATION CHART AND SAMPLE KIT . . . Contains swatches of S.A.E. felt types, with specification tables. Write for it. (No sales follow-up.)

2072

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PRECISION CUT FELT PARTS

Metallurgy

[CONTINUED FROM PAGE 113]

period when there was an alloy steel shortage in war industries. Even today, when alloy production is at its lowest point since the United States entered the war, quality scrap is almost non-existent. It is true that there is a definite surplus of alloy turnings and flashings, so much so that stocks are accumulating all over the country and prices for these items have fallen sharply. However, non-alloyed scrap, billet and bloom croppings and the better grades of uni-alloyed steel scrap are still far below needs and extremely difficult to obtain.

From the electric melter's standpoint, it is believed that bundling and briquetting will become considerably more important as time goes on. However, in the briquetting of turnings, it is extremely desirous to remove the oil on the turnings by burning, heating, chemical cleaning or centrifuging. Such cleaning is necessary because the oil will increase the carbon content of the charge by as much as 10 points per 1000 lb. of turnings charged. Likewise, the sulphur in the oil has detrimental effects.

Trends in electric furnace deoxidation are shaping up with some interesting developments expected. Clean lump ore has been found superior in some respects to roll scale, but the high silica in some of these ores makes the use of excessive lime in the slag blanket necessary. In the use of roll scale, care must be exercised to make certain that it is not contaminated with nickel or chromium unless these types of steel are being made. If stainless scrap is being remelted and contains oil, grease and other carbonaceous material, the roll scale must be pure in order to reduce this carbon. Chateaugay sinter, with an extremely high iron content and very low phosphorus content, has been found to be an excellent deoxidizer.

The year 1943 has been one of major developments and refinements on developments and will have definite and tangible results on the scientific and economic factors of steel making in the future. It is true that many of the developments of the past year or so have resulted from the scarcity of certain materials, for which others have had to be substituted. However, regardless of the reason, new ideas have been formulated, tradition and precedent have been forgotten and new methods have been developed, many of which will vitally affect the metal working industry and lay the groundwork for more progressive and creative thinking for years to come.

The
IRON AGE

ESTABLISHED 1855

o o o

Jan. 13, 1944

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Conservation: The Postwar Keynote

PROBABLY because of strikes and threats of strikes, word has gone around that the less said or thought about postwar problems the better. That is true for most of us but it does not, it seems to me, apply to top management in industry.

The higher up you go in the scale of industrial executive position, the farther ahead is the thinking. The man on the job at the lathe or rolling mill thinks and acts in terms of the immediate moment. His foreman thinks and plans as to tomorrow's schedules of production, having finished his planning for today's. The superintendent thinks in terms of next week's labor supply, the purchasing agent in terms of next month's material requirements, the works manager in terms of equipment and plant needs six months from now. When you get to the top officials, a good part of their thinking is one to, perhaps, three years ahead.

It has to be that way to keep industry running, either during a war or after it. The locomotive is naturally way ahead of the caboose; if you try to run them side by side you eventually get a smash up.

Top industrial thinking with respect to production of the great bulk of war materiel was largely completed a year or more ago and put into capable hands farther down the line to be carried out. If Eugene Grace of Bethlehem and his executives had confined their thinking to day to day problems, for example, 380 ships would not have been completed by that company in the 365 days of 1943. No man on the coming invasion front will lack support and materiel because of failure of our top American industrialists to think ahead and plan ahead for victory. Let's hope we will be able to say as much for top labor thinking and acting.

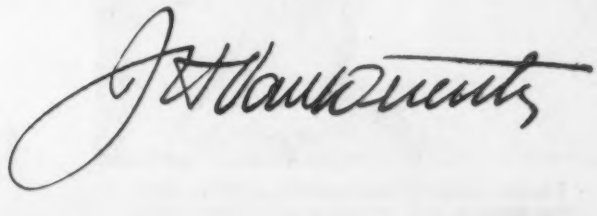
So while most of us must keep on thinking of the tasks of today, these men whose function it is to look forward must think of tomorrow. And here is something for them to think about.

Until the war is won, our chief emphasis in industry must be on saving time. That is the job for the men in charge of production; the present day to day thinkers and planners. For time saved in production and supply means lives saved and days or weeks or perhaps months sooner for victory.

But after the war, the emphasis will change. The coming generation will have as many minutes, hours, weeks, months and years as we have, perhaps more as life spans are lengthened by science. But they will not have the abundance of materials that we have had. The cream is being skimmed from the bottle of our natural resources.

Time is inexhaustible; natural resources are not. The minutes that we are using today will be replenished by Father Time, but Mother Earth will not be as bountiful with our rich ores, our diminishing forests and our flowing oil wells.

Conservation will be the keynote of our postwar America and our forward thinkers would do well to plan for it.



Inland medical staff discussing an X-ray film.

Blood tests often suggest corrective treatments that keep men at work.

The X-ray is extremely useful in preventing the loss of man-hours.

The knowledge of heart action is useful in placing workers and extending their work years.

INLAND CLINIC HELPS SOLVE MANPOWER PROBLEM

The Inland clinic, established long before Pearl Harbor, has taken on added importance during the war by helping to solve the vital manpower problem.

Working closely with the Inland industrial relations and safety departments, the clinic appraises the usefulness of many handicapped people—suggests types of jobs they can perform, —helps find work they can do in the Inland mills to replace workers who have gone to war.

The clinic staff speeds men back to jobs by assisting them in obtaining needed outside medical attention. It recommends and arranges for special treatment. It helps find medical service for workers new in the vicinity and for those whose regular physicians are away at war.

The 24-hour dispensary provides medical attention quickly and keeps many a man producing who otherwise might be absent from work because of slight injury or minor illness.

Finally there is the regular clinical work—free examinations that forestall illness, prevent accidents, speed the recovery of injured and sick employees. Although not compulsory, all but a very small percentage of Inland employees have taken advantage of this service.

Through its important work the Inland clinic has literally added thousands of man-hours to America's war effort, bringing Victory that much sooner.

INLAND STEEL COMPANY

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Milwaukee • Detroit • St. Paul • St. Louis • Kansas City • Cincinnati • New York

IRON AGE

JAN. 13, 1944

NEWS FRONT

• Current steel operating rate of, say, 98 per cent of capacity is some three points higher than actual operation, as the activity is figured on capacity as of July 1. New capacity figures will not be ready until end of January.

• New WPB regulation gives C. E. Wilson, executive vice-chairman, authority to direct activities and functions of all officials of WPB, Aircraft Resources Control Office and the Aircraft Scheduling Unit.

• All powers previously held by Nelson have been granted the vice-chairman.

• This seems to be the first move to line up Wilson as director of reconversion activities, as planned by Baruch.

• Evidence is accumulating that the aircraft of tomorrow, a la Buck Rogers, will be driven by squirts and not by propellers.

• Germans, long contemptuous of wooden aircraft, have been so impressed by Russian craft and the British Mosquito as to start production on a large number of wooden front-line aircraft. Numerous advertisements in the Reich and in occupied countries are attempting to flush wood workers for the German aircraft industry.

• Recently, a German radio station mentioned that Focke-Wulf will soon introduce a wooden version of the single-seat Fw 190 fighter. Displaying astounding originality, this plane will be called "Moskito".

• A German war reporter has just described a new Soviet transport airplane, said to be the largest in the world. It is stated that the largest German bomber could be parked under one wing.

• The American soldier's newspaper, Stars and Stripes, published in Cairo, recently said: "Too many Americans are walking around ablaze with bits of colored silk . . . We would like to petition the War Department to spare us some of this shower of silken recognition . . . Our feeling is that the British are perhaps a little too reserved in their treatment of their heroes." The British have issued no battle ribbons in this war so far.

• Bomber strength of the U. S. Eighth Army Air Force (based in England) is now 2500 aircraft.

• In 1942 Admiral Towers, U. S. Navy, said that the Glenn Martin "Mars" (world's largest flying boat) was obsolete so far as performance was concerned. However, figures released on the recent Maryland to Brazil flight of the "Mars", unless they have been fudged, indicate an incredible performance, i.e. cargo weight of 24 per cent of gross weight, against a comparative 6 per cent figure typical of a Boeing 314, the next largest flying boat in regular operation.

• Large inventories of steel disks for cartridge cases, orders for which have been cancelled, will be used mainly for manufacture of steel mortar shells. Uses for smaller disks are as yet uncertain.

• Although Metals Reserve relaxed to accept manganese carbonate ores, no use for these ores has as yet been determined.

• Navy cutbacks during the last six months in ships, aircraft, ordnance, etc., totalled $2,856,000,000. Destroyer escort vessels accounted for $1,370,000,000 of the total.

• Russia is negotiating for the structural mill now being stored in crates at the Columbia Steel plant at Geneva, Utah.

• In a letter to Jesse Jones, WPB recommended the cancellation of funds for four Carnegie-Illinois plants at Munhall and Braddock, Pa., Gary, Ind., and South Chicago. Slow cooling pits, hot topping equipment and soaking pits were to be built.

• Estimates of man-days lost because of strikes in 1943 total 17,317,500. In 1939, there were 17,810,000 man-days of idleness.

• Worried lest aluminum cutbacks shut down West Coast plants, officials there are pointing out that aluminum produced in the Pacific Northwest costs less than 15c. a lb. Shipshaw aluminum delivered to Vancouver for lend-lease shipment to Russia costs the United States about 21c. a lb.

Machining the Wright Cyclone

By H. E. LINSLEY
Wright Aeronautical Corp.

o o o

THE first public announcement of the Cyclone forged aluminum head was made in May, 1942, although the actual development work had begun early in 1938 and in the fall of that same year the first forging dies were purchased. The problem of producing the forging itself is one which has given a great deal of trouble. At the present time three different methods are available, each developed by a different forger and each giving satisfactory results. In general, the process consists of producing a cast billet, either round or rectangular with rounded corners, scalping this to remove scale, cutting off sections to the desired length, and pressing to shape in two or more passes in the forging press or upsetter.

Heat-Treating Cycle

Forgings are delivered to Wright in the "as forged" condition and weigh approximately 65 lb. The first step after inspection is to give the forging an elaborate heat-treating cycle. This is extremely critical since the speeds used in machining are so extremely high that even slight differences in heat treat and material structure will have an appreciable effect on the life of the cutters. Continuous conveyor type combination gas-electric furnaces are used, two furnaces being arranged in parallel with a gravity type conveyor between them for the return of trays. As seen in Fig. 1, forgings are loaded on to two "subway grating" trays, six to a tray, and these trays are moved into the furnace vestibule in pairs by means of a hand crank. Then power driven rollers carry the trays through the gas fired, radiant tube heating section in which the parts are brought to a temperature of 960 deg. F. and then through the electrically heated section where they soak at 960 deg. for 6 hr. When the trays arrive within about 2 ft. of the discharge door they trip a limit

FIG. 1—Loading end of the continuous conveyor type combination gas-electric furnaces used for heat treating Cyclone aluminum cylinder head forgings.

o o o

FIG. 2—Mounted on the column of a Bullard Mult-Au-Matic, this special target fixture assists in truing up cylinder head forgings so as to equalize stock removal in the initial machining operation.

Forged Cylinder Head

. . . After more than five years of intensive and costly research, the Wright Aeronautical Corp. now has its forged aluminum cylinder head program in full operation and is manufacturing these vastly superior engine parts on a quantity production basis. Some of the unusual special purpose machine tools devised to machine this head are described and illustrated in this article, the most interesting of which are the automatic units for milling out the cooling fin slots. Machining time has been increased but a difficult and tedious foundry job has been eliminated.

o o o

switch which opens the door and at the same time starts an electric motor which operates a high speed driving mechanism to convey the two trays out on to the roller conveyor cooling section as quickly as possible.

Rapid cooling is achieved by an air blast directed upwards from under the conveyor, about 25 min. being required to bring the temperature down to 340 deg. F. or lower. During this time the trays move to the loading end of the second furnace where they are picked up by a six-strand continuously moving chain which carries them through the vestibule and through the direct gas fired, recirculating heating section where they are brought to 340 deg. They next pass into the electrically heated soaking section for 8 hr., and finally out on to the strand chain cooling section where they cool for 4 hr.: Still on the same chains the parts next pass through the third furnace, heating to 450 deg. in the direct fired gas section, soaking for 5 hr., and then discharging on the final strand chain conveyor where they cool to room temperature. After the parts are unloaded, the trays return to the loading end of the furnace by the gravity roller conveyor.

FIG. 3—Locating dowel holes are drilled and reamed on this special Allen drill equipped with turnover fixtures to facilitate loading of the aluminum heads which weigh 65 lb. in the rough forging.

The forgings, which now have a hardness of 85 to 95 Brinell (500 kg. load, 10 mm. ball), are snagged and then forwarded to a 16-in., 8-station Bullard Mult-Au-Matic. At the first station the part is loaded into a chuck, resting on equalizing buttons, and clamped on the lower portion of the chucking piece.

Target Fixture Used

It is then trued up by means of targets and flush pins carried on a special target fixture, Fig. 2, which is mounted on the machine column and lowered into place. The outside diameter of the body is finish turned, the flange finish formed, and the first fin groove finish turned. Parts are then transferred to a second Mult-Au-Matic in an inverted position, the chucking piece faced off, and the interior dome rough and finish formed.

Two locating holes are now drilled and reamed on a special Allen drill. This is a three position indexing machine, Fig. 3, having two two-spindle heads and three trunnion mounted fixtures to facilitate loading. Parts are loaded in an upright position, locating on the flange diameter, and targeted on the rocker boxes. After clamping, the fixure is inverted to present the base of the flange to the drills.

Greenlee Transfer Units

Heads are next conveyed to a Cincinnati Hydro-matic rise and fall machine on which the curved upper part is profile milled, after which they are mounted on special carrier plates before passing to the special Greenlee

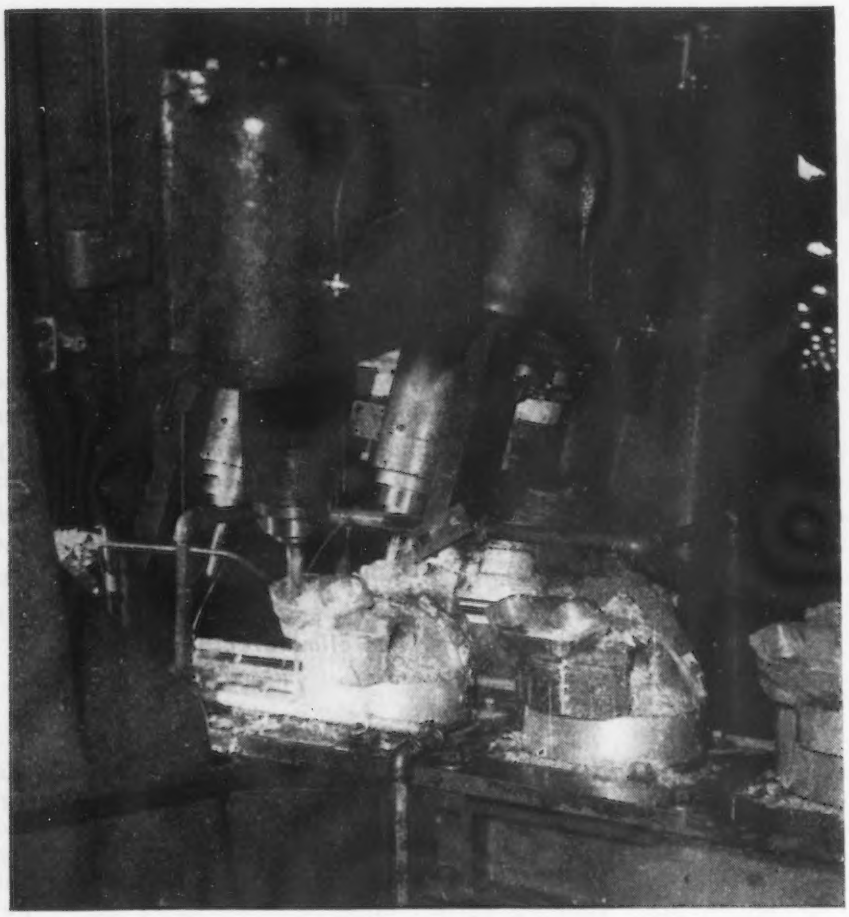

FIG. 4—A close-up view of one of the stations of the Greenlee transfer machine used for roughing out Cyclone cylinder head forgings.

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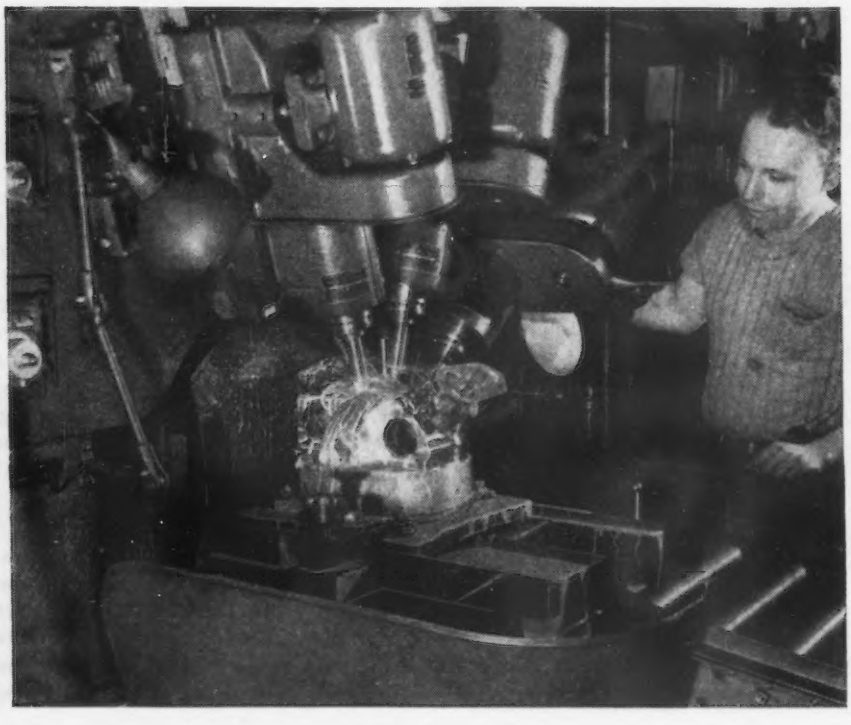
FIG. 5—Three grooves are milled simultaneously on this special three-spindle Snyder machine. The head is still supported on the same carrier plate as used on the Greenlees.



transfer machine. This machine is very similar to that described in THE IRON AGE for Oct. 9, 1941, except that it is built in three sections and combines milling operations with drilling, counterboring, reaming and tapping operations.* Parts are loaded into the first or 16-station section so that the rear of the head faces the right side of the machine. At the first operation both rocker box faces are rough milled, removing about 3/16 in. of stock with end cutting mills. At the next operation a ½ in. hole is drilled and reamed and then the two spark plug holes are drilled, counterbored and chamfered. A hydraulically operated arm now picks up the head, lifts it clear of the conveyor, tilts it to remove the chips and excess cutting oil and then replaces it on the track.

See also "In-line Machining of Aircraft Cylinder Heads," by W. A. Phair, THE IRON AGE, Aug. 12, 1943, p. 66, detailing the Greenlee units installed at the Studebaker Corp. for producing the Wright cast aluminum cylinder heads.

At this point a manually operated turntable is incorporated in the track to enable the second operator to turn the head a quarter turn so that the rocker boxes face lengthways of the machine. This operator then advances the head into the second or 35-station section where the first operation consists of drilling two 13/16 in. diameter holes near the ends of each rocker box and rough counterboring the valve spring counterbores to 1-25/32 in. diameter, Fig. 4. The valve holes are next drilled ¾ in. diameter through into the dome and finish counterbored to 2½ in. diameter. The opposite or push rod ends of the rocker boxes are then rough and finish counterbored to a spherical radius. A clearance recess is end milled at the valve ends and then the push rod holes are drilled through and counterbored. At the next station the rocker shaft holes are drilled, after which a 1⅛ in. wide slot is milled through the stock between the valve and push rod counterbores. Finally two holes are drilled and reamed for the fin bracing and thermocouple tubes, the latter being also counterbored.

Chips and Oil Dumped

The head is again raised and inverted to remove oil and chips and advanced to the third or 12-station section. Before entering this the part enters a manually operated cage in which it is turned upside down, in

which position it passes through the section for rough and semi-finish counterboring the valve seats. Emerging from here it is again tilted to remove chips, turned right side up and passed through an automatic wash machine.

This one machine comprises a total of 63 stations, of which 23 are active, or operating stations, three are loading, three unloading and the remainder serve merely as bridges between the units to allow access to the tools for setup and maintenance. It has a length of 110 ft., and is equipped with a total of 41 tools to perform 40 operations. These include four milling cutters, 15 drills, three reamers, 17 counterbores and two end mills.

After the heads leave the wash machine, they travel by roller conveyor to a battery of special Snyder mills, Fig. 5, equipped with three inclined spindles each of which is individually driven by its own high speed motor. Parts are located by means of the carrier plate on which they have been passed through the Greenlee and are clamped to a power operated table. The three spindles feed down to the required depth of 0.175 in., and the table then advances to produce the desired 5 in. length of slot. After finning, these slots serve to receive reinforcing strips to brace the fins.

The carrier plates are now removed and the parts passed to special Allen drills, Fig. 6. These machines are provided with a four-position indexing table and three drill heads, each of which carries eight spindles. The cylinder heads are loaded in an inverted position, locating in the dowel holes and the center bore. At the first index the drills start the holes to a depth of approximately ½ in., at the second index the holes are drilled through and at the third are reamed and countersunk. At a later operation anchor tubes are inserted into these holes to serve as fin braces.

Complicated Valve Chambers

The next operation consists of machining out the exhaust valve chambers in such a manner as to leave a central boss, Fig. 7, in the form of a truncated cone whose base blends into a full radius and is in the form of a portion of a helix, so that the height varies progressively from minimum to maximum, and back to minimum. This somewhat difficult form is generated on a special Snyder machine built to Wright designs, Fig. 8. The part is held on a rotary fixture inclined at the angle of the valve guide cone, and is located on the

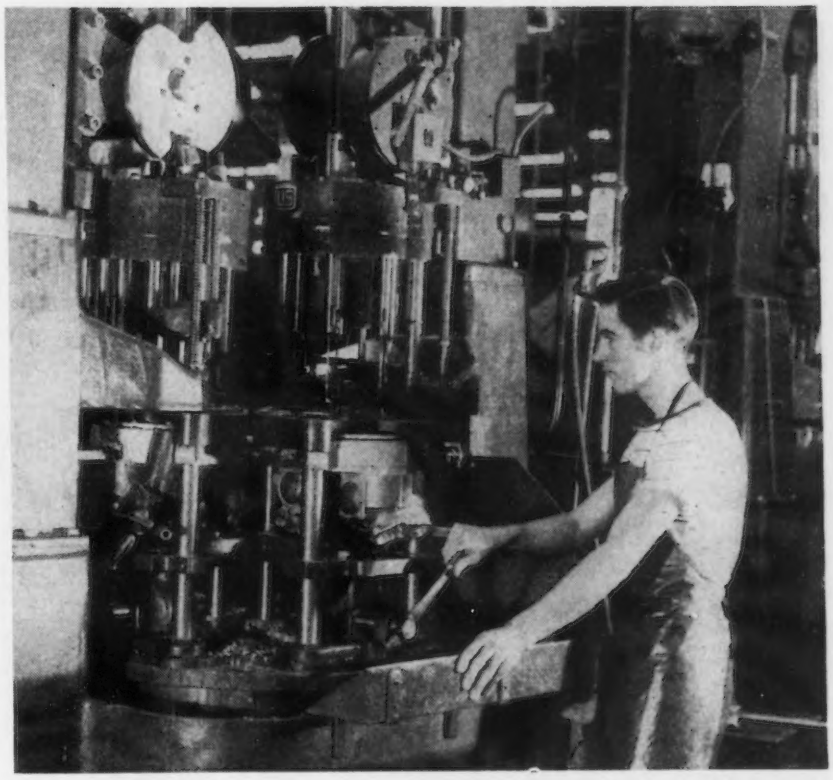


FIG. 6—Eight fin bracing tube holes are drilled, redrilled and reamed on this special Allen drill equipped with three heads and a four-position indexing table.

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FIG. 7—A cross-section through the exhaust port of a Wright Cyclone forged cylinder head, showing the complicated forms to be machine generated in the ports and rocker box.

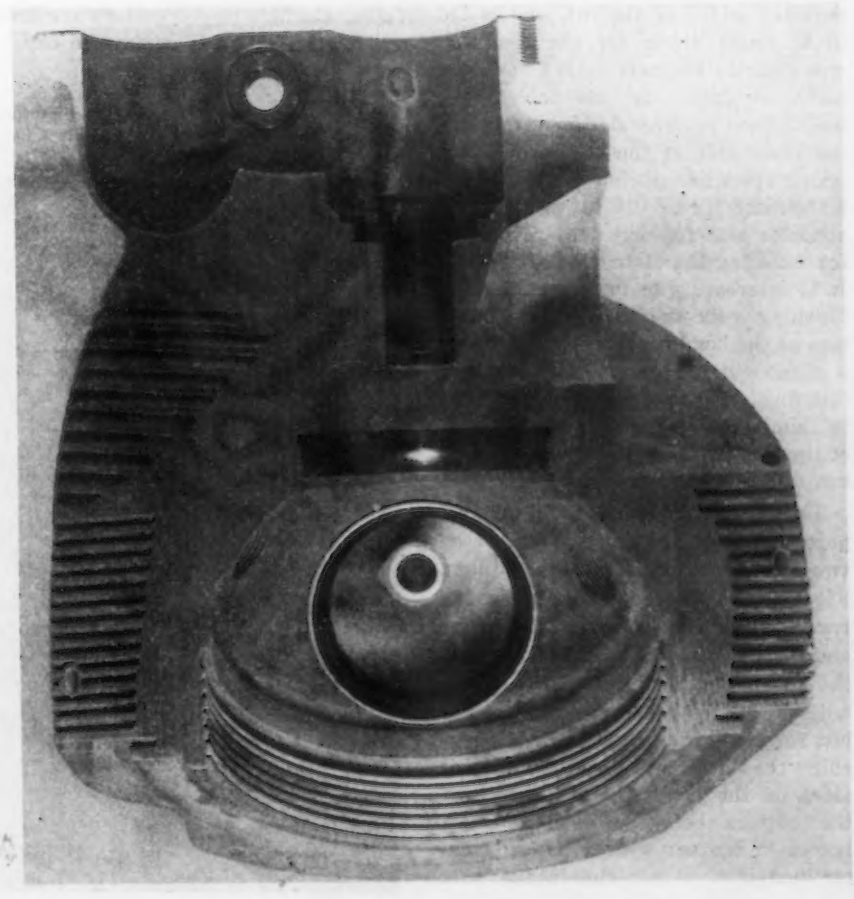


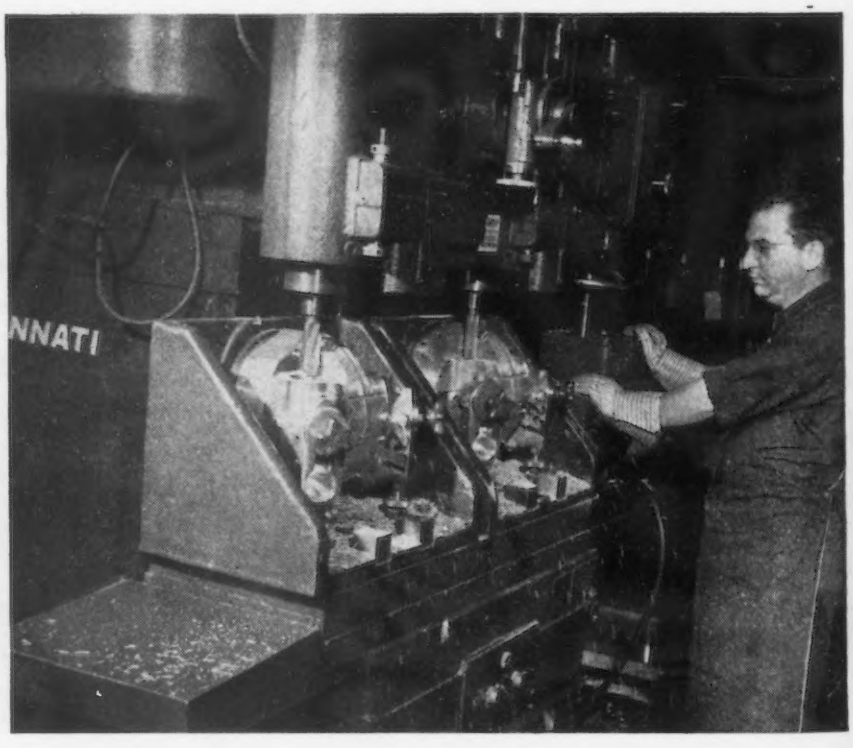
FIG. 8—Special Snyder machine equipped with inclined rotary tables form the complicated intake and exhaust valve chambers. (See also Fig. 7.)

valve spring counterbore and rocker box slot. The form end mill used is 0.030 in. smaller in diameter than the required width of the cut, and is fed in to finish depth for the roughing operation as the part makes one complete revolution on the table. The tool is then set over 0.015 in. towards the inner side of the cut for the finishing operation during the next revolution, and then 0.015 in. towards the opposite side for the final revolution for finishing the other side of the cut. It is interesting to note that for the finishing cuts the direction of rotation of the head is reversed to produce a climb cutting action and obtain a fine finish. The intake valve chamber is similarly machined on Snyder equipment, with the fixture set to suit the different angle.

The faces of the intake and exhaust ports are rough and finish milled on two-spindle Cincinnati profile millers, Fig. 9, on which the heads are loaded two at a time, locating on the flange and dowel holes and clamped through the intake and exhaust valve guide holes by plates bearing on the rocker box faces. Spiral fluted end mills machine the port faces and the adjacent sides of the head, the movement of the cutters being controlled by a tracer in contact with a hollow master template. After the intake port face on both parts has been machined, the tracer is shifted to a second template for machining the exhaust port faces. Carbide tipped cutters are used and the operation is performed dry.

Following this the intake and exhaust ports are milled out to connect into the valve chambers. For this purpose, a special high speed Cincinnati Hydro-Tel milling machine, Fig. 10, is equipped with three individually powered spindles each direct driven by a high-cycle motor at 6900 r.p.m. The power for these is provided by a motor driven high cycle converter. The spindles are inclined at an angle of 15 deg. from the vertical, but the heads feed vertically downwards on the ram face. Three cylinder heads are loaded at one time, location being by means of hardened blocks fitting into the slot in the rocker box. The holding fixtures are linked to a reciprocating bar in such a manner that they oscillate through a small arc. As the spherical cutters feed down into the ports, they travel in an approximately circular path with respect to the work, being controlled by a ball-ended tracer operating in a master form, also attached to the reciprocating bar. The curved passage thus generated is remarkably clean and requires only a smoothing operation with abrasive cloth to remove tool marks and blend it into the opening of the valve chamber. Approximately 15 min. are required to perform the operation on the three heads for the exhaust ports, and a similar amount for the intake ports. In spite of their high speed the spindles may be stopped in about 5 sec.

FIG. 9—The faces of intake and exhaust ports are rough and finished milled on two-spindle Cincinnati profile millers.



by pressing the electric reversing button.

Experimental Unit Built

Milling out the fins constitutes one of the most interesting operations and is achieved by the use of special Cincinnati milling machines designed especially for the job through the joint efforts of Wright and Cincinnati engineers. To establish the method a standard knee and column type miller, Fig. 11, was modified by attaching a harness to the table, and by means of weights and pulleys, reducing the friction load on the feed screws to less than 5 lb. Two Keller attachments were then connected to the table, one for the vertical movement and one for the horizontal, to cause the table to follow a master profile. Although the first heads were successfully produced on this experimental unit, considerable trouble was encountered with the cutters. Gang milling was tried, but proved unsuccessful. Standard milling saws were found to be entirely unsuitable since their harmonic frequency was such that they excited the fins and produced fatigue fractures. Special cutters were therefore designed so that the vibration was dampened and the excitation no longer occurred. These cutters are 13 in. in diameter and have nine carbide tipped teeth, carefully ground and honed to a fine finish. When operated at a surface speed of 4500 ft. per min. and a feed of 70 in. per min. they produce an exceptionally good surface and have been so carefully worked out that the heat generated is virtually negligible; both cutter and work piece remain sufficiently cool to be handled without difficulty.

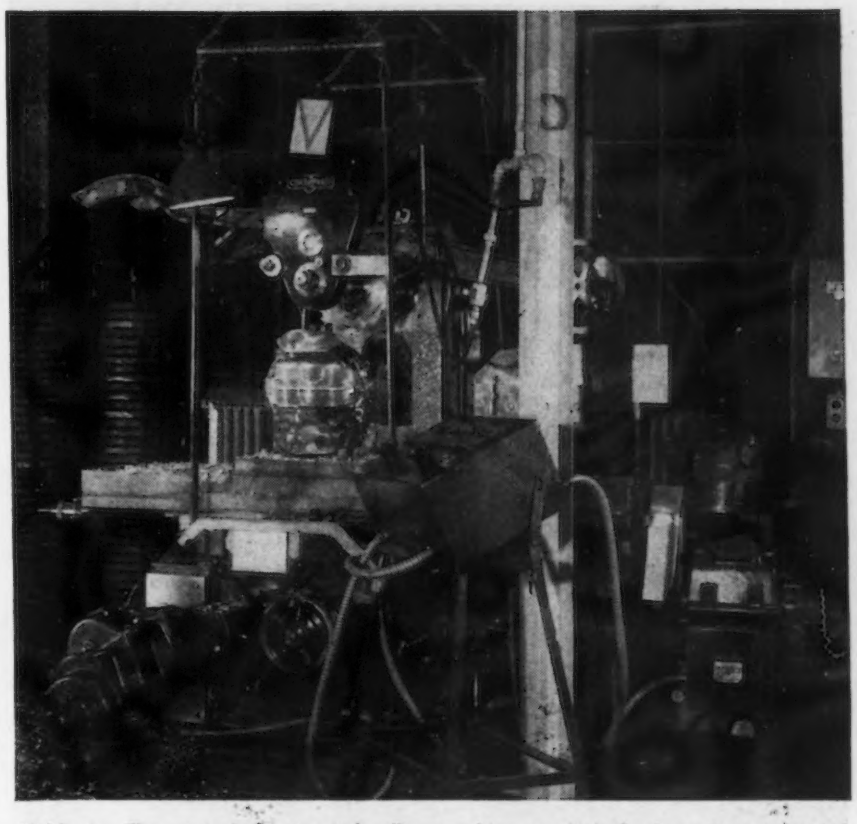
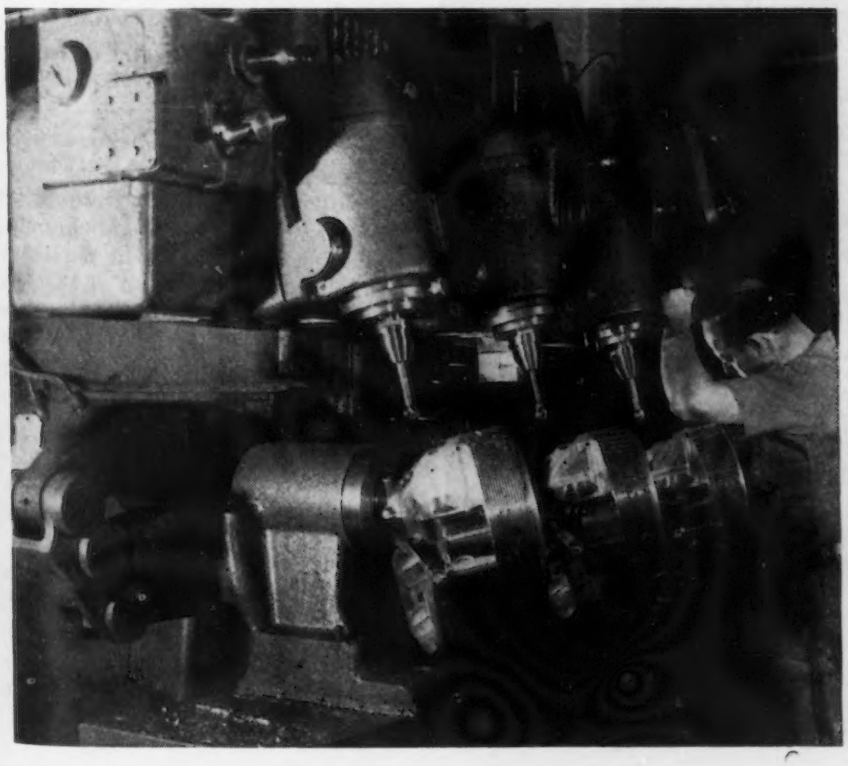


FIG. 11—The original experimental milling machine on which the fin cutting operation was developed. Table is counterbalanced by a system of overhead weights to reduce friction.

When the machines were first installed it was believed that the centrifugal force produced by the high speed cutters would render it impossible to make any effective use of fluid coolants, and the machines were therefore designed to use heavy tallow as a cutter lubricant. This was fed by compressed air from a container through a flexible tube terminating in a slotted nozzle through which the edge of the cutter passed. An automatic trip operated the air valve to deliver a "shot" of tallow every few seconds. This was satisfactory in so far as cutting was concerned, but proved to be very wasteful of tallow which was soon splattered all over the machine and which could not be readily recovered. Furthermore, it resulted in the parts being heavily coated with grease and made very objectionable to handle. Experiments are now being conducted with fluid coolants with apparently successful results, and all machines will probably be changed to such a type of coolant in the near future.

The first finning operation consists of cutting 14 fin spaces around the lower part of the body. This is done on a Cincinnati Hydromatic with the

FIG. 10—Specially designed high-cycle Cincinnati Hydro-Tel milling machines are used to generate the form of the intake and exhaust ports.



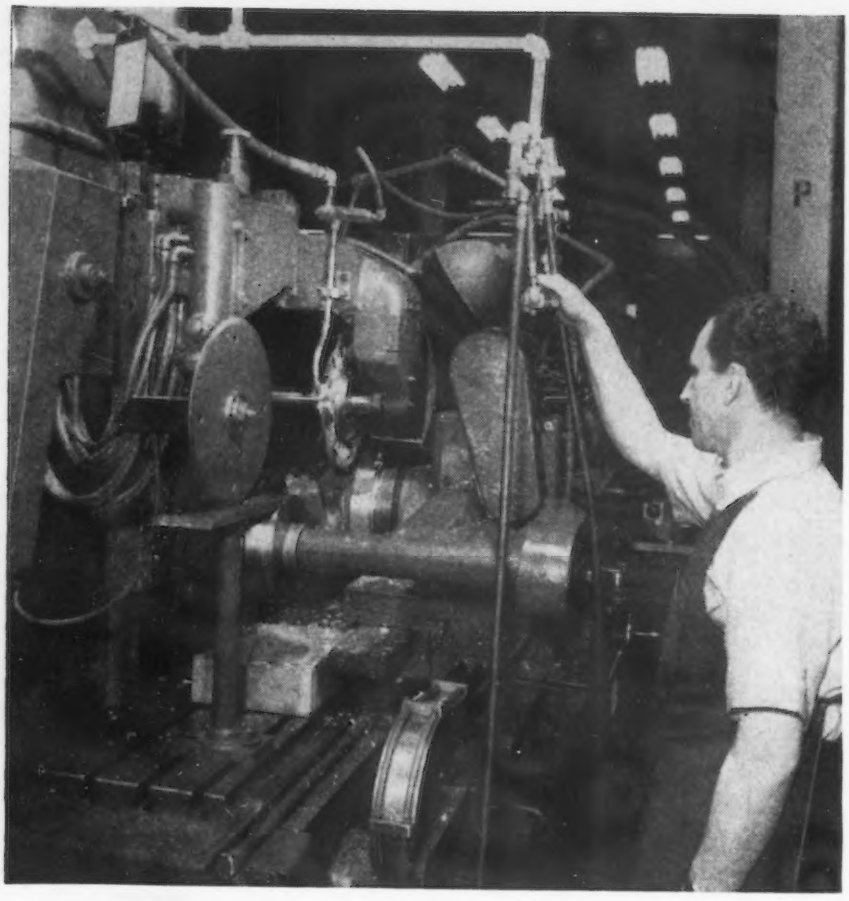


FIG. 12—The nearly circular body fins are cut on a special Cincinnati Hydromatic mill using two saws controlled by a rotary cam and follower. Infeed approach is controlled by the flat plate shown at the upper left.

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FIG. 13—Special Cincinnati Hydro-Tel mills are used for cutting the wide fins at the intake and exhaust ports.

cylinder head mounted on a special rotary fixture and located on the flange diameter and the locating pin holes. Fig. 12. The groove bottoms are not perfectly circular nor all of the same contour, and a master cam is therefore used to obtain the necessary rise and fall of the machine spindle. At the start of the cut the cam follower travels along a horizontal plate to feed the cutters in to depth, thereafter it engages the cam which rotates at the same feed speed as the part and produces the required profile. On this operation two cutters are employed, 0.112 in. thick, and spaced at the mean thickness of the fin which is 0.058-0.068 in. The depth of the cut is about 2¾ in. at the deepest part.

Fin Cutting Millers

Parts are now passed to a special Cincinnati Hydro-Tel automatic milling machine for cutting the 16 fin spaces on the exhaust side. As in the case of all the fin cutting machines, this one was built for the particular purpose and was the result of close cooperation between Wright and Cincinanti designers. As shown in Fig 13, it consists essentially of two vertical spindles each carrying a single cutter and operating at 4500 ft. per min., and three rotary tables. One of these carries four identical sets of cams, each of which consists of a series of plates whose contours correspond to the varying profile at the base of each individual fin space. The other two tables are work tables holding four cylinder heads, one on each of four vertical work faces. The in and out movement of the cutters is controlled hydraulically through a follower wheel held in contact with one of the cam plates.

A variable speed feed cam controls the speed of rotation of the parts past the cutters. For the first ¼ in. of cut the feed is at the rate of 15 in. a min., increasing constantly to a maximum of 70 in. at the end of cut of the first head. A rapid traverse of 270 in. a minute then brings the second head into cutting position, whereupon the feed is slowed again to 15 in. After the fourth head has been cut, the rapid traverse is slowed somewhat to allow time for the cam follower to index vertically to the second step of the cam.

A similar machine cuts the five fin spaces on the intake side of the head, after which another similar machine cuts the 38 spaces on the top of the head. This is the unit pictured in Figs. 14 and 15.

Following these operations the parts are washed and inspected 100 per cent, then forwarded to a second Greenlee transfer machine. This comprises a total of 124 stations, divided into three sections, and is similar to the machine used earlier. It performs all the semi-finish and finish milling operations, drills, reams, countersinks and taps all holes, counterbores the valve spring seats, finish reams the valve guide holes, and forms and taps the valve seat counterbores, using carbide tipped taps.

A special Snyder milling machine is employed for forming counterbores and blending radii in the inside of both bosses in each rocker box. The double ended cutters carry a groove around their periphery to act as a journal, and are supported in bronze brackets. After the head has been located and clasped these brackets advance into position between the bosses, and the driving arbors are advanced manually through the rocker shaft holes to engage the cutters. From there on, the cycle is automatic, the cutters feeding to the right to form one counterbore, then to the left to form the other, and finally returning to the center to permit disengaging of the arbors and withdrawal of the support brackets.

The head is now loaded into a Hall Planetary miller equipped with a special lead screw lock. On this machine a recess is cut at the end of the thread diameter and at the junction of the pilot diameter with the dome on the inside of the head. A second machine then rough and finish mills the special modified buttress thread and the pilot diameter simultaneously, using a combination cutter to assure perfect concentricity.

The final operation consists of turning and facing the flange on a Bullard Mult-Au-Matic, the part being held on a special adapter locating on the buttress thread.

With the exception of the fin cutting operations and the machining of the rocker boxes and valve ports, the operations performed are similar to those required on the original cast head, although automatic equipment is employed to a far greater extent than was ever done before. Actual machining time is considerably longer than on the cast head, but this is more than offset by the tremendous savings occasioned by the elimination of the lengthy and tedious foundry operations.

FIG. 14—Milling the fins on the curved upper surface of two Cyclone cylinder heads by means of a special Cincinnati Hydro-Tel milling machine holding eight heads altogether on two rotary indexing fixtures. The table at the right carries four sets of cam plates.

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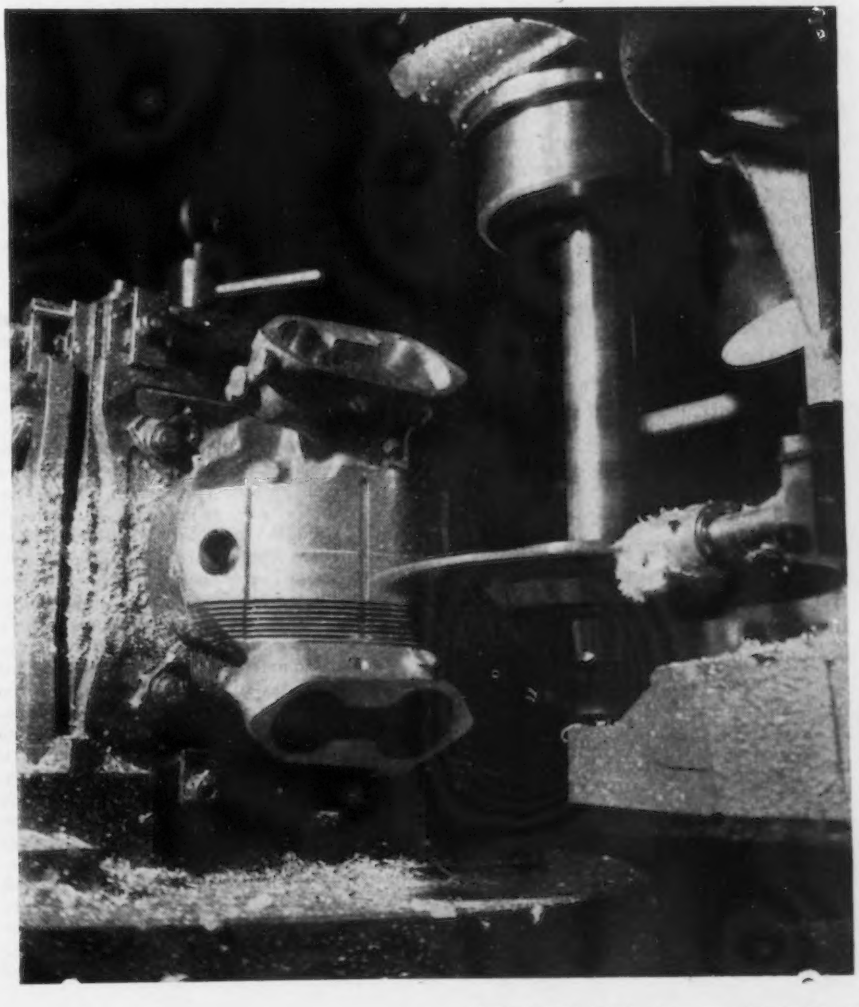
FIG. 15—A close-up view showing the operation of cutting one of the dome fins on a special Cincinnati Hydro-Tel.



Future of Magnesium

. . . The experience in the use of magnesium that industry is now gaining should give direction to research and subsequent development of new and improved alloys. In this paper which was presented before the Philadelphia Chapter of the American Foundrymen's Association, the author evaluates the properties of magnesium for sand, die and centrifugal casting and suggests what improvements may be forthcoming.

MAGNESIUM has had a potent shot in the arm, because due to war exigencies industry has been forced to use magnesium in such vast quantities and for such a variety of purposes. A splendid background of practical experience in handling the material and of performance under all kinds of service has been created, which otherwise would have taken many years of slow tryouts and watchful waiting on the part of the engineers. Magnesium metallurgists and technologists have a clearer vision of where specific research and development are most needed to build up their fences.

Production of magnesium is now about 600,000,000 lb. a year, where in 1939 it was about 10,000,000 lb. for all purposes. Production of magnesium now exceeds consumption so that a good deal of it goes into a stockpile. Undoubtedly, however, after the war some of the producing plants will go out, since their production costs, at least as it appears at present, will not be competitive with other producing processes for magnesium.

It should be noted that at present about 25 per cent of the total magnesium production goes into aircraft; the other 75 per cent probably largely into incendiary bombs, etc. It may be assumed that after the war practically all of the bomb business and a large part of the aircraft consumption will have to be taken by new commercial applications, which will have to be worked up gradually.

The established advantages of magnesium are:

(1) Light weight. Magnesium weighs 0.065 lb. per cu. in. compared with aluminum 0.1 lb.; cast iron 0.260; steel 0.285; brass 0.307 and copper 0.322.
(2) Excellent machinability.
(3) Excellent damping characteristics (reduces amplitude of transmitted vibrations). It is better than aluminum, and useful for radio and communication work.
(4) High fatigue strength.
(5) Non-sparking.
(6) Non-magnetic.

Definite disadvantages of magnesium are:

(1) Modulus of elasticity is 6.5 million lb., against 10 million for aluminum and about 28 million for steel. Where stiffness against deflection is needed, magnesium must be about 17 per cent thicker in sections or must be stiffened by ribs or other means. Low modulus when coupled with relatively high elastic limit, as in magnesium alloys, is sometimes a distinct advantage as to resilience.
(2) Thermal expansion of magnesium, 0.000016 in. per deg. F., is greater than that of aluminum, 0.000013 in.; steel, 0.0000066 in., and cast iron, 0.000006 in.
(3) Commercial magnesium products have pretty good corrosion resistance to ordinary atmospheric influences, unless submerged or kept wet in sea water, or exposed to tropical, humid climates. Magnesium alloy castings exposed for several years near the seacoast of Point Judith without special surface protection, have not shown any noticeable decrease in strength or surface deterioration. There is considerable variation in different compositions. New developments have brought out compositions in which the most injurious elements, nickel and iron, are kept to low limits. In commercial purity alloys, the loss when tested by alternate immersions in seawater, varies from 5 to 100 mg. per sq. cm. a day, showing the great variations in the compositions. The high purity alloys lose 0.15 mg. per sq. cm. per day, $\pm$ 0.05, which is considerably better and more uniform. However, in the same test, copper loses about 0.12 mg. which considering the weight ratio means that the depth of corrosion of high purity magnesium is still about six times that of commercial copper. The loss for tin bronzes is only half that of commercial copper.

From a corrosion standpoint, even the high purity magnesium alloys should not be used where it is immersed or constantly wetted by salt water, or where exposed to humid, tropical climates. Protective coatings are a help, but only effective as long as they are not broken.

(4) While subnormal temperature has no marked effect on the physical properties of magnesium, a temperature above normal reduces the properties more than is the case with aluminum. Magnesium should not be used where exposed to temperature above 300 deg. F. for any great length of time.
(5) Magnesium is particularly susceptible to the effect of concentrated stresses as caused by notches, sharp corners, etc. In designing magnesium alloy parts, it is highly important to avoid points of concentrated stress by distributing loads and pressures over larger areas, rounding off all corners, liberal filleting, and very gradual change of section.

There are certain other properties which are not exactly disadvantages or advantages such as magnesium, being a softer material than aluminum, is apt to show somewhat lower creep value, but due to the rapid work hardening of magnesium, the initial primary creep period is finished within two days, after which the secondary creep starts with a straight gradual increase. Creeploads within the elastic limit impose elongation usually within the permissible limits of the design.

The shock resistance of magnesium alloy parts is somewhat less than that of aluminum for shocks by external forces, such as hammer blows, projectiles, etc., but better than aluminum due to lower weight for shocks due to dropping magnesium alloy parts.

Casting Characteristics

Magnesium alloy castings are subject to two primary considerations:

(1) The low thermal capacity on volume basis (specific heat) makes possible rapid and economical melting, but it also makes for rapid cooling in the mold so that in sand as well as in metal molds it is important to get the metal into the mold and to fill the mold completely as quickly as possible. Furthermore, the low specific gravity of magnesium means that molten magnesium does not differ greatly in weight from non-metallic inclusions and that the pressure of the pouring head is relatively low.
(2) Some type of inhibitor must be present in green as well as dry sand to prevent reaction between moisture

Castings . . .

By D. BASCH
Works Laboratory
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and molten magnesium, also to produce a non-oxidizing atmosphere within the mold cavity. This means a synthetic sand should be used.

These two points are disadvantageous in that they add somewhat to the cost and make manufacture more difficult. There are, however, some compensating features.

Magnesium alloy castings differ from castings of most metals in that there are definite and positive means of controlling the grain size (by superheating) so that the coarse structure often encountered in heavy sections, for instance in aluminum, is largely eliminated. For this reason the properties of test specimens cut from magnesium alloy castings approach more closely those of separately cast test bars.

Although there is some difference in grain size between heavy and light sections in magnesium alloy castings, the difference is not nearly so marked as that encountered for instance in aluminum and other metals. In fact the presence of micro-shrinkage (intergranular shrinkage cavities) is about the only marked reason for a difference in properties between specimens cut from a casting and separately cast test bars. Even in castings which contain the normal amount of micro-shrinkage, it will generally be found that the average of test bars cut from a casting will be about 80 to 85 per cent of separately cast bars. On other material such as aluminum the ratio is considerably lower.

Micro-porosity unfortunately is hard to avoid in magnesium alloys. It will vary with the alloy, those compositions high in aluminum are less subject to it than those lower in aluminum. Micro-porosity cannot easily be detected by X-rays, due to the low density of magnesium and the lessened contrast between metal and voids. On the other hand, micro-porosity becomes structurally dangerous only when it is visible to the naked eye. Fractures of sample castings will give a reliable indication. Micro-porosity can be controlled to some extent by gating and chilling. Magnesium alloy sand castings are not so susceptible to so-called pinhole porosity as for instance aluminum.

Magnesium alloy castings when heat treated do not air-age into the final condition with higher tensile and lower elongation as rapidly as do aluminum alloy compositions. With aluminum it takes about three months to reach the final conditions with simple air aging, whereas with magnesium alloys it takes years, so that in many cases the magnesium alloy castings can be used in the solution treated condition (heat treated but not aged) with the much higher elongation, greater shock resistance and greater deformability without fear of losing these properties after a short time. When subjected to elevated temperature, the air aging of magnesium alloys progresses more rapidly, so that under such conditions fully aged castings should be used.

In general an average figure for the yield of magnesium alloy sand castings compared with aluminum, primarily due to the effect of low thermal capacity, requiring more and larger gates and risers, is 2¾ lb. poured to each lb. of good castings in aluminum (for the most commonly used alloy with 4 per cent copper, and 5 lb. poured to each lb. of good castings for magnesium). Of course, these figures vary quite a good deal for different jobs. In spite of this, another comparison can be made by taking the average cost per lb. of good aircraft castings which, at least in the G. E. foundry, is about $2.55 for magnesium alloy (heat treated) against $1.75 for aluminum (heat treated), which indicates that considering the weight ratio of 2 to 3, the cost of magnesium alloy sand castings is not far from aluminum. These figures may vary somewhat, but the differential for magnesium castings is surprisingly low. There is a good chance that the cost of magnesium alloy castings may still come down farther as practices in foundry and new metallurgical developments are perfected.

Due to the rapid work hardening and the low modulus of elasticity of magnesium alloys, magnesium alloy castings which require considerable machining may need more care in machining than aluminum or other materials to prevent deflections and distortions. Careful supporting and in many cases strain relief after rough machining and straightening may be necessary. Strain relief is usually carried out at about 400 to 500 deg. F. for 3 to 6 hr. depending on the casting.

At this point, some statistical data about the tremendous increase in magnesium alloy sand castings (and in comparison of aluminum alloy sand castings) may be of interest.

Sand Castings

	Magnesium, Lb.	Aluminum, Lb.
1939	1,321,080†	.....
1941	1,753,000	.....
1942	32,763,000	207,488,000
1943*	26,337,000	142,446,000

*First six months.
†Includes permanent mold castings.

The physical properties of magnesium alloy sand castings for the two most common alloys are shown in the table below.

By comparison, the physical properties of the most common aluminum base casting alloy with 4 per cent copper are:

Heat treated but not aged = 29,000 tensile, 6 per cent elongation.

Heat treated and aged = 32,000 tensile, 20,000 yield strength, 3 per cent elongation (all minima).

There is a steadily increasing use of permanent mold magnesium alloy castings, which require less machining, a particularly favorable factor where production is not high enough to justify the expensive dies of die castings but high enough to permit the cost of permanent molds to obtain castings. From about 20,000 lb. a month in the latter part of 1941, permanent mold magnesium castings increased to about 300,000 a month, exclusive of bombs, during the first part of 1943. Magnesium alloy perma-

Physical Properties of Magnesium, Alloy Sand Casting

	Min. Tensile Strength	Min. Yield Strength	Min. Elongation, Per Cent
Al 6 per cent, Zn 3 per cent, heat treated and aged	32,000	10,000	7
Al 6 per cent, Zn 3 per cent, heat treated but not aged	34,000	16,000	3
Al 9 per cent, Zn 2 per cent, heat treated and aged	32,000	10,000	6
Al 9 per cent, Zn 2 per cent, heat treated but not aged	34,000	18,000	1

nent mold castings can be heat treated and also superheated for grain refinement like sand castings.

Magnesium alloy ingots of "A" purity cost now about 20 to 21c. a lb., aluminum alloy ingots about 15c. Considering the weight ratio, the prices of aluminum and magnesium alloy ingots are kept pretty much balanced.

A great deal of talk has been going on about postwar prices. Of course, it is not known exactly what is going to happen but there seems to be a general feeling among metal producers, that after the war, the price of primary aluminum ingot will be around 10c. a lb., secondary aluminum around 6c., primary magnesium about 15c. and secondary magnesium around 10 or 11c. This adheres pretty closely to the weight ratio.

If these figures are correct, and it should be reemphasized that so far they are only guesses, following again the weight ratio and competing with primary magnesium, brass ingot would have to sell for about 3c. a lb., and cast iron about 4c. Competing against secondary aluminum which is being used in ever increasing quantities in the foundry, brass ingot would have to sell for about 2c. and cast iron for about 2.3c. and magnesium for about 9 cents. Of course the metal cost is not the only factor determining the cost of the casting.

Increased Use of Die Casting

Pressure die castings of magnesium alloy are finding many applications due to the fact that many jobs in war time are used in such quantities that in spite of the high die cost, die castings become commercially feasible. Furthermore, pressure die castings offer the shortest and most direct route from the raw material to the finished product with the greatest saving of strategic material, man-hours and machine hours in casting and machine shops. Magnesium alloy pressure die castings do not lend themselves to heat treatment and cannot easily be superheated, like sand or permanent mold castings, but some improvement in physical properties is obtained from the rapid chilling of the metal die bringing them to about the same figure as for fully treated and aged sand castings. Magnesium alloy pressure die castings have increased from about 60,000 lb. per month in the last few months of 1941 to about 250,000 lb. per month in 1943.

It may be assumed that after the war, when production quantities will be materially reduced, the use of magnesium alloy die castings will decrease, temporarily at least, unless die costs can be greatly lowered. There will, however, be many new applications for commercial products such as portable sewing machines, typewriters, business machines, portable tools, vacuum cleaners, floor polishers, radios, transportation (automotive, railroad, transport planes, etc.) reciprocating machinery, rotating apparatus and many others. The same die casting machines may be used for aluminum and magnesium, also generally the same dies with possibly some changes in gating.

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BENCH molding department of the American Magnesium Corp.'s Buffalo foundry.

Centrifugal Castings

Magnesium and aluminum are not very well adapted to centrifugal castings. One of the greatest advantages of iron and brass centrifugal castings is the so-called self-cleaning action which due to the centrifugal force throws the heavier base metals toward the periphery and holds the oxides and non-metallic inclusions in the center section which is usually machined out. The remaining metal section is thus clean of the non-desirable elements.

In magnesium and aluminum, the oxides are heavier than the base metals and therefore the non-desirable elements are thrown towards the outside periphery so that the most valuable part of the casting where the structure is most attractive due to the high centrifugal force, must be machined off.

New developments in magnesium may bring forth new alloy compositions to shorten the solidification range, so as to reduce danger of micro-porosity and to yield high physical properties without high tem-

perature heat treatment. Improved corrosion resistance of magnesium alloys, especially against salt water and tropical humidity may also be expected as well as improved protective coatings. Improved die casting techniques and alloy compositions for pressure die castings so as to make possible high temperature heat treatment with corresponding properties (improved structure and density) may be other future developments. Additional improvements may include fluxes which are less destructive to steel work in magnesium plants and an adaptation of magnesium alloys to the plaster of paris process as now used for brass and for aluminum.

Tightening up on precautions and handling routines in castings and machine shops to eliminate the absolutely unnecessary fires and explosions which prejudice users against magnesium are other improvements to look forward to. Also, bearing and sliding wear properties of magnesium alloys should be established.

Simple Method for Etching Metals

AN English process, on which a patent is pending, provides a cheap and simple method of etching on the surface of metals. The method is rapid and simple to operate and gives pleasing results, particularly on hard or stainless alloys such as high speed steel, stainless steel, stellite, etc. It can be applied to brass, nickel, indeed to any metal.

It enables a number of small articles to be etched in the same time as taken for one article. It has no limitations in the complexity of the design which can be transferred, provided only that a stencil can be cut. Awkward shapes lend themselves particularly to etching by this method. No tools are required and, beyond the cost of the stencils and etching solutions, the running costs are negligible.

The process is electrolytic and makes use of a standard waxed paper stencil, such as is used on a duplicating machine, on which is typed or printed the required words or designs. This is placed between the metal article, which forms the anode, and an absorbent pad containing the etching fluid, which is connected to the cathode of a 15-volt d.c. circuit. All the equipment and the etching fluid are obtainable from Griffin & Tatlack Ltd., Kemble Street, Kingsway, London, W.C.2.

An illustration of the main features of the apparatus is shown in Fig. 1. It consists of a unit comprising transformer, rectifier and output controller, which gives a potential of 15 volts d.c. from the 200/300 volts a.c. supply. The illustration also shows the blocks used as anode and cathode for the etching. B is a graphite base plate connected to the negative terminal of the d.c. supply. On the surface of this block rests a pad C, which may be a few layers of ordinary blotting paper. This pad is damped with the etching fluid and the typewritten, or hand drawn, or otherwise imprinted stencil D is then placed face downward upon it. The metal object F which must have a flat, but not necessarily polished, surface is then placed face downward upon the stencil. Electrical contact and pressure is provided by placing on top of the metal the weighted graphite block A which is connected to the positive terminal of the d.c. supply.

The current is then turned on for a period varying from 5 sec. for a small design to 10 sec. for a larger one, or even 30 sec. where, say, 20 metal objects are being etched at once. The current varies from 2 amp. up to approximately 10 amp. for a large number of articles. It is important in the latter case that sufficient mechanical pressure is maintained to ensure good contact with each specimen.

In placing a specimen upon the stencil no part of it should touch the bare pad, otherwise it will become etched. It is not necessary for the surface of the metal article to be free from grease before engraving since greasy surfaces etch quite well. When etching stainless or corrosion resisting metals, each cut in the stencil is good for at least 15 etchings, the life being limited by the tendency of the stencil to become burned, and the etching to become blurred. The life of the stencil is reduced to about 10 engravings with less corrosion resisting metal such as mild steel, as the dielectric properties then become impaired.

The normal depth of the engraving is about 0.0005 in. and an important feature of the process is that in no way is the structure of the adjacent metal altered, nor is the surface of the metal embossed, but remains perfectly flat. The etching appears as a silvery color on mild steel and is more brilliant on stainless metals. It can be filled afterwards, if desired.

Round or curved articles can be rolled over the stencil while in contact with the top block, or alternatively, awkwardly shaped or large articles can be etched by fitting the waxed stencil to the curved face of a hand blotting pad and making the necessary electrical connections to the metal body of the hand blotter and the article.

The method is particularly useful for marking toolroom products, such as small tools, tool bits, form tools, name plates, etc., as the etching can be carried out after the work has been completed. The operating cost is very small, as a large number of markings can be typed on one stencil.

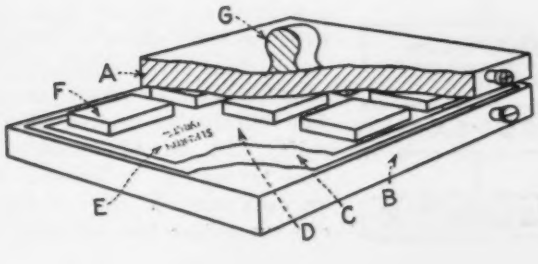

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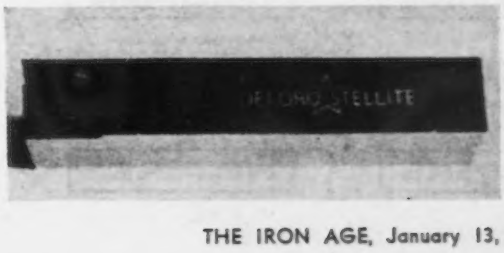
FIG. 1—Details of the Deloro etching apparatus.

BELOW

FIG. 2—Typical work, showing a trademark etched on a piece of tool steel.



Welding Organization and

By C. W. JOHNSTON
Assistant Superintendent of Welding, California Shipbuilding Corp., Los Angeles

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IN the intervening months since Dec. 7, 1941, problems of industrial management peculiar to the times and to all production programs have arisen and been met by industry in such a manner as to materially contribute to future welding organizational and welding production practices.

To a certain extent, in pre-Pearl Harbor days our personnel problem had been solved by the War Production Training Program of the United States Department of Education, through the institution of short term (200 hr.) vocational training as a substitute for a long and extended trade apprenticeship training for skilled workers. In common with other new shipbuilders, the California Shipbuilding Corp was almost solely concerned with the acquisition of material for the complete utilization of those pre-employment trained workers. It was not until our production of ships was fully under way did we understand or have a clear conception of the importance of welding organization and training made necessary by welded ship construction.

It had originally been planned to draw on the worker output of the War Production Training Schools for the welders required and to use the facilities available in our own personnel training department for the further training of employees in blue print reading, shipfitting, layout, etc. Then with the gradual entrance of the yard into a shipbuilding program there would be the absorption of newly trained welders from the outside schools in such a manner as to fully adapt them to working conditions. At the same time there was to be the gradual building of a welding organization through the development of supervisory personnel from the more promising workmen.

But with the entrance of this country into actual participation in warfare all production schedules were stepped up, making it necessary for Calship to increase its welding personnel to between 6000 to 7000 employees. This figure represents more welders than had been actively employed at any one time in the entire area west of the Mississippi River on any previous occasion. This increase in welder requirements, plus the erection of additional shipyards in this area, created such a drain on the War Production Schools that they were unable to fill the local demand. Furthermore, the increased production schedules made it impossible to allow for an adaption period between time of employment and effective placement on production welding.

So we found ourselves precipitated into an organizational and personnel problem to which too little thought had been given, namely the immediate organization and placement on the job of a volume of welders who as a result of their schooling and booth training were able to pass the tests qualifying them as shipyard welders, but who had no previous experience in welding, nor were accustomed to the adverse welding conditions of emergency work.

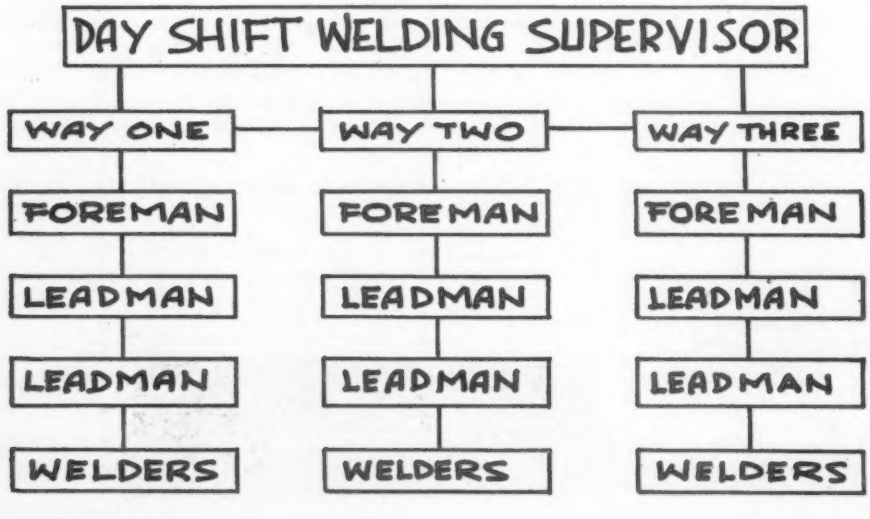
Survey Made

The first phase of a welding department training program was started among the welding foremen and leadmen by Ted Warne of personnel training and consisted of a complete Job Instructor Training course to acquaint the welding supervision with the qualifications and basic practices of an instructor. At the same time the hull and yard department, under the management of J. S. (Jumpy) Sides, began a survey of welding conditions and training requirements on the shipways. This survey produced the following conclusions:

1. *Insufficient Supervision:* A proportional increase in welding foremen and leadmen had taken the majority of qualified and experienced welders from productive to directive positions. The available supervision had an ample background of welding experience, but were taxed to capacity with supervisory duties and had no time for the actual welding instruction of men under them.

2. *Conflicting Supervision:* The organizational arrangement (see Fig. 1) was such that it contributed to considerable confusion through the confliction and overlapping supervision of the various shifts. Each shift had a welding supervisor whose authority extended over three shipways. As a result three entirely different welding practices were being used on one shipway during the course of all three shifts and led to considerable lost time through re-assignment of welders each shift and the inability of any one supervisor to accurately arrange

FIG. 1—The original organizational setup was such that considerable confusion and overlapping of supervision resulted. Each shift had a welding supervisor whose authority extended over three shipways but there was no real coordination between the three shifts.



Training

. . . When the war skyrocketed welded ship construction on the West Coast, a dual problem was created: Setting up an efficient welding organization and training welders, the latter phase being aggravated by the fact that all the skilled men were immediately made supervisors. What changes were made in both organization and training to meet this emergency and to make competent welders out of men who had picked up faulty habits in outside welding schools are related by the author.

the working continuity of three separate shipways.

3. *Production Losses:* Tangible reasons for production losses such as time lost due to power failure, machine movement, etc., were easily accounted for. But the greatest production loss was created by the chipping and rewelding necessary to repair faulty work of inexperienced welders. The tempo of construction was so fast and the number of men involved in one operation was so great that no accurate repair order and accompanying check of lost time could be made. However, a fairly accurate survey showed that as much as 40 per cent of welding footage was being lost through repair work.

Of approximately 5000 welders employed at that time, only about one in every hundred had any prior experience and the rest had acquired faulty welding habits in the course of their booth training. It was evident that these faulty welding habits were the main contributing factors to this unnecessary loss of production footage.

That portion of the survey covering training requirements disclosed that the faulty welding habits were:

1. Improper arc length
2. Improper rod manipulation
3. Improper rod angles
4. Faulty machine adjustment
5. Improper speed of travel.

These habits were a result of the faulty training practices of instructors who had not been guided by a curriculum of weld training, nor had the instructor qualifications necessary to the transmission of their skill to the trainee.

Bad Habits Taught

Typical of this training were the conditions relative to the growth of the habit of improper rod manipulation. It was found that in the "fly-by-night" trade schools the instructors were either devising their own individual training programs or were presenting programs formulated and supervised by men whose educational backgrounds were unquestionable, but whose welding experience and background were rather vague. The success of each program was dependent upon the trainee's ability to pass test plates qualifying him for ship welding, so his booth practice was entirely upon short lengths of plate similar to the tests to be taken. The resulting accumulation of heat in the short practice plates led to over-manipulation as a substitute for lowering the heat adjustment of the machine. Consequently the trainees had this manipulation firmly established as part of his practices by the time he became employable. In fact quite a number of men were found who had received their welding instruction from the same instructor; each of these men had a forward and backward, dabbing and move-away rod movement of at least 6 in. on vertical and overhead welds. Continual practice in applying a bead in this manner had led to every one of them being able to deposit a surface bead so fine in appearance that the superficiality was disclosed only by subsequent checking.

During the course of the training survey several hundred newly trained welders were closely questioned as to the training practices used by the various instructors. This was done in order to segregate good and bad training practices before too much time and expense were expended upon a training program and to assure definite rather than haphazard results.

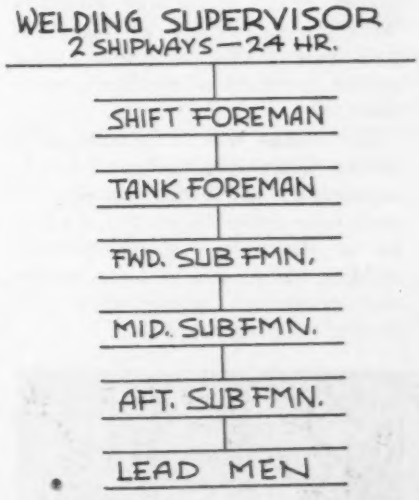


FIG. 3—The third phase of organizational changes. Welding supervisors were confined to two shipways and each shift welding foreman was given three subforemen for separate sections of the hull. By this time the use of special on-job instructors was dropped.

FIG. 2—To a great extent the addition of roving instructors to the supervisory force relieved the foreman of instructional work and gave tangible results in reduction of repair welding. This was an intermediate phase of the organizational changes (See Figs. 3 and 4).

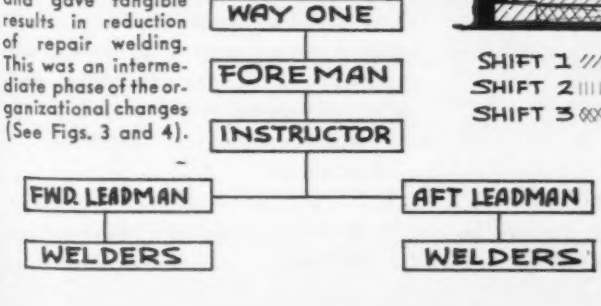


FIG. 4—Shift assignment of foremen to areas shown are for pickup and final completion only. Production is worked progressively throughout. There is a similar shift assignment of tanks (dark areas).

Where the instructor had an ample background of practical experience, it was found that he had imparted a certain amount of skill to his students. However, a more or less self-education in welding and a self-conceived knowledge of the science of welding by the instructor contributed to a misinterpretation of the technique of welding and on the part of the student to an exaggeration of the instructor's manual practices.

Variety of Presentations

Where a number of skilled welders had been gathered together into an instructional group and were teaching essentially the same practices, it was found that the lack of a curriculum of training for welding instructors and an accompanying standard weld training procedure led to a variety of presentations of the same subject by the various instructors and also contributed to a misinterpretation and misapplication of manual procedures.

As a result of this training survey the following training requirements were established:

1. One welding instructor was to be placed on each shipway. His duties would in no way interfere with the supervision of the work and were to be performed under actual production welding conditions.

His status was to be that of a roving instructor; his instruction to supplement the booth training of each new welder in such a manner as to eliminate any questionable welding habits and to acquaint the new production welder with productive welding practices.

FIG. 9—Tackers are periodically sent to training booths for special instructions and practice away from job noises.

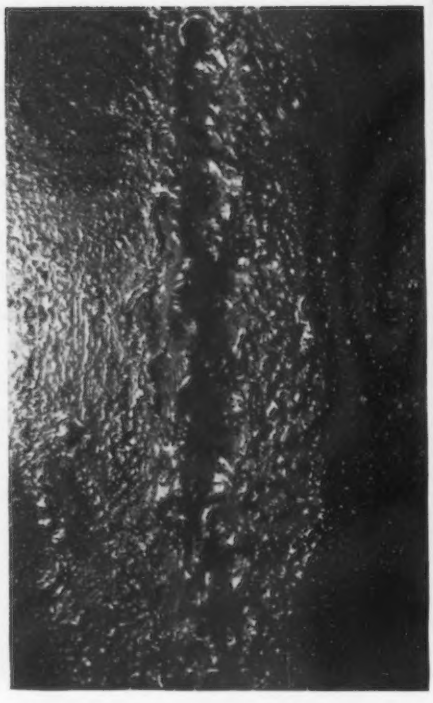


FIG. 5—"Private" welding schools mushroomed overnight in shipyard localities. This test plate represents the result of 200 hr. of poorly supervised training.

FIG. 6—An additional 32 hr. of supervised training and the trainee shows evidence of developing a certain amount of skill.

2. In lieu of a curriculum for instructors, each man employed as an instructor was selected from a list of recommended and reputable production men whose background showed a minimum of 12 years experience. Their assignments were to be made in such a manner as to allow no duplicate or overlapping instruction.

3. Each trainee was to progressively advance through the following steps:

1. Tacking
2. Flat production welding
3. Vertical production welding
4. Overhead production welding
5. Horizontal production welding.

Each progressive step was to be followed up by the instructor and the trainee specialized until he had mastered that position.

The addition of instructors to the supervisory force altered our organizational chart from that shown in Fig. 1 to that of Fig. 2 and to a great extent relieved the instructional burden of the welding foremen and left them free to organize, plan and supervise their work. As a result an increase in the skill and producing ability of our welders was evidenced by an immediate decrease in repair welding (present loss is approximately 1 per cent).

42 Instructors At Peak

At the peak period of our on-the-job training program there were 42 welding instructors employed on the shipways alone. These instructors represented the highest degree of welding skill obtainable. Through an analysis of their individual welding and training practices it was possible to standardize on the actual manual practices of a skilled welder. The research necessary to develop even a semi-standardization of manual practices was quite extensive. Briefly it was found that:

Of the instructional group under observation one-fourth were exceptionally skilled welders, and the results obtained from their instruction was much more satisfactory than was the work of the others.

The individual welding practices of this most successful group were identically the same, although they came from various fields of welding application such as pipe shops, plate shops, boiler and tank work, and pipeline construction jobs.

Even though their backgrounds were entirely different, the identical skill and practices of each were derived from a common source. This common source proved to be mutual experience in the various phases and cycles of welding progress such as:

1. Acetylene welding—forehand technique
2. Electric welding—bare electrode
3. Acetylene welding—backhand technique

FIG. 7—The trainee successfully passed his flat plate test after 54 hr. of training and was started on vertical practice. This is his first attempt at positional welding. At this stage the trainee either develops rapidly or evidences inability to master positional welding.

FIG. 8—Upon completion of 48 hr. of vertical training the trainee was able to pass his vertical plate test. He was immediately assigned to production work under close supervision. After 144 hr. of combined work and training he was able to make the above plate. Summarized, the total training time was:

200 hr. "private" training
54 hr. supervised flat welding training
48 hr. supervised vertical welding training
144 hr. flat and vertical production welding
446 hr. total

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4. Electric welding—coated electrode.

From these four stages of welding practice they had each developed certain techniques and practices which, when combined, tended toward a definite and standard coated electrode welding technique.

Hence the conclusion was reached that it was entirely possible to present a welding instructional course based on the mechanics of a standard technique in much the same manner as is training done in the entirely mechanical skills.

With this in mind a welding instruction program is being developed which includes a standard presentation and explanation of the following:

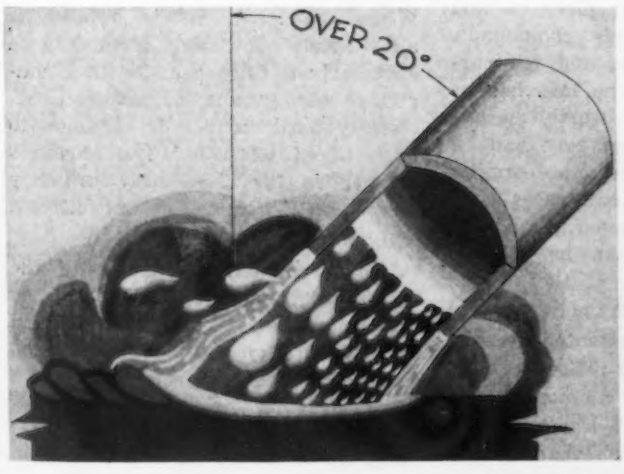
1. *Arc length*
   Action and visible characteristics.
2. *Arc stream*
   Action and visible characteristics.
3. *Metallic upset*
   (a) Crater depth
   (b) Extent of fusion
   (c) Effect of arc on base metal.
4. *Heat cycles*
   (a) Fluid areas
   (b) Solidifying areas
   (c) Chilling areas
5. *Electrode coating*
   Flux flow and appearance
6. *Electrode manipulation*
   (a) Flat
   (b) Vertical
   (c) Overhead
   (d) Horizontal.

The program itself is based on the following equation:

CORRECT CURRENT SETTING *plus* NORMAL ARC LENGTH *plus* REGULATED MANIPULATION *plus* NORMAL RATE OF TRAVEL *plus* POST HEAT TREATMENT *equals* A WELD OF UNIFORM QUALITY AND APPEARANCE.

It is hoped that this is a step to-

(CONTINUED ON PAGE 134)



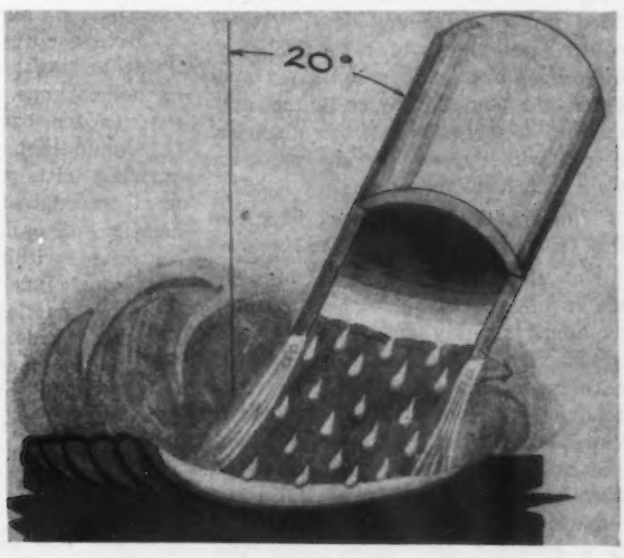


Fig. 10—Types of diagrams developed for use in a standard explanation of arc stream action.

(Left): With excess angularity of rod and improper machine settings:
1—There is an excessive spatter loss.
2—The globules are larger and more irregular in shape.
3—The burnoff of coating is irregular and can be seen leaving the electrode in larger particles.
4—The puddle is more fluid because of the added resistance heat and will be correspondingly harder to control.
5—The crater will be somewhat shallower due to the lessening of arc blast pressure.
6—The arc stream will be wavery and accompanied by irregular explosive sounds.

(Right) When the rod is held at the proper angle and machine settings are correct:
1—There is an even regulated flow of small sized globules.
2—The burnoff of flux, or coating, is also even and regular, i.e., the coating seems to be melting and dissolving into the arc stream in small particles and the burnoff rate is evenly distributed around the electrode.
3—Spatter loss is slight and is confined to minute bits, popping sparklike out of the arc stream.
4—There is a sputtering, hissing sound with a staccato crackling of the arc.

. . . Modern Heat Treating

By A. S. EVES
Chief Field Engineer, Perfection Tool & Metal Heat Treating Co., Chicago

° ° °

THE waging of war is largely a contest between the tools and toolmakers of the countries involved. No one can say that the mechanics of this country are not doing a superior job; the successes of our boys overseas speak for themselves. But there is a way in which those who design and produce machines and parts can achieve still more success and that is by keeping informed as to new and better methods and equipment for heat treating.

Long ago when the men who made tools did their own hardening, there were broadly speaking just two classes of steel: First, low carbon steel which must be cyanided or carburized, and second those steels which contain high enough carbon to permit straight heat treating. The equipment for both of these was simple and low in cost.

Today, however, all this has become far more complex. There are thousands of steels, hundreds of treatments, and many special furnaces and other expensive equipment designed to treat each job in the one best way. Regardless of how carefully steel may be alloyed and refined in the furnace and forged, rolled and annealed at the mill, or how much thought, time, money and pains are poured into designing and making a tool or part, the ultimate result will depend largely on how well it is heat treated.

What good, for example, is a die that is improperly hardened?

Now there are lots of good hardeners in manufacturing plants. But let us admit frankly and honestly, two things. First that no such man, regardless of his skill, can produce a good job with poor tools; and second, that he cannot take advantage of new and better heat-treating methods if they are not known or available to him. Most tools now are heat treated in a different department from the one in which they are made, or are sent outside to a professional heat treating plant. A gap exists between the producer and the heat treater. When handing over a job, it is always good practice for the former to tell the latter all details as to the kind of steel each tool is made of, and the use to which each will ultimately be put.

On the other hand, how many producers are actually well enough informed in this age to be safe in taking it upon themselves also to tell the heat treater *how* that work shall be done? The greater the variety of steels added to an already imposing list and the more progress made along the lines of better treatments, the greater danger that something worthwhile may be overlooked.

I know no better way to make this clear than to sketch some changes which have taken place in recent years, and mention some new treatments which are available:

Case Hardening: Not just one, but quite a number of different baths are now found in a modern hardening plant. Instead of being limited to about 0.003 in. case, we can increase both the hardness and the depth by choosing the particular salts best fitted to each job.

Carburizing: The old bone-dust method is gone. In its place we find (a) modern carburizing compounds, (b) liquid carburizing, and (c) carburizing with gas. The last has at least one advantage worth special mention. The depth of case can be controlled within very close limits. Also, parts such as ball races that often are partially copper plated for selective hardening can be treated with far less chance of the copper spreading and spoiling the job.

Chapmanizing: A patented process for producing a wear-resistant case on mild steels with ammonia gas. Claims are somewhat higher hardness and less distortion than occurs with conventional case hardening compounds.

Nitriding: An extended ammonia gas process for case hardening special nitralloy steels to moderate depths. Object: To avoid warping and achieve somewhat more than usual surface hardness.

Liquid Nitriding: A reliable manufacturer of case-hardening salts now is marketing a compound for liquid nitriding. The claim is made that it is 300 per cent faster than the dry ammonia gas process, yet the results are equivalent.

Aerocasing: Special salt bath treatment for casing lightly mild steels without danger of surface decarburization or scale.

Ihrigizing: This is an impregnation process, similar to carburizing, using amorphous silicon carbides, for case hardening low carbon steels. The resultant surface will resist nonviolent corrosion. A solid round so treated can be laid in acid, and when all of the untreated portion has been eaten away, a perfect cylinder remains—composed of the case only.

Although the surface hardness reads only about 50 Rockwell C, it has a peculiar "soapy" feel, which aids materially in reducing friction and prolonging wear life. Malleable chain links under arduous service, for example, wear at least 25 times longer when so treated.

Scottsonizing: Still another kind of case hardening which materially increases the life of wearing parts made from stainless steels (completely finished). Such parts remain non-magnetic and non-corrosive. When the treatment is applied to alloy steels containing from 0.35 to 0.50 carbon, fully heat treated, machined and ground to size, an extremely hard surface is obtained to a depth of 0.005 in. The hardness claimed is far above any ordinary treatment. There is no size change.

Hy-Speed Case: With this process, cutting tools made from any of the various high speed steels—after they are completely heat treated and finished—are immersed in special salts and held at 1050 deg. F. (a mere drawing temperature). The hardness is not altered, but the tool takes on 0.001 or 0.002 in. of very hard skin without appreciable growth, which often improves the cutting edge. Tools can be re-ground if done in a manner which would leave the case on the cutting edge. Otherwise, they must be retreated after each sharpening. This treatment is sometimes termed Nitriding.

Takes a Lot of Know-How

. . . There are so many processes for hardening tools and machine components that a heat treater must be well posted if he is not to overlook the ideal choice for a particular job. In this short article, Mr. Eves summarizes all the tried and untried proprietary and non-proprietary methods of heat treatment that have been introduced in recent years.

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Hard-Cote: A secret method of impregnating high speed tools, similar to Hy-Speed Case, to claimed depths as great as 0.020 in. Not yet widely used.

Carbide Case: A formula has been developed, but is still untried, for putting a cemented carbide case on mild steels. If successful, long tools such as broaches, drills, etc., would be like any other carbide tipped tools, but because of their tough core would be virtually unbreakable.

Nusite Hardening: A unique way of hardening high speed cutting tools. The process results in a hardness throughout the tool of 65 to 67 Rockwell C, which is a couple of points harder than ordinary. Strangely enough, however, instead of sacrificing toughness, this method achieves a molecular cohesion which makes such tools considerably tougher and more resistant to abrasion and shock. Tools so treated will usually stand more top rake and hold a keener edge in "hot" jobs, with fewer grindings necessary. Such tools are fine for tough, stringy jobs but are not recommended for sandy castings.

Selective Hardening: This is too broad a subject to discuss fully here. Suffice it to say that there now are many ways in which tools and mechanical parts can be hardened, leaving one or more portions soft, or vice versa.

Induction Heat Treating: Often accomplishes hardening tasks in a few seconds that would otherwise take hours. Useful for selective hardening of higher carbon steels, where the portions to be treated do not lend themselves to ordinary methods.

Flame Hardening: Heat is applied to one spot at a time for a predetermined period, followed by a stream quench. Gears, for example, can be hardened one tooth at a time. Generally speaking, each job requires a different flame tip.

Martempering: A heat-treating operation, whereby martinsite is produced in alloy steels with a minimum of residual hardening strains.

Austempering: This process holds some promise for the future, although it is not yet widely used. High alloy steels up to about ½ in. section have been raised to file hardness, but did not break when bent at an angle of 45 deg.

"Silver Finish" Hardening: A bright-hardening process which permits steels to be heat treated up to 1900 deg. F., without any discoloration. It avoids oxidization, consequently there is no scaling or discoloration. Burnished pieces retain their sheen. Engraved dies, die casting blocks and inserts, and threaded tools all come out clean, hence the name, Silver Finish. The treatment enables the rescue of many a job that otherwise would be scrapped. Dies or tools can be annealed to permit changes or additions and then be re-hardened without loss of surface or change in appearance.

Quench for Mild Steel: Known as the Nelson process, this is a way of boosting tensile strength of mild steel higher than ever before. When such steel is heated to 1750 deg. F. and water quenched, a tensile strength of about 175,000 lb. per sq. in. can be attained in a bar, say 1 x ¼ in. But if the quenching medium is a solution of potassium hydroxide, the tensile strength is said to be more than 12 per cent higher. The author has not as yet had occasion to test this out in his plant, but it has obvious possibilities.

Deep Freezing: Here the heat treater leaps from the skillet into the refrigerator: Fully heat-treated tools and parts are carried down from room temperature to as much as 120 deg. F. below zero. This low temperature gets rid of retained austenite, frequently improving the quality of tools. It provides a positive means for quick aging and stabilizing such items as gages and has added to the life of high speed steel cutting tools, since it often boosts the hardness several points without increasing brittleness. Deep freezing is a very handy method of shrink-fitting, too.

It should be perfectly plain to the reader that some of these processes call for special equipment and some also need more than one furnace. In this regard, it is not quite so obvious (yet nevertheless it is a fact) that no man can get the same results out of a piece of high speed steel, for example, if he has but a single furnace at hand, that can be achieved in a jobbing heat-treating plant where two furnaces would probably be used for preheating that piece, still another to harden it, and two more for drawing it—all five at different temperatures.

Moreover, for doing quantities of items like small springs, a modern commercial heat treating plant usually has continuous furnaces, with complete uniformity that cannot be achieved by the batch method. The same plant has press quenching machines for holding parts between dies so they cannot distort while cooling, besides special furnaces and devices of other kinds to do certain individual jobs.

The average manufacturer does not, as a rule, have enough work of every kind to justify the purchasing of much special equipment. Often, he has but one or two furnaces and in few instances are they equipped with automatic time and temperature controls; still less often is any machine available for hardness testing.

Regardless of all the skill his hardener may have, lack of information about the newer and better methods and lack of sufficient equipment must reflect themselves in the ultimate performance of his tools and production parts of any manufacturer. For best results we must add to the hardener's ability the best in equipment, modern heat treating practice and the new processes which spring up and prove themselves from year to year.

Mass Production Casting of Bombs

MASS-PRODUCTION of greensand molded 500-lb. bombs, using a maximum of steel scrap and a minimum of ferro-silicon is described in a recent issue of the British Foundry Trade Journal. The unquestionable success of the system was based on a new theory for the operation of the side-blown converter; the synchronization of mold assembly and other jobs with the time taken to pour a predetermined number of castings and a new system of sand cooling.

The theory postulates the quite tenable and now well proved notion that silicon as a constituent of the charge is unnecessary, provided the metal is superheated to a temperature equivalent to that existing in the vessel when the carbon begins to react with the oxygen of the bath. In the case cited, this superheating of the cupola metal is carried out in pulverized fuel fired rotary furnaces. The equally important systems of synchronization in manufacture and sand cooling will be dealt with later.

For the manufacture of these 500-lb. bombs one foundry used 20-ton per hr. cupolas; 12½-ton rotary furnaces; and a battery of 3½-ton capacity side-blown converters. The scrap is unloaded by 7½-ton electric overhead magnet cranes into stock bins or into the cupola charging buckets mounted on bogies running on a narrow gage track. These bogies are propelled by means of a battery-operated locomotive. The skips are of the drop-bottom type, and are lifted from the bogies by a 7½-ton electric overhead cupola charger. The coke and the limestone on arrival are dumped into track hoppers at the wharf, and are then taken by belt conveyors to conveniently situated bunkers. From here, the coke is loaded as required into a scale car, which discharges into specially designed charging buckets of the drop-bottom type.

The cupolas are blown by blast supplied by electrically driven positive displacement blowers, each unit in the battery having a capacity of 18,000 cu. ft. per min., at a maximum pressure of 54-in. water gage. With the object of securing a wide range of speed variation, each blower is provided with a modern type of a.c. commutator. The cupolas are fitted with a tunnel type of anti-glare spark arrester.

The cupolas are not provided with receivers but with a deep well to facilitate carbon pickup from the coke bed. Low-phosphorus material not being essential for this particular production, the iron produced by these cupolas has the following average analysis: C, 2.7 to 2.8 per cent; Si, 0.1 to 0.2; Mn, 0.3 to 0.5; S, 0.12 to 0.15; P, 0.06 to 0.07 per cent.

Using 30 lb. of soda ash per ton, the sulphur is reduced to an average of 0.035 per cent, but can be reduced still further when required. The accompanying silicon loss is small and is not important to the process. The ladles in which this process is effected are firebrick lined. The metal is transferred by one of the 10 overhead cranes to the rotary furnaces, which are fired by pulverized anthracite. In the rotary furnaces the temperature of the metal is raised by 400 deg. F. without change in composition. The technique of lining conservation has been so improved that one furnace had treated no less than 4000 tons and was still in commission. Apart from superheating, these furnaces also act as mixers, and iron out any slight variations in cupola practice. From the rotary plant the metal is transferred to the side-blown acid converters.

The vessels are provided with electric tilting gear actuated by remote control. They are blown by electrically driven positive displacement blowers giving an output of 5000 cu. ft. per min. at a maximum pressure of 6½ lb. per sq. in. Like the cupola blowers, these also have modern variable speed commutators, so as to give a wide range of speed. The hoods surmounting each converter are movable to facilitate the removal of the vessel from the blast ring for relining in specially prepared pits, located adjacent to those used for preparing the bodies of the rotary furnaces. The composition of the steel leaving the converters will average: C, 0.23 to 0.25; Si, 0.3; Mn, 1.3 to 1.4; S, 0.03 to 0.04; and P, 0.06 to 0.07.

Teapot lip pouring ladles receive the metal from the converters, and are transported to the overhead hot-metal runway. Here, they are weighed and then taken to the pouring position alongside the mold conveyor.

The metal losses registered are about 5 per cent in the cupola, and 5 to 7 per cent in the converter. Using the new technique, it was found that there was a fairly heavy erosion round the tuyeres of the vessels, and on the teeming side, owing to the absence of silicon in the charge. However, this was soon cured by the addition of a few shovelsful of sand. The tensile properties of the metal are about 83,000 lb. per sq. in., with 27 per cent elongation in 2 in. Before machining, the bombs are subjected to a heat-treatment consisting of raising them to a temperature of 1750 deg. F., soaking between this temperature and 972 for 2½ hr., and cooling down over a period of 5½ hr.

Sand Handling

Between 21 and 25 per cent of new sand has to be added to maintain physical properties, and to replace

sand taken out for coremaking, when mixed with 4 per cent bentonite. The mixture of old and new sand is fed into rotary coolers. From the coolers the sand is fed to mills for preparing molding and core sand. The sand hoppers serving the mills are designed to furnish a definite quantity of sand into each mill automatically. As provision is made at each mill for the accurate measuring of loading material and water, absolute control is maintained over the physical properties of the sands used.

After milling, the molding sand is conveyed by underground belt to a storage hopper situated well below ground; from here, by a feeder and a long inclined belt, the sand is conveyed to the hoppers feeding the Sandslingers. These hoppers are furnished with push-button controlled endless belts, so that the operator can start or stop the flow of sand to the impellor head. Surrounding the machines is a grating through which surplus sand falls to feed an underground belt; this discharges into an elevator feeding the belt supplying the Sandslinger hoppers. Excess sand is led by a chute and a short length of belting onto the spillage belt.

The core sand is taken away from the smaller mills by a belt conveyor running to the opposite end of the battery on the molding sand, where it feeds an inclined belt which delivers the sand into hoppers. These hoppers have a disk as their base to prevent sticking. The sand is ploughed off this disk to fill the working hoppers. Beneath each station is a grating, so that sand dropping through it can be returned to the main supply belt by means of a spillage belt, and a short cross belt.

The core knock-out station is comprised of two stationary grids, beneath which are chutes discharging the sand on to an inclined belt conveyor. This elevates the sand to a position outside the shop to fill a 10-ton hopper located over the railway sidings.

Core Making

For core making circular turntables are used, on which are disposed three sections of the corebox. The first section deals with the placing of the prepared core bar into the lower part of the corebox, a short portion of which is rammed by hand. In the second position, a specially designed machine rams the main body of core, the process involving the rotation of the corebox by means of a piston clutch. At the third point on the turntable the upper part of the core is rammed by means of a small pneumatic rammer. These three processes are carried on simultaneously, rendering the system continuous.

This account of a highly mechanized foundry describes the casting of 500-lb. bombs with maximum steel scrap and minimum ferro-silicon. Particularly interesting is the fact that the foundry uses a satisfactorily-working, well synchronized triplex method for preparing its metal.

When the completely rammed core reaches the first position, the corebox is opened, and the core is transferred by a specially designed jib crane, carrying a balance weight equal to the weight of the core, to a circular plate from which the cores are suspended. The plate is attached to a rotating tube mounted on a mild-steel bogie. Each bogie carries ten cores, and the three women manning each station fill one every 40 min.

The perforated tubular core bars are mechanically wrapped with wood wool on a battery of vertical machines. The wrapped bars are then suspended on an overhead chain conveyor and singed. The conveyor, which has a 538-ft. circuit, takes the bars within easy reach of the coremakers.

The bogies carrying the cores are pushed through continuous drying stoves by an electically-operated pusher gear, conveniently situated beneath the track at the front end of of the stoves. The stoves are gas and hot air continuous recirculating type, and operate at a maximum temperature of 410 deg. F. Each stove, which has a capacity of 3 bogie loads per hr., is divided into three zones, preheating, soaking, and cooling. The preheating zone extends over five bogie lengths, the soaking zone eight, and the cooling zone two.

For the preheating zone, waste heat from the hot castings is used, but provision has been made to assist this by coke oven gas which is burnt in refractory-lined combustion chambers. The burners used are of the low-pressure turbulent type, in which the air and gas are premixed in the burner body before entering the combustion chambers. The hot air employed, which is drawn from the continuous cooling ovens used for the handling of newly-made castings, is supplied under pressure from a low-pressure blowing fan. Additional hot air, as required, is admitted to premix the products of combustion, prior to entering the high temperature recirculating fan. By using the waste heat from the cooling castings, a saving of at least 1,000,000 cu. ft. of gas per week is effected. Some of the concerns mass producing iron castings might with advantage, study the possibility of using the heat given off by newly made castings as a post-war economy.

For the stoves under review, the products of combustion, together with the preheated air, are churned in the high-temperature recirculating fan, and are delivered to the preheating and soaking zones. This hot mixture of gases and air is then delivered under pressure to the distribution chamber extending the whole length, and formed between the arch and the roof of the stove, thence out through louvred parts in the roof of the chambers it is circulated round the cores through the perforated base of the bogies to the flues and the steel exit chimney.

The temperature of the combustion gases is automatically pyrometrically controlled. Hot air for recirculation is drawn by the fan from the cooling zone, and is premixed as noted above at the burner nozzle. An indicating controller is fitted, and a motor and reduction drive is arranged to operate the air and gas valves.

An electrically operated dividing door is installed between the preheating and soaking zones, thus preventing the ingress of moisture to the soaking zone, and permitting close temperature control. Control levers operated from the outside of the oven are disposed along the whole length of both zones. As indicating controls are fitted at regular intervals, the flow of hot gases through any section can be regulated. Vertical ducts,

centrally disposed at either side of the zones, convey the waste gases to the flues, thence to a steel chimney.

An electrically operated dividing door is located between the soaking pit and cooling zones. This insures that both uniform temperature and correct pressure balance are maintained continuously in the soaking zone.

The system is so perfected that it is practicable to control the temperature to within +10 deg F. In the cooling zone cold air is admitted to the underside of the bogies. It passes around the cores, and is sucked from the top of the chamber to the inlet side of either the recirculating fan or the blowing fan. Swing doors of the hinge type are fitted at the discharge end of the oven. The bogies continue to a transfer track, and go back to the front of the core-making stations along tracks. The dried cores are lifted from the bogies on the transfer track to an overhead electrically driven chain conveyor carrying spreader bars suspended from two chain trolleys. The spreader bars carry brackets for accommodating two bomb cores at 18 in. centers. This conveyor, which is continuously moving at the rate of 5 ft. per min., serves as an auxiliary cooling medium, and also transfers the cores to the coring-up station. When manufacturing thin-wall bombs, the cores are, by means of small tools, cut sometimes vertically in three places, or spirally; the incisions thus made are lightly filled in with core sand. This brings about increased collapsibility during the period the steel is freezing around the core.

Molding and Casting

For the making of the molds a battery of Sandslingers is used, each in combination with a pair of down-draw molding machines. Half of the stripping plate machines are used in making of drags, and half for the copes. These are of simple construction. The patterns are drawn down through a stripping plate 2 ft. 9 in. x 1 ft. 9 in. to a position low enough to clear the molds. The ram on these machines is operated by compressed air at a pressure of 80 lb. per sq. in., through an oil cylinder, 8½ in. in diameter, which is fitted with dash pot and regulating valve. The control and adjustment of these machines is commendably simple.

Air hoists traveling on telpher joists are used for transferring the drag parts to the mold conveyor. The cores are placed in these molds by small double-armed jib cranes mounted on a platform. These cranes pick off pairs of cores and lower them simultaneously into the molds. The molds are closed by placing on the copes by means of double-armed jib cranes which transfer this part of the mold from the stripping plate machines onto the drag. The cores are centered by a jig and wedged in position by the insertion of three sections of centering rings made up as oil sand cores. The molds are clamped, completely assembled with runner bushes and centering cakes on the mold conveyor, the operator working on an elevated platform, where supplies reach him by a conveniently disposed overhead pendulum type conveyor.

The centering rings, runner bushes, and test-piece molds require a special plant for their production from oil sand. The centering rings are made on molding machines of the turn-over draw-down type made by the foundry itself. The down-draw table is controlled by air pressure operating through an oil cylinder. For the runner bushes and test-piece molds, No. 1 Ajax jolt turnover and pattern draw machines are used. The machine table is lifted pneumatically prior to turning over, and the coreboxes forming the runner bush are stripped by means of a side-drawing mechanism, which is also operated pneumatically. The sand for the machines serving this section is obtained from overhead hoppers, kept full by Rotoil mixers situated beneath hoppers receiving their supply from the main conveyor. The products of these small molding machines are conveyed from the molding station on a pendulum conveyor, and placed in a vertical hot-air drying stove, after which they are placed on the conveyor and passed along to the mold assembly station.

Casting is carried out from a platform erected at the side of the mold conveyor. The ladles of molten steel are received on a platform dial type weighing machine, and are conveyed to the casting station by means of 7-ton electric telphers running on an endless telpher track 192 ft. long.

The mold conveyor is a complete articulated train of 58 steel chassis, each of which carries a series of cast-iron mold carrying plates in four sections, having a total length of 9 ft. 8 in. x 4 ft., designed to carry two molds. The conveyor is intermittent in action, and is stationary while the following operations are being carried out: (1) Four drags being placed on the conveyor; (2) eight cores being lowered into position; (3) four copes being set on the drags; (4) four boxes being clamped and assembled; (5) four copes being stripped and knocked out; (6) eight castings being removed from the molds; and (7) four drags being knocked out.

Heats are timed to arrive continuously at the casting platform, so that no break occurs. The casting platform is 48 ft. long, and is sufficient to allow for one heat of 16 bombs to be cast, if necessary, without any movement taking place.

The corebars are withdrawn approximately two minutes after casting by means of small overhead travelling air hoists. From here the mold conveyor takes its load into a tunnel, wherein the fumes and gases are extracted by an exhauster fan. On emerging, the castings are stripped and molding boxes knocked out by a battery of 5-ton overhead cranes serving the knock-outs previously referred to.

For knocking-out the copes and drags, jolt grids are used, while for the actual casting, stationary grids are sufficient. The overhead cranes deliver the empty boxes onto a gravity roller conveyor along which they move to the back of their respective molding stations. Here they are picked up and placed on the stripping machines. The hot castings are placed on specially constructed bogies travelling on two tracks, each bogie carrying eight bombs which are propelled through two cooling chambers.

These chambers accomodate about 25 bogies; air is drawn from beneath the bogies at the center of the furnace, and is taken to a large blowing fan at the discharge end, where it is picked up by exhaust ducts situated at the side of the chambers, leading to a common main at the top of the chambers. The hot air so generated is led for use with the core stoves as described earlier.

On discharge from the cooling chambers, the bogies containing the now cooled bombs are transferred crosswise to a track beside which are positioned the core knock-outs. Their load removed, they are passed forward and mechanically conveyed by a single strand continuous moving chain floor conveyor of the drag type to another transfer at the end of the track, bringing the bogies again into circulation to the knock-outs on the track by the mold conveyor.

The core sand being removed, the bombs in pairs as cast pass through

(CONTINUED ON PAGE 134)

Tool Steel Identification System

A SYSTEM for classifying and identifying domestic high speed steel cutting tools has been agreed on by the three major automobile companies in Detroit. Other concerns, including some outside of the automotive field, have indicated interest and a decision to go along with the program.

Standards of General Motors, Ford and Chrysler are being set up to facilitate such identification. A simple three-part code, to be stamped on each tool, will identify it as to formula and producer.

With this information marked on all high speed tools, users will obtain

(CONTINUED ON PAGE 139)

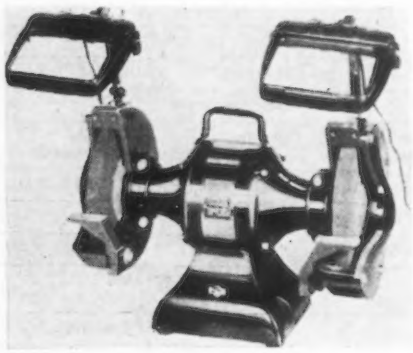
Symbol	TUNGSTEN HIGH SPEED STEELS							
	18-4-1	18-4-2	18-4-3¼	18-4-1 Plus 4	18-4-2 Plus 8	22-5-1½ Plus 12	14-4-2	14-4-2 Plus 5
	ANALYSIS SYMBOL							
	T-1	T-2	T-3	T-4	T-5	T-6	T-7	T-8
A	Red Cut Superior	EVM		Red Cut Cobalt		Grey Cut Cobalt		
B	Blue Chip	HV Blue Chip			Circle C			
C	Kutkwik							
D	B-6	B-9		B-7			14-4-2 HS	B-8
E	Bethlehem HS	HV		Comokut			Extra Special HS	
F	Electrite No. 1	Electrite No. 19	Electrite Vanadium	Electrite Cobalt	Electrite Super Cobalt	Electrite Ultra Cobalt	Electrite Uranium	Electrite Uranium B
G	LXX	ML		Panther Special	Super Panther			
H	Clarite	Vanite						Maxite
I	Vinco	Twin Van		Cobalt	Bonded Carbide Jr.	Bonded Carbide		
J	Dreadnaught	Super Van Dreadnaught		Baltoc			Super Dreadnaught	999
K	Star Zenith	Super Star Zenith						Gold Star
L	Two Star			Three Star	Four Star	Five Star	One Star	
N	Red Streak	Lockport Special			Super Cobalt			
P	Wolfram	Super HS Steel		Wolfram Cobalt			No. 14	
W	Supremus	Supremus Extra		Purple Label			Jessco	Jessco B
X	Rex AA	Rex Super Van		Rex AAA			Rex Champion	Rex 95

Symbol	MOLYBDENUM HIGH SPEED STEELS					
	8-4-1-1½	5-4-1½-6	8-4-2	8-4-1 Plus 2½ Boron Added	8-4-1-1½ Plus 4	8-4-1½ Plus 8 Boron Added
	ANALYSIS SYMBOL					
	M-1	M-2	M-10	M-20	M-30	M-40
A		6-6-2	Van-Lom			
B	H-M Blue Chip	Star-Mo		Mo-Chip		Super Mo-Chip
C						
D	Motung	Motung 6 E			Super Motung	
E		66				
F	Tatmo	Double Six				
G	LMW	D.B.L.				
H		Molite	Molyite			
I	No-Cut	Brae-Mow				
J						
K	Starmax	Speed Star				
L						
N						
P	Vulm)	TM-5				
W	Mogul	T-C-M				
X	Rex Tmo	Rex MM	Rex V. M.			

New Equipment . . .

Recent developments in small tools and accessories, marking devices and numbering machines are described in the following pages.

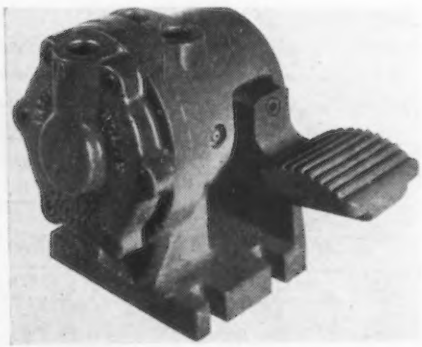
A NEW model of Marvel grinder shield that provides properly directed light and protection for the face and eyes from flying particles has been announced by the *Boyer-*



Campbell Co., 6540 Antoine Street, Detroit. The frame is molded from a high impact resisting, plastic material and the electrical parts are in a completely insulated chamber and mounted on an adjustable bracket. The window is of non-shatterable glass and the lamps, of the bayonet type, are vibration resisting and set in flush with the frame. Illustration shows dual installation.

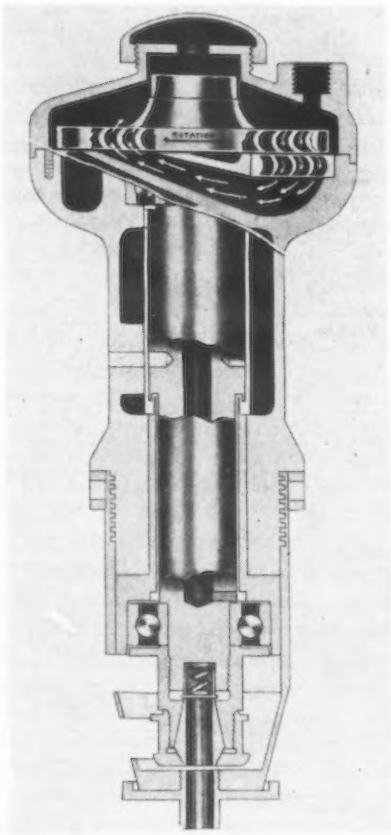
Foot-Operating Valve

A FOOT-OPERATING valve, designed for general use on pneumatic equipment, is offered by *Anker-Holth Mfg. Co.*, 332 S. Michigan Avenue, Chicago 4. It is of the disk type and is made in sizes from ¼ to ½ in. When the pedal of the valve is pushed down and the foot removed, the pedal is returned to neutral by means of a spring, but the work is not released until the pedal is again pushed down.



Air Turbine Rotor

OPERATING on an impulse reaction principle, the solid milled rotor with bucket-type impeller blades, developed by *Onsrud Machine Works, Inc.*, 3913 Palmer Street, Chicago, employs an air feed-back system. The expanding air, plus patented "Metered Mist" lubrication, hold unavoidable wear to a minimum. Rotors of this type are used in Onsrud air turbine motors. Motors ranging from 1/6 to 3 hp., operating at speeds of from 15,000 to 100,000 r.p.m. are available.



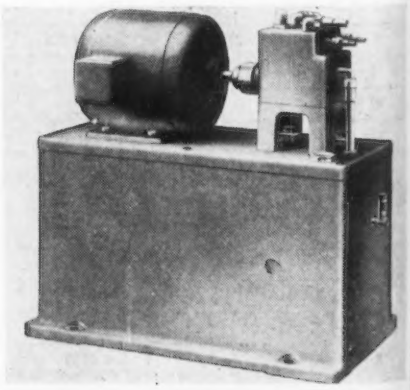
Coolant Cooler

DESIGNED to provide automatic temperature control of coolants and lubricants in machine processing,

Model 75-AC coolant cooler has been announced by *Frostrode Products*, 19003 John R Street, Detroit 3. Coolant temperature is selected by setting a dial on the panel of the cooler. Uninterrupted flow of coolant is obtained by a single steel tube evaporator coil construction. Rated capacity is 18 gal. of coolant per min. when cooled down to 20 deg. F. below room temperature. The model is a compact, self-contained, portable unit.

Supercharged Hydraulic Pump

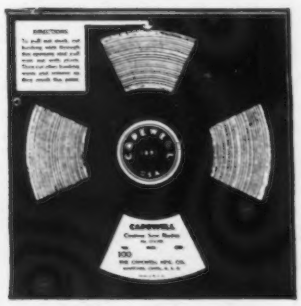
A SUPERCHARGED combination high and low pressure oil hydraulic power unit, the Hi-Po, has



been placed on the market by the *Anker-Holth Mfg. Co.*, Port Huron, Mich. Three thousand lb. line pressure is quickly delivered with the use of a ½-hp. motor using a supercharger to preload the piston chamber. Pump and motor are mounted directly on the oil reservoir. Low-pressure by-pass control having a range up to 300 lb. is built into the pump body. Both high and low pressure can be controlled individually on the power lines or through automatic control.

Contour Saw Blade Box

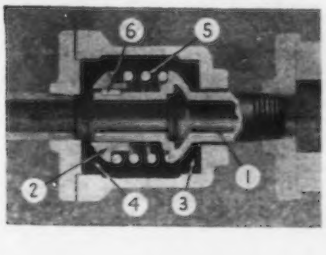
THE CAPEWELL MFG. CO., Hartford, Conn., has brought out an indestructible box for its 100-ft.

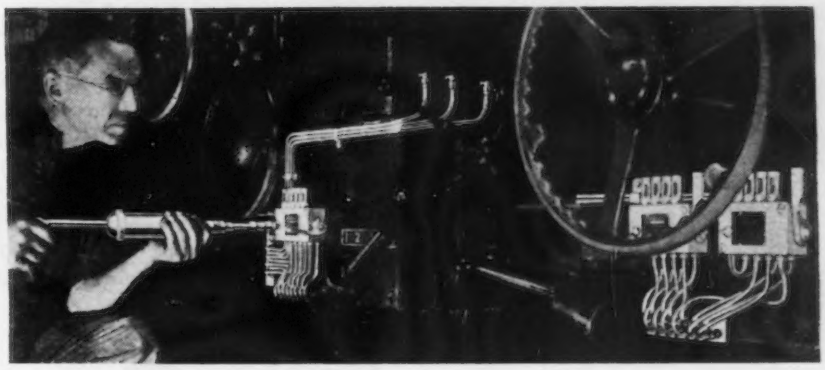


coils of contour band saw blade stock, which utilizes an ingenious method to keep the narrow stock from becoming tangled. The saw stock is withdrawn as needed and flows freely. This contour stock is used on Doall, Grob, Walker-Turner, Thiel, Oliver, Tannewitz, Laidlaw and other machines.

Rotary Pressure Joint

BY means of a special rotary pressure joint, manufactured by the *Johnson Corp.*, Three Rivers, Mich., oil is admitted inside the spindle of a turret lathe. It passes through the spindle and is conducted directly to the tools at the working end, providing oil at the exact spot required and serving to wash away most of the cuttings and turnings. The joint is a packless type of stuffing box or steam fit. Two self-lubricating carbon graphite rings, of special composition, eliminate any need for packing. Pressure within the joint keeps it automatically sealed.





Lubrication System

POSITIVE lubrication of all bearings on machine tools and similar equipment may be had through the Multival system made by the *Farval Corp.*, 3250 E. 80th Street, Cleveland. Oil or grease under pressure is delivered to the distributing blocks by means of a manual or power-operated portable gun which serves as a central pump. Complete equipment consists of multiple valve blocks, each serving 2 to 10 bearings, lubricant lines leading to individual points and suitable fittings to accommodate practically any type of bearing connection.

Grinding Compound

MICROGRIND No. 132 has been brought out by by the *Quaker Chemical Products Corp.*, Conshohocken, Pa., for use on grinding, honing, lapping or super-finishing operations. It is a dark, heavy bodied liquid that when mixed with water in proportions ranging from 1-3 parts up to 1-75 parts makes a translucent, permanent solution which is stable in hard or soft water. It is claimed that glazing and loading of abrasives is eliminated and recirculation of chips is prevented. It is non-injurious to skin and to metals and is odorless and non-foaming.

Hone for Carbide Tools

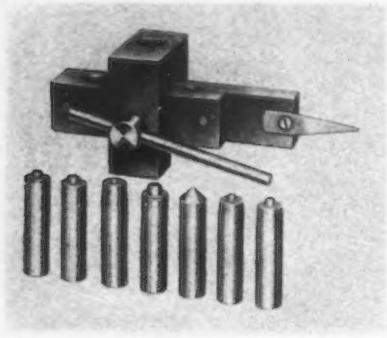
IN the Tamaloy diamond hone introduced by the *Tungsten Alloy Mfg. Co.*, Newark, N. J., a matrix of tungsten carbide holds the diamonds securely in place, preventing displacement when they contact a hard surface or edge. The hones come in three grades—rough, medium and fine. The company has also developed Speedaloy, which is a cast tungsten-chromium-cobalt alloy which is said to fill the gap between high-speed steels and tungsten carbide. It is available in solid tool bits, flats and a variety of tipped tools.

Handle Wheels

THE GIBBONS MFG. CO., 11 Gordon Street, Worcester 4, Mass., offers a safety handle wheel for all types of wood and metal working machines. It is especially recommended for rapid traverse machines where handle wheels or cranks are in fast motion. The wheel keyed to the shaft allows necessary adjustments without the use of the safety handle.

Flaring Tool

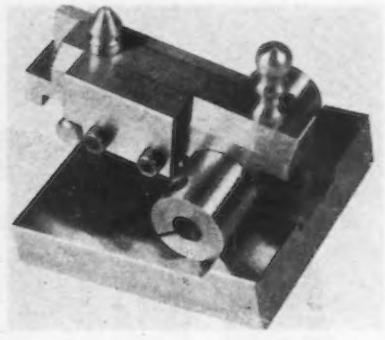
A HEAVY duty portable flaring tool, the Flaremaster, which produces a double-lap flare on steel and non-ferrous tubing, has been developed by *Everhot Product Co.*, 2055 W. Carroll Avenue, Chicago, Ill. It was specially designed to produce the correct 45 deg. double-lap flare for SAE flare type and inverted flare-type connections on Bundy, Bundyweld and Bundyflex steel tubing. It consists of a pair of holding jaws and a U-shaped clamp with a built-in vise.



Jaws are counterbored to provide exact length of tubing to insure correct double flaring for each size. The company also makes Bundyflex copper fused steel tubing, a satisfactory replacement for ordinary copper tubing.

Angle Wheel Dresser

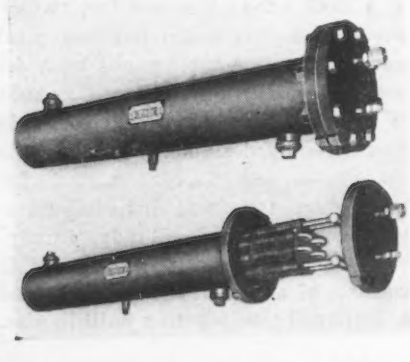
THE FLORIAN MFG. CO., Plansville, Conn., announces the sine angle grinding wheel dresser. By its use and with the aid of standard gage



blocks or adjustable parallels, wheels of surface grinders may be dressed to any angle from 0 to 90 deg. The bearing surfaces are hardened, ground and lapped.

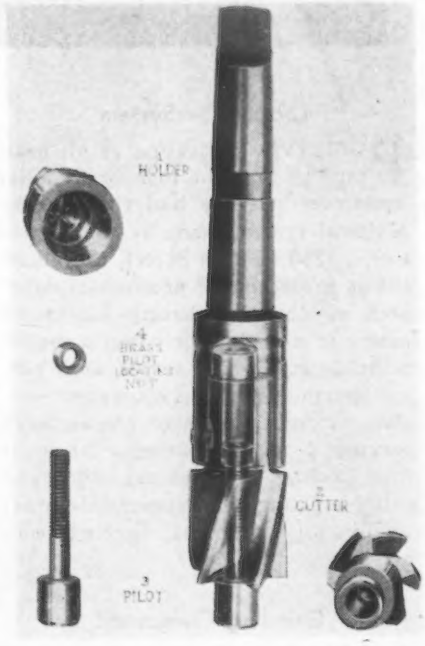
Coolant Cooler

KRAMER TRENTON CO., Trenton, N. J., has put on the market a coolant cooler of the shell and fin tube type. It consists of a spiral fin cooling coil inserted into a steel shell. The unit is provided with a bolted flanged lid for easy removal of the cooling coil for cleaning. The coolant circulates at properly designed velocities by means of spaced baffles. Water, brine or direct expansion refrigerant may be used.



Counterbore Drive

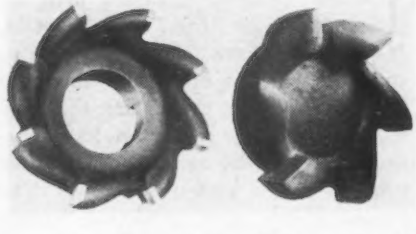
UTILIZING the eccentric principle to equalize the torque load on the holder and the mating driving



member of the cutter, *Moreland Tool Co.*, 16935 W. McNichols Road, Detroit, has put on the market a counterbore drive in sizes up to 3 in. diameter. The driving member of the cutter fits into a special off-center hole in the holder. Concentricity of the unit is held to close tolerances by means of a "stick taper." The angular notch is so positioned as to assure full contact of the driving members.

Milling Cutter Bodies

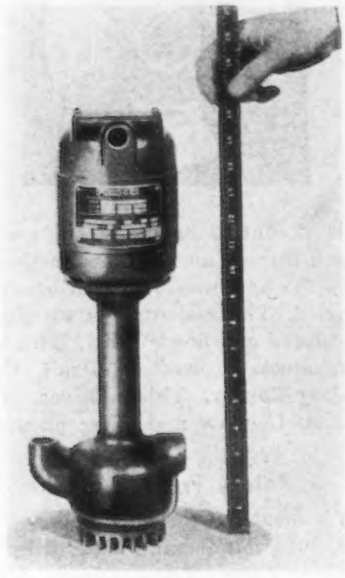
FARREL-BIRMINGHAM CO., INC., Ansonia, Conn., has developed milling cutter bodies of Meehanite which can be machined for carbide



or cast alloy tips within a broad range of rake and spiral angles. The user faces, bores and slots the hub to suit his requirements, mills the tooth seats and brazes on the desired tips. Carbide tips may be applied where a high grade finish is required and cast alloy tips used for heavy roughing operations. Meehanite has a coefficient of expansion that is closer to that of carbides than is steel.

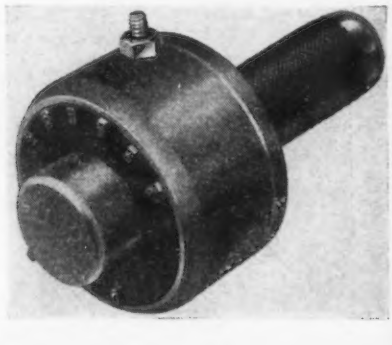
Sealless Pump

A SMALL-SIZED sealless pump, Model MVA, has been designed by the *Pioneer Pump & Mfg. Co.*, 19650 John R Street, Detroit, for hand mills, surface grinders, internal grinders, drill presses, tapping machines and the like. Described as a submerged type pump, this model is intended for machines having a coolant sump in their base or for machines provided with separate coolant tanks. In the case of the latter, brackets and flanges are available for mounting pump on the edge, side or top.



Gear Marking Holder

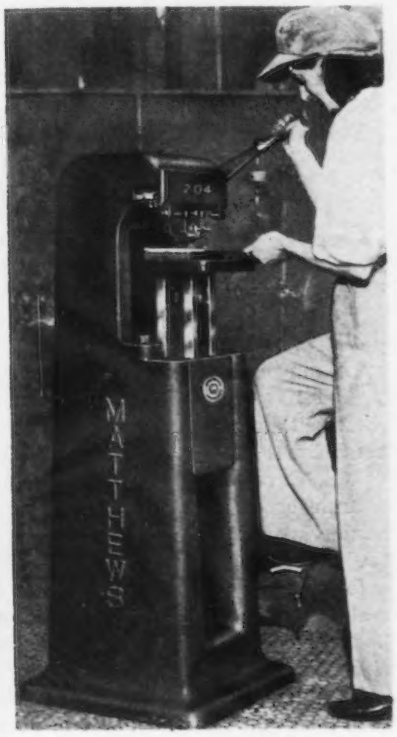
A SAFETY hand model gear marking holder has been developed by *M. E. Cunningham*, 115 E. Carson Street, Pittsburgh 19. The new type plate is cut out for the exact number of characters and letters desired, with straight type used instead of tapered type. A special method of holding the type characters



in place prevents them from flying off or falling out of the holder. The pilot designed to suit the hub of the gear, allows perfect positioning of the letters.

Hand Operated Marking Machine

THE No. 204 general purpose marking machine, put on the market by *Jas. H. Matthews & Co.*, 3942 Forbes Street, Pittsburgh, may be used for marking almost any flat



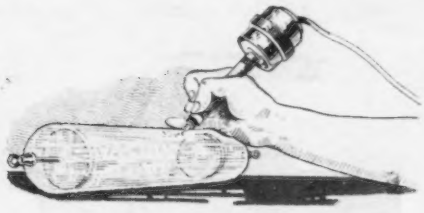
or round product and can be furnished with a motorized unit or with a pneumatic attachment. Flat parts are marked legibly by means of solid or mortised roller dies and interchangeable segment type. Round parts are marked with flat dies or interchangeable steel type.

Petroleum Sulfonates Substitute

ACCORDING to the *Curran Corp.*, Malden, Mass., difficulties caused by shortage and the diversion of petroleum sulfonates of "mahogany" soaps may be avoided in the manufacture of war-scarce emulsifiers and soluble oils by the use of Gunk Concentrate P-96. Stable milky emulsions for cooling and grinding operations are said to be obtained by diluting the concentrate with approximately three volumes of a suitable mineral oil and extending the soluble oil further with water as needed. It is claimed that the presence of alkyl phenols form cooling and grinding compounds which are free of bacteria and eliminate the problem of skin infection or dermatitis.

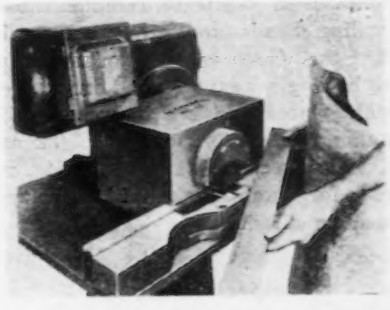
Electric Writing Tool

FOR permanent marking of brass, marble, tile, glass, plastics, wood, hard rubber, aluminum, steel and bronze, an electric writing tool of special design has been announced by the *Breuer Electric Mfg. Co.*, 5100 N. Ravenswood Avenue, Chicago. It operates like a pencil and provides more than 7000 cutting strokes per min. Made in different models for light or deep etching, it operates on 115-130 volts, 50-60 cycle a.c.



Power Marking Machine

CONTINUOUS automatic marking of metal strip or easy roll marking of flat parts is accomplished with the No. 52 power marking machine brought out by the *Acromark Co.*, 341 Morrell Street, Elizabeth, N. J. The flat stock is fed in, the marking roll slides it to the left as it rolls in the mark, and it is automatically ejected. Interchanging of marking dies in the holder is accomplished by removing the feed guard and loosening the rotary holder, in which separate pieces of type or full roll dies can be used.



Freehand Electrical Marker

A DEVICE for placing numbers, symbols and identifications on soft or hardened steel, alloy steels, wrought and cast iron, designed primarily for freehand marking, has been announced by *H. P. Preis Engraving Machine Co.*, 157 Summit

Street, Newark, N. J. It consists of a special transformer with 10 voltage stages controlled by a rotary switch, a hand-held marking pencil, a ground plate for use with small work and a ground clamp for large work. Any desired depth of marking may be obtained. Use of this device is said to eliminate the necessity for stamping parts before heat-treating them and to overcome the disadvantages involved in acid marking.

Gusher Pump

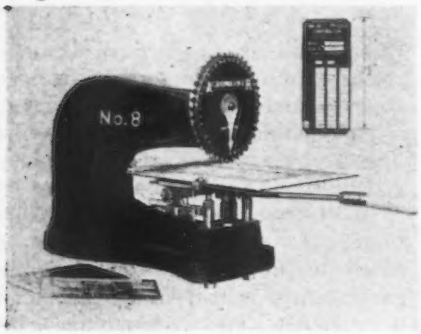
THE immersed type motor-driven gusher pump developed by the *Ruthman Machinery Co.*, 1819 Reading Road, Cincinnati, is equipped with integral flange bracket for reservoir cover of bed-plate mounting. The unit, known as model No. 9040, is designed for installation interchangeability with Gusher model 1-Pc pump, and is available in any current characteristics, including 25 cycle, 1, 2 or 3-phase. It is made in two lengths. The dimensions from the mounting flange to the bottom of the pump are 6-7/16 and 8-7/16 in. respectively, and can be had with either ½ or ¾-in. pipe size discharge.

Level Glass

STANLEY TOOLS, New Britain, Conn., has introduced a level made with red glasses for quick declivity readings in ship construction and with green "Cat's Eye" glasses where a level and plumb are required. Red glasses can be set individually to any pitch or declivity up to and including 2 in. to the foot. Black dots and arrows on both sides of the level indicate the end or edge to use for declivity readings. Glasses may also be set in pairs to any degree in the circle.

Heavy Duty Marking Machine

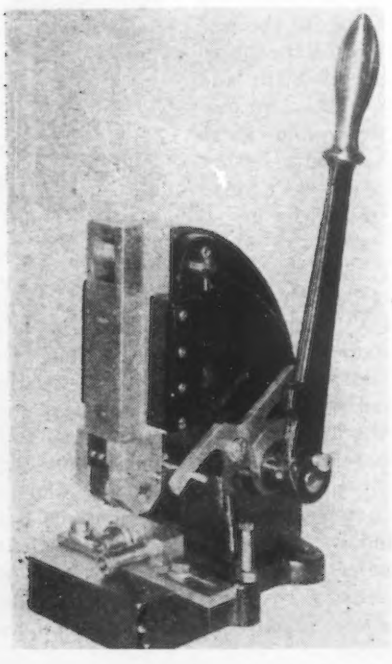
FOR stamping numbers and letters into steel, brass, zinc, plastic, fiber and pressed wood parts, the *Acromark Co.*, 341 Morrell Street, Elizabeth, N. J., has brought out the No. 8 Acromarker. The device stamps parts in any position up to 9 in. from the top, and takes pieces up to 2½ in. thick and as large as 10 x 12 in. Au-



tomatic advance moves part in a level plane to the left after each character is stamped, spacing each letter evenly. Powerful screw, operated by hand lever, lifts table with work against heavy duty marking dies. Die heads of sizes ranging from 1/16 to ⅜ in. are available for quick interchanging. Deep throat and long stroke permits assembly of special fixtures to hold irregular shapes for stamping.

Serial Numbering Unit

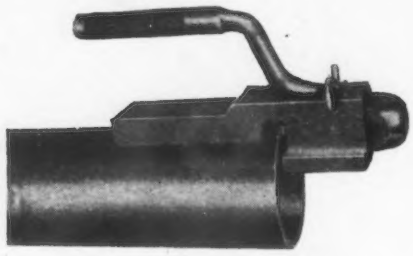
WM. A. FORCE & CO., 216 Nichols Avenue, Brooklyn, N. Y., has developed serial numbering machines for numbering two or more mating small parts. The hand bench



press is fitted with an automatic numbering head with special trip cam arranged for consecutive, duplicate or any required type of numbering. The modified toggle lever movement enables the operator to exert considerable pressure for marking hard parts, or to control the pressure so that extremely delicate watch and instrument parts can be numbered or marked without harm.

Shell Marking Holder

A BOX type shell marking holder, manufactured by *M. E. Cunningham Co.*, 115 E. Carson Street, Pittsburgh 19, has been designed for marking on ends of hot, rough, turned shells. A sturdy outside box with safety handle includes a grooved



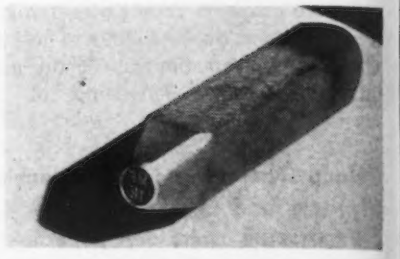
guide which holds a type holder in the correct position to give a complete, clear impression. A solid, one-piece safety steel type holder, said to resist spalling and mushrooming, is held in place by a special shepherd hook pin which is easily removed for changing type inserts.

Rivet Gun Kit

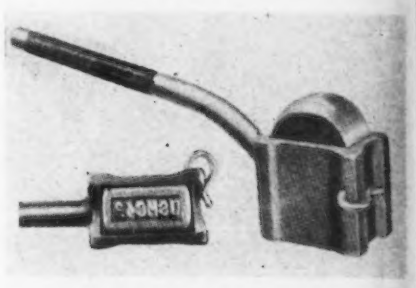
A RIVET gun kit to aid field service and repair men in heading up Cherry blind rivets has been put on the market by *Cherry Rivet Co.*, 239 Winston Street, Los Angeles. It contains a complete complement of pulling heads and other accessories for the G-10 hand gun, including right angle adapter used in inaccessible places and six interchangeable pulling heads for sizes ⅛, 5/32 and 3/16-in. standard diameter rivets, one each for countersunk and brazier type head in all sizes.

Inspectors' Stamps

A SPECIAL line of inspectors' stamps for Magnaflux work has been announced by *New Method Steel Stamps, Inc.*, 147 Jos. Campau Street, Detroit 7. The letters Mf, together with a numeral or letter, are incorporated with a circular, oval, square or triangular shaped border. This design not only indicates that the part has



been magnafluxed, but also permits ready identification of the operator who has passed the part through Magnaflux inspection.

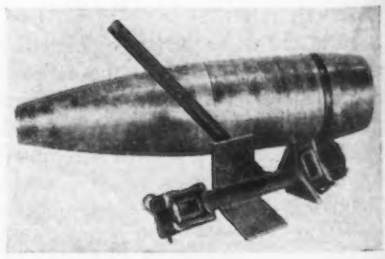


Safety Box Type Holder

AN improved safety box type holder for marking round or square pieces either hot or cold is being marketed by the *M. E. Cunningham Co.*, 115 E. Carson Street, Pittsburgh 19. A reinforced outer box, to which handle is welded, levels the holder on the piece being marked and acts as a safety guard by preventing pieces of scale or chips from flying out from under holder. The steel type holder rides freely inside of the box, but cannot fall out because of special shepherd hook pin which holds it in place. It can be made in numerous sizes and number of characters.

Shell Marker

TO meet requirements for a versatile and practical shell marker, the *M. E. Cunningham Co.*, 115 E. Carson Street, Pittsburgh 19, has made available a dual purpose box type holder. It is of special design for stamping identification marks on end



and side of semi-finished 155 mm. shell forgings in one operation. Guide plates level both type holders to assume clear, uniform markings. Use of the device eliminates separate handling required for each marking.

It is one of the most fascinating riddles of our time. For powerful telescopes have brought to light a strange network of "canals" on the planet's surface . . . Magnifying a celestial spark to the size of the moon, the power of light and a lens reveals facts never before suspected.

We have a parallel to make that is likewise interesting, and may be of importance to you. We manufacture an industrial instrument known as the Jones & Lamson Optical Comparator. It, too, consists primarily of light and a lens. Its purpose: rapid, accurate inspection.

Now this machine—by means of an enlarged shadow—reveals facts about the nature and the accuracy of parts that are often unobtainable by any other method of gaging.

It makes possible the measurement and inspection of complex surfaces faster, more reliably and more *easily* than is possible with any other form of gage.

Because of this, Jones & Lamson Optical Comparators are in use today by leading producers in virtually every line of production . . . and the record of these machines in helping to cut costs and speed production is the important part of the story.

In the change-over ahead, Jones & Lamson Optical Comparators are going to be of tremendous value. Why not get ready now to meet—and beat—fierce postwar competition? Jones & Lamson Inspection Engineers can help you. Call on them now.

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SPRINGFIELD, VERMONT, U. S. A.

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Profit-producing Machine Tools

Assembly Line . . .

STANLEY H. BRAMS

• Tool and die companies are worried over postwar business and renegotiation; corner-cutting starts . . . Prime contractor checks their financial status . . . Packard plans for postwar era.

DETROIT — Tool companies are beginning to pull in their horns. There are a number of reasons —collections from government contracts continue slow, as they have been; renegotiation is a specter of extremely worrisome proportions; and the end of the war, together with its resultant uncertainty, can be imagined if not seen in the not too far distant horizon.

Above and beyond these ordinary considerations coming into play today, a number of tool companies overexpanded at the beginning of the war program and thereby started up a train of circumstances which may be disastrous for them. Some of these overexpansions were innocent, motivated by patriotism, while others were greedy. It appears now, in retrospect, as though a common fate may descend on many of these over-enlarged operations.

Considerably enlarged facilities brought with them the necessity of maintaining the facilities at work. There were plenty of subcontracts to be had, of course, and selling was not at all difficult. But obtaining manpower to sustain these operations then became an increasingly complicated problem.

Confronted with this dilemma, many of the tool companies could do no more than enlarge their headaches. They hired production workers accustomed to close tolerances, reclassified them as tool and die craftsmen, were thereby enabled under War Labor Board regulations to pay them higher hourly wage rates, and thus maintained their working forces. Or, they took upgraders, started them at the basic rate, raising them in accordance with Detroit area regulations at a progression of 5c. a month. That way, also, they obtained sufficient help.

But the sum and upshot of such programs was that production workers and learners graduated at dizzy speed into the highly select pay ranks of the tool and die craftsmen. For instance, an upgrader begins on a machine at 85c. an hr. In 15 months he has risen to the maximum for, as example, a grinding operation. For 15 months' work he is obtaining the pay rate customarily given to men with 8000 hr. apprenticeship behind them.

This simple qualification of a production worker or a 22-year-old for $100 a week jobs is well and good for the worker, but not so good for the employer. There is, after all, a basic reason for the payment of high hourly wages, and that reason is the ability of the help to deliver its money's worth. There is no short cut on experience any more than there is on anything else of stated dimensions. The tool companies employing such practices, necessarily employing them to maintain their machines, have not obtained the production from those machines they could normally expect; and the shortened output has become a factor in their problems of today.

INDICATING the broad interest which is being manifested in this general picture is the action of one of the major automobile companies in recent months, in making a complete survey of its wartime vendors to see which ones will be maintained as suppliers after the war—and during the war.

This company is making a comprehensive and formalized file of its delivery experience from each contractor, of the quality of the work as measured by rejects, and of the financial standing of the concern, procured by consultation with banks.

Where this company has experienced cutbacks, it has passed them along in the greatest bulk to the subcontractors which scaled in the lower brackets on the grading sheets. Some concerns have been stricken from the supplier lists entirely.

It is by on means unusual to measure supplier performances by delivery promises and quality of work, but the inclusion of a financial factor seems new. A top executive of the automobile company introducing this factor is quoted, in explaining the plan to a friend, something like this: "We absolutely are not going to do business with anybody who is not in financial order. We don't care whether he is an alley shop with 12 employees or a big company listed on the New York Stock Exchange—all our suppliers from now on have to have their books in good order."

This cannot be construed as a simple manifestation of morality in the automobile industry. It reflects rather a decision that companies with their financial housekeeping clean are better to do business with them than fiscally shaky firms.

Along this same line, one of the top aircraft companies is circularizing its suppliers with forms seeking fairly complete information not only on their productive facilities but on their financial ability to handle commitments.

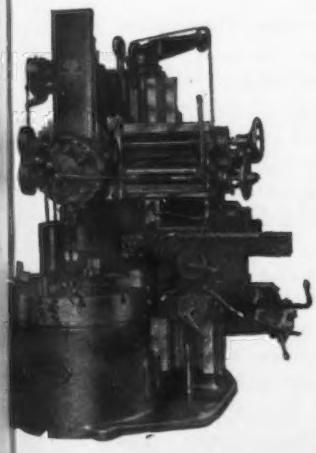
Returning to the Detroit tool and die shops, the early part of the Winter has not brought any change of consequence in their order situations. Delivery promises for gages, jigs and fixtures appeared to have lengthened somewhat, while those for cutting tools have been slightly reduced.

Average delivery is available today in slightly over four weeks on jigs and fixtures, and in about 3½ weeks on gages. Cutting tools can be obtained in fairly short order, within 2½ weeks from the average tool shop. Inasmuch as these figures represent very little change from the comparative levels prevailing at the start of the fourth quarter of 1943, it would indicate that the rather precipitate decline experienced by the Detroit area tool companies during the earlier part of last year had shaken them down to a rather stable plateau of activity.

MEANWHILE postwar automotive planning continues apace. Last week saw Nash and Packard anticipations brought to light.

Packard officials are going on the rosy assumption that there will be a release of civilian car production during the first half of this year. Knowing their facilities are jammed with war work, they have all but completed arrangements to lease space, install a

2 HEADS ARE BETTER THAN ONE



FEW indeed are the manufacturers who are making the same products today that they will make after the war is won.

In production for peace as in production for war the Vertical Turret Lathe offers exceptional advantages. Its two heads—main and side---(as illustrated) work simultaneously to perform several operations with one set-up, at marked savings in time. Its rigid design insures accuracy. Its outstanding versatility is shown by the ease with which scores of V.T.L.s shifted from valves, flanges, and compression parts to building airplanes and tanks. They will be equally ready to turn back once their present tasks are done. And their speed will offer an even greater advantage when comparative costs must win markets against stern competition.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

limited amount of machinery, and get out any authorized passenger car output. Whether such makeshift arrangements could produce a profit is open to question, but it would give Packard dealers something to sell along with their competitors. The additional Packard space will be in Detroit area, but it is not exactly defined yet. Packard first sought idle Hupp Motor Car Corp., but Briggs also had its eye on those facilities and won the race to the landlord this week. So Packard is still looking.

Nash has a solidly based postwar program ready to start in motion the minute the Washington light turns green. Like General Motors, this independent has placed orders with machine tool companies for required equipment, to give it places near the top of the order books when these facilities are authorized to produce. Its entire tooling program is set up on paper—it represents expenditures probably four times or so the normal allotment for year-to-year model changes.

EXPECTING a tremendous postwar market, Nash is planning on the basis of annual overall 6,000,000-car-production for some time after the war. As regards Kelvinator and Leonard operations in Michigan, important sheet steel outlets, president George Mason said the first postwar year's goal is a cool million units. This probably represents an increase of 50 per cent or so above "good year" projections of this company.

There are some grounds for belief, too, that Nash's contract with United Aircraft to produce Army helicopters may have postwar ramifications. Company officials, enthusiastic about this project, constantly talk of its after-war possibilities.

o o o

Cutbacks $2,856,000,000 in 6 Months

• • • **None** of the curtailments in war production to date has been based upon plans for resuming manufacture of civilian goods, announced the Office of War Information last Friday, asserting that "no considerable curtailments for that purpose can be scheduled during 1944 unless the war in Europe should take an early decisive turn in our favor, ending hostilities not later than June or July."

Beyond the 2,000,000 electric irons and 50,000 bathtubs recently authorized by WPB, any return to civilian manufacture probably will be in goods necessary to maintain the civilian economy, such as transportation equipment, it was stated. Some refrigerators and stoves for war housing may be scheduled later this year.

Chief cutbacks during the coming months will come in small arms and ammunition, tanks, certain types of anti-aircraft equipment, non-combat aircraft, and artillery fire-control equipment.

The Navy says that its portion of the over-all program for 1944 will be almost one-third greater than during 1943—totaling nearly $16,000,000,000 as against $12,000,000,000. The Navy has projected plans for plane production into 1945 and for its shipbuilding program through 1947.

In the past six months the Navy has made cutbacks in ships, aircraft, ordnance and other items amounting to $2,856,000,000. Material eliminated was to have been produced during 1943-1946. Cutting back was largely a paper transaction because, with some exceptions, fabrication had not actually started. While $1,370,000,000 of the total cutback figure represents destroyer escort vessel construction, this reduction is offset, the Navy says, by greatly expanded landing craft construction.

WPB cautions against the conclusion that an end to metal famine in war production will mean ability to swing at once into civilian production.

WASHING MACHINE: *A Pratt & Whitney aircraft engine machining plant of Chevrolet Motor Div. of General Motors reclaims about 850 gal. of cutting oil daily with chip spinners. Approximately 22,000 lb. of aluminum chips and 3000 lb. of magnesium chips pass through machines like this one daily.*

•

558 Contracts Ended In Chicago District

Chicago

• • • **Contracts** let during the first 11 months of 1943 by the Chicago Army Ordnance district totaled $1,465,000,000 compared to contract terminations for that period of $955,000,000, according to Brig. Gen. Thomas S. Hammond (I.N.G., Ret.), district chief.

The district, which is the country's largest in number of contracts, has terminated 558 contracts. The terminations figure for the first 11 months of 1943 of $955 million is based on the uncompleted portions of the terminated contracts. It includes both terminations on which final settlement has been made and those on which final settlement is still pending but on which production has already been stopped.

The tempo of ordnance production in the district almost tripled during the period, amounting to $1,834,881,000 during the 12 months ended Nov. 30, 1943, compared to $668,900,000 for the preceding 12 months. Measured tonnagewise, shipments for the 12 months' period ended Nov. 30, were 2,557,214 tons against 1,040,733 tons for the 12 months ended a year earlier.

•

Wickwire Spencer Shuts Down For Plant Improvements

Buffalo

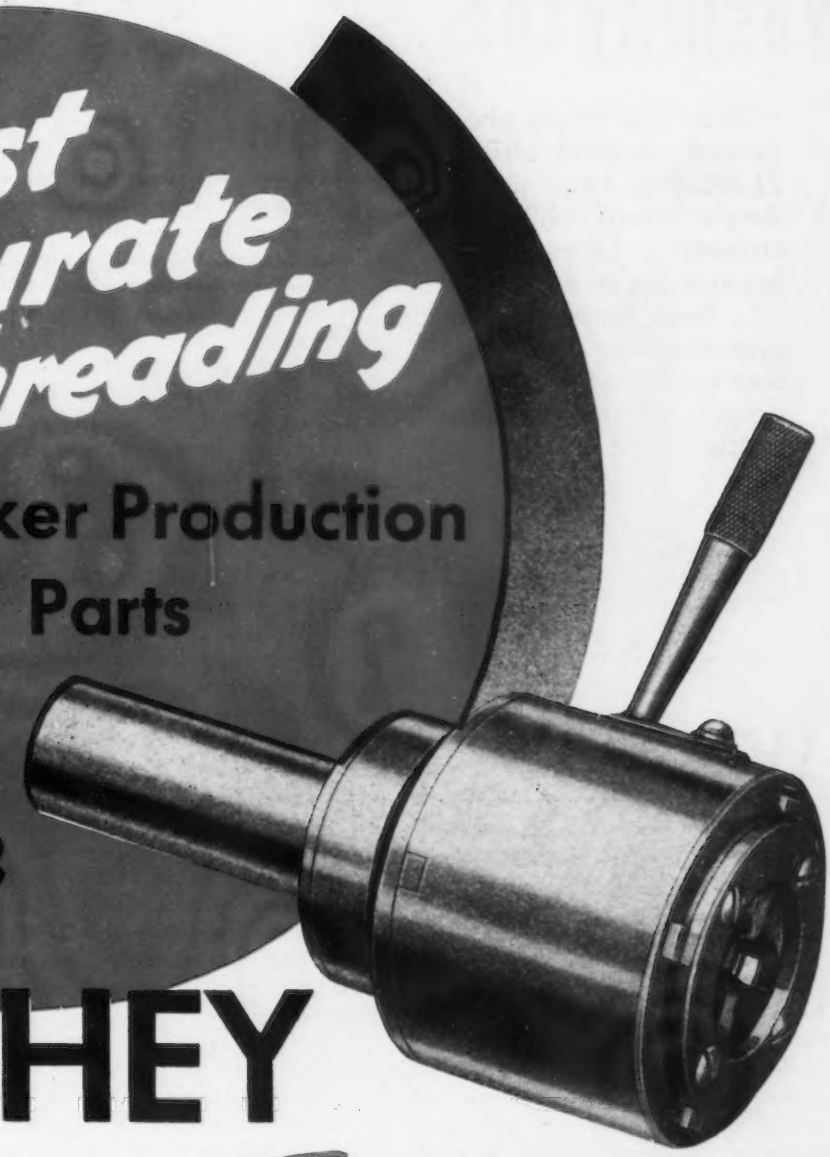
• • • **Long-deferred** because of the pressure of war business, a $200,000 improvement program will be executed at Wickwire Spencer Steel Co., during the week of Jan. 23 when all steel production will be stopped. The project includes installation of a preheating furnace, enlargement of soaking pits, relining of drives in blooming and billet mills, and rewinding one of the large electric motors in the plant.

Rather than accumulate ingots, the three working open hearths will be shut down for the entire week, according to Robert T. Dunlap, general manager of the Buffalo works. The rod mill and two blast furnaces will remain in production. Most employees affected will be used in speeding the improvement job or in other departments.

For Fast Accurate Threading

and for Quicker Production on Threaded Parts

There's Nothing Like



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Threading Tools

4 WEEKS DELIVERY

● This Type "G" (non-rotating) Self-Opening Die Head has established an enviable record. It is regarded with highest respect and admiration wherever threaded parts are needed to help win America's production battle. Type "G" is designed and engineered for use on any machine where die heads do not rotate. Made in sizes from 7/16″ up to and including 6″.

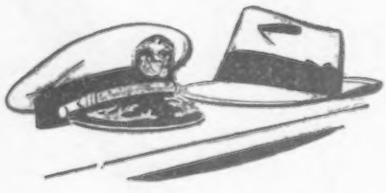
Write for literature on Type "G"—also on a companion product, Type "C-O" (rotating); on Collapsible Machine Tap Type "B-M" and on Murchey Thread Milling Machines, Shell Tapping Machines and Roller Pipe Cutting-off Machines.

MURCHEY MACHINE & TOOL CO., Dept. I—DETROIT 26, MICH.

MURCHEY

Washington . . . L. W. MOFFETT

• Two war years show record of 5438 strikes, 21,500,000 idle man-days, and 4,991,500 strikers . . . Government blames organized labor . . . Rep. Smith recommends guilty unions be deprived of maintenance of membership rights.



WASHINGTON — Labor's "no strike" pledge in 1943 meant 2470 strikes, causing the loss of 11,545,000 man-days of war production and involved 2,769,000 workers in the eight months of the year for which the Labor Department has records.

By projecting the average of the eight months for each statistic, the figures for 1943 will be an estimated 17,317,500 man-days of idleness, 3672 strikes, with 4,153,500 workers involved. Thus, in the war year just ended, labor almost equaled its 1939 record when there were 17,810,000 man-days of idleness. However, in 1939, there were only 2613 strikes and only 1,171,000 workers out.

In the two years ended December, 1943, when the no strike pledge was in effect, labor's strike record has been: 21,500,000 man-days of idleness, 5438 strikes and 4,991,500 striking workers. The foregoing figures are those of the Bureau of Labor Statistics, with estimates for four months in 1943.

BLS says it does not have figures for July, August, and September, 1943, because the compilation was based on OWI's newspaper clipping service which was discontinued for that period when Congress denied OWI funds for this purpose. December's figures have not been completed.

Recently, Chief of Staff General George C. Marshall is credited with saying that the threatened railroad strike, which caused the government to take over the roads had been used by the Nazis as propaganda demonstrating chaotic conditions in the United States. The steelworkers strike was used also as propaganda by the Germans to show that this country is disorganized.

It was charged that the propaganda was effectively prolonging the war and causing the loss of life because underground groups have hesitated in revolting against Nazi troops. The revolts were supposed to be timed with Allied invasion plans.

A CIO official called the remarks "filthy propaganda." AFL President William Green has characterized the statement as "irrational, uninformed and inflammatory," and has challenged "General Marshall, or anyone else to prove that the report of America's soldiers of production provides an effective propaganda weapon for the enemy."

"On the contrary," stormed Mr. Green, "the fact is that American workers have silenced Hitler's propaganda guns and have shortened the war by turning out tremendous quantities of planes, ships, guns and ammunition in record time."

Like John L. Lewis, Mr. Green's gratitude for the Administration's coddling was a denunciation.

Said Mr. Green: "I hereby charge that the responsibility for the prolongation of these disputes rests entirely upon the bungling, fumbling and incompetent handling by government officials and agencies."

Mr. Green may be right about government bungling, but his searing rebuke for the Administration's long-time policy of extreme leniency deserves examination. Reports hint that the President backs General Marshall and that temporarily, at least, organized labor will have to take the rap for the results of the Administration's labor policy.

FURTHERMORE, the "liberal" press is calling for a National Service Act, and for the government to "do something" along the lines of a universal draft. The War Department has long been on record as approving a universal draft. Donald R. Richberg, the ex-New Deal NRA General Counsel, now a private attorney, has recently advocated "drastic labor controls" to stop wartime strikes.

This sudden criticism of organized labor and its leaders by Administration leaders all may be a smokescreen designed to conceal the simple truth that labor could never have made its wartime "no strike" record without the government's tacit consent.

The President has never appealed to public opinion for the disciplining of labor unions. It is generally agreed that if he had done so before this, organized labor would not have dared to buck mobilized public opinion.

IT is true that the Nazis have used strikes as propaganda against this country and that the propaganda has probably been damaging, as supported by OWI. But, it is equally true that labor is not entirely to blame for its strike-born damage to war production.

American workmen whether organized or not, are out-producing the Axis during the war. No one can detract from the thousands of production records American workers have hung up, in spite of a sordid strike record.

Government action to prevent strikes to be perfectly fair would not be to put labor in a straight jacket. To punish labor alone for its actions when those actions were partly government-inspired and sanctioned would be the height of inequity.

National Service legislation is not needed in America. Firm government policy is needed. The strict regimentation of millions of workers in trade unions would be as un-American, as the complete socialization of industry (direct government control) which so far has not been necessary. The dan-

Offer to Aid Soldiers Turned Down by Union

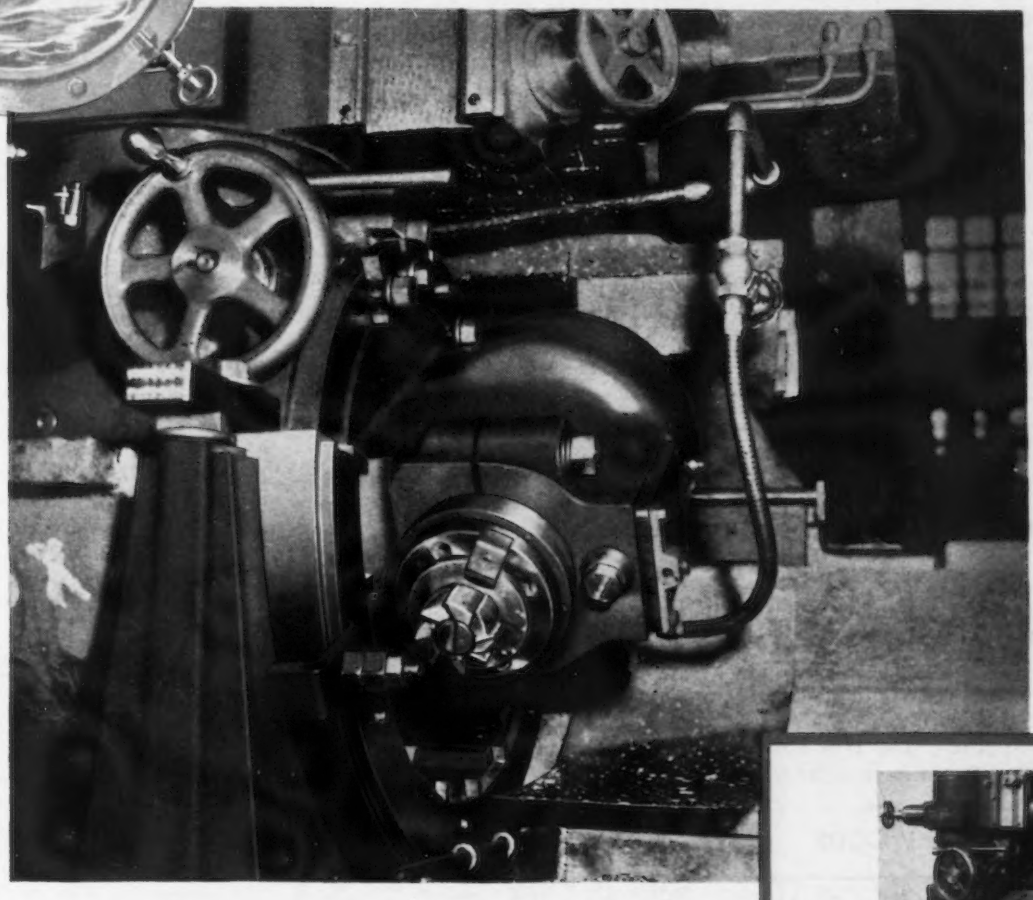
Canton, Ohio

• • • During recent negotiations between the United Steel Workers of America and the Timken Roller Bearing Co. here, the company offered as a counter proposal the granting of an extra day's seniority for each day its employee spent in the armed services. This gesture apparently grew out of the company's recognition of its employees' services to the country.

The union turned down the proposal, reportedly on the basis that other employees not in the armed service would be opposed to such a set-up.

Take a Tip from the Ship Yards

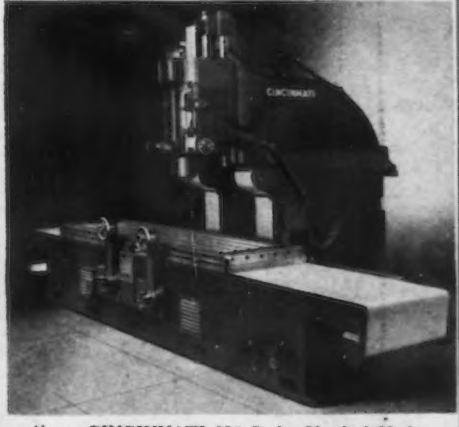
ON MACHINING SLOTS INSIDE HALF-ROUND BEARINGS



The slots in bearing struts always presented one of the most difficult machining jobs in shipyards. Two or three years ago when production was of little consequence, there was no urge to change, but with the requirements for more and more ships, something had to be done about speeding up this operation. A CINCINNATI engineered Universal Index Milling Attachment, on a CINCINNATI 28″ Series Vertical Hydro-Tel Miller, solved the problem. The machine has the capacity and power for milling these large parts, and the attachment is designed so that it may be indexed to several milling positions within a radius of 180 degrees. This method of machining the slots is much faster than the previous method . . . *the work requires only one setting and the attachment may be quickly indexed from one cut to the next.*

The attachment is a typical CINCINNATI Service Engineering development for more rapid production through the use of the right machine, fixture, and cutters. Talk over your milling jobs with this group of authorities; they may find a more profitable and productive method for handling your milling operations.

Above: Universal Index Milling Attachment. It has No. 50 standard taper hole; quick change collet; 1¼ to 1 speed ratio, index plate for locating angular position of attachment spindle.



Above: CINCINNATI 28″ Series Vertical Hydro-Tel Milling Machine. Specification catalog M-1018-2 gives complete information.

CINCINNATI

THE CINCINNATI MILLING MACHINE CO. CINCINNATI, OHIO, U.S.A.

TOOL ROOM AND MANUFACTURING MILLING MACHINES . . . SURFACE BROACHING MACHINES . . . CUTTER SHARPENING MACHINES

ger of such policies being continued after the war cannot be over-emphasized.

The stringent methods now proposed by those who seek legislation to force a man to take a particular job and retain it so long as the government wants him to, or to imprison the leaders of striking unions are discarded by Representative Howard Smith of Virginia.

REPRESENTATIVE SMITH, who is co-author of the Smith-Connally anti-strike act, and who has been called an "enemy of labor" and a "labor baiter" told THE IRON AGE that he would merely have the government deprive unions of their maintenance of membership rights, or at worst provide that the government could order that a new bargaining agent be chosen at a struck plant.

While asserting that the maintenance of membership clauses which the War Labor Board has caused to be inserted in collective bargaining contracts against the will of the employers are illegal and in contravention of the Wagner Act and the Smith-Connally Act, Mr. Smith says that WLB could discipline striking unions "where it hurts" by withdrawing the foregoing rights.

Said Mr. Smith: "The War Labor Board says that it grants maintenance of membership clauses to unions in exchange for their promises not to strike. Why wouldn't it be fair for WLB to forbid a union which strikes from further enjoying maintenance of membership privileges when it violates its 'no strike' pledge?"

TO illustrate how unions abuse privileges granted them by WLB, Mr. Smith described the case of James Huffman, a member of a CIO local at the Gambrinus Bearing Factory of the Timken Roller Bearing Co. WLB had given the union maintenance of membership rights.

In March, union members and management officials met to discuss the terms of a contract which had been tentatively agreed to by the company and CIO officials. The employee group which was protesting the terms of a new agreeemnt was represented by Mr. Huffman.

Mr. Huffman asked the government presiding officer, a conciliator from the Labor Department, what steps the group he represented should take to have a new election and secure a new bargaining agent. As a result of this question, Mr. Huffman's membership in the union was revoked and I. W. Abel, CIO sub-regional director, requested Huffman's dismissal under the terms of the WLB-generated maintenance of membership clause.

Timken was forced to comply. Mr. Huffman's fellowworkers immediately struck in sympathy. They went out on April 2 of last year and did not come back until April 11. Approximately 36,875 man hours were lost in the plant of an important industry.

MEANWHILE, Mr. Huffman, who asserted that he had been put out of the union in a manner forbidden by the union constitution, appealed to the international union which reinstated him. Mr. Smith says that evidence shows reinstatement was made recently only to permit the local union to constitutionally discharge him. Mr. Huffman was discharged, and now, according to Mr. Smith, Timken fears another sympathy strike.

Clearly, if WLB had assumed jurisdiction and ordered the Timken workers back on the job immediately under penalty of loss of maintenance rights, there would have been no loss in production time at Gambrinus. Nor would Mr. Huffman have been discharged in the first place.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Resources Depleted By War Must Be Replaced, Says Batt

Chicago

• • • **Further evidence** that the Administration has set a pattern for postwar international trade calling for the acceptance of imported raw materials in exchange for American exports were given here recently when this suggestion was made by William L. Batt, WPB vice chairman and United States member and representative on the Combined Raw Materials Board and Combined Production and Resources Board.

Addressing the Chicago Association of Commerce, he said that if the principle of a balanced trade budget is accepted as the essential, a novel means of approaching this balance is the acceptance of raw materials from abroad in exchange for American exports. It was proposed that this country sterilize or freeze the surpluses over and above normal import needs, retaining these materials in a stockpile not to be touched except in case of national emergency.

Mr. Batt said the important thing is that this country would be replacing those resources which are being exhausted and would be tending to bring the United States back to an economy of abundance as distinct from an economy of scarcity. Of all the questions that are most difficult, he said, is the matter of disposing of war surpluses.

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ARMY E NAVY

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WEST COAST . . . .

OSGOOD MURDOCK

• "Cut back any aluminum plants but ours," cry West Coast Congressmen and public power purveyors . . . Developments at Bremerton . . . Superlative achievements by warplane builders.

SEATTLE—"Aluminum Pots are Cooling" warned recent headlines in the *Oregon Journal* and "U. S. Cut-back Aluminum Alarms State" worried the *San Francisco News*. Down in southern California "Aluminum Plants Face Three Months Shut-down Here" dreaded headlines in the same baleful tone.

So far there have been no actual cut backs or shut downs on the West Coast, but the suspense is proving dreadful. It all seems to have started when Washington reports told of a growing surplus and balanced budget in the aluminum account and indicated curtailment of certain plants dependent upon coal for fuel. On the West Coast all reduction plants and pot-lines depend upon hydro-electric power, and since principal power sources for aluminum production are either federally owned, as from Bonneville, Grand Coulee and Boulder Dam, or municipally owned as from San Francisco's Hetch Hetchy project which powers the DPC Riverbank reduction plant in the San Joaquin Valley, political pressure was immediately exerted.

From the Pacific Northwest resistance to any present reduced output was headed by Senator Homer T. Bone (D., Wash.), Congressman Homer D. Angell (R., Ore.), and Congressman Walter Horan, of Washington, all of whom were credited with fronting the stalwart defense. Officials of the Bonneville Federal Power Administration have been breathlessly in touch with Washington also, through Secretary of the Interior Harold L. Ickes, since a major portion of the 600,000 kilowatts of Columbia River power now utilized for northern aluminum production is at stake in the rumored cut backs.

It is understood here that WPB may shut down as much as one-third of the nation's aluminum producing capacity. The West Coast delegation points out that aluminum produced in the Pacific Northwest costs less than 15c. per pound because of the low hydro-electric rate. There is particular jealousy and resentment of the Shipshaw Canadian plant financed with U. S. funds with a capacity of 320,000 tons per year, approximately the same as that of the 22 United States pot-lines which it is understood are planned to be closed. It is pointed out that the cost of Shipshaw aluminum delivered to Vancouver, B. C., for Lend-Lease shipment to Russia costs the United States about 21c. per pound, approximately 50 per cent over the cost of aluminum ingots produced in the Pacific Northwest.

Since manpower requirements in aluminum production are extremely modest, since most of the plants are away from metropolitan areas where manpower and housing are scarcest and because of the constant and growing demand for aluminum by the aircraft industry on the West Coast, there seems reasonable basis for the plea to continue the bubbling of these comparatively new but promising far western pot lines.

THE largest forging press west of the Mississippi has just been installed and set to work at the Bremerton Navy Yard on Puget Sound. This 2200-ton press with its squeeze of 2,000 lb. per square inch was once headed for Japan and was fortunately awaiting shipment at Portland when the belated embargo on materials for Japan was placed.

Bremerton Yard is still short 8,000 civilian workers, and in addition to the recruiting drive, Secretary of the Navy Frank Knox has established a Navy manpower survey board for the Pacific Northwest district to check all Navy manpower in shore installations in Oregon, Washington, Idaho, Montana and Wyoming in the hope of diverting unnecessary labor to Bremerton.

There is even a possibility that Bremerton may, after all its years of ferrying visitors, workers and terminal freight from Seattle for 20 miles across the Sound, get a mainland railroad terminal connection. Bremerton itself is on a promontory finger pointed northeast and connected by a narrow neck to the Olympic Peninsula. The prospective railroad will be a 40-mile extension of the Northern Pacific Elma-Shelton branch line, west of Olympia, and circling the southern and western shores of Puget Sound. One of the most difficult rail freight deliveries in the country are now to Bremerton Navy Yard because of the barging of all cars, the necessity of awaiting favorable tides, the menace of storms and the limited barge docks, ferry accommodations and 16-car team track at Bremerton. The contemplated mainland rail connection would break the bottleneck, but by the time these 40 miles of rail are in, the pressure will probably be off.

CLIMAXING months of negotiations, appeals, strike votes and deferment of decision, 800 foundrymen from Pacific Car & Foundry Co., Olympic Steel Works, and Western Steel Casting Co., Inc., were out on an "unauthorized" strike on Jan. 7. Members of the Tacoma local were meeting to decide on effecting their strike, voted some weeks ago. War Labor Board had recommended an increase of eight cents per hour for unskilled workers, up to nearer the aircraft, unskilled shipyard and foundry helpers minimum in California. Union requests had included also a corresponding increase for journeymen and other classifications, to remove an historic differential between the Pacific Northwest and California scales, and to allow classifications equal to the California basis on all grades.

Philip G. Johnson, president of the Boeing Aircraft Co., was acclaimed "Seattle's first citizen" at an annual civic banquet sponsored by the Seattle Real Estate Board on Jan. 13. Graduated in mechanical engineering from the University of Washington, he started to work as a draftsman in William E. Boeing's one-year-old Boe-

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The **REID-AVERY COMPANY**

DUNDALK BALTIMORE 22 MARYLAND

ing Airplane Co., May 4, 1917. Johnson also heads the Kenworthy Motor Truck Corp.

Production economies and greater labor utilization through mass production and assembly line methods have reduced its price of planes to the government aproximately 50 per cent, Boeing reports, so that refunds on a single contract amounted to $120,000,000, the cost of 400 planes at $300,000 each. In addition there has been a 27 per cent increase in wages paid workers. Present rate of production is ten times that of November, 1941, and 92 per cent greater than at the start of 1943.

CORRESPONDING gains in productive efficiency and volume of output are reported at the close of the year for all West Coast warplane builders. The seven major Pacific Coast plants turned out 141,480 tons of warplanes in 1943 which is a 72.31 per cent gain over 1942's total of 82,106 tons. The goal for 1944 is to be 225,000 tons, a 56 per cent increase over this year. In units, the 1943 output reported for the members of the Aircraft War Production Council was 26,636 whereas in 1942 it was 17,694. This indicates that the average plane last year weighed 5.3 tons whereas the average for the previous year was 4.66 tons. Since West Coast plants produce 60 per cent of the nation's heavy bombers, the trend is unmistakable. In sharp contrast to the custom tailoring methods of 1940, it develops that for every 100 workers then required to build an attack bomber only nine are now necessary, only five on an interceptor and only ten on a medium bomber. But turnover of workers is still the biggest obstacle for 17,000 workers leave their jobs in these far western aircraft plants every month. Although this is better than the former average of 20,000 per month, it is still a restless, irresolute indictment of too many civilian workers in the battle for survival.

Douglas Aircraft Co. is justifiably proud of its own world's record output of 48,223 tons of combat planes in 1943 valued at a cool billion dollars. Direct manhours per plane were reduced by this company more than 50 per cent and in some instances as much as 71 per cent, the company reports. Furthermore, the company decreased its per unit cost to the military an overall 22 per cent and paid out more than $50,000,000 in taxes to Federal, state and local government.

o o o

Full Employment Set at 54,000,000 by Brookings

Pittsburgh

• • • **In a comprehensive** study on post-war re-employment by Karl T. Schlotterbeck, published by The Brookings Institution, Washington, D. C., the following conclusions were presented by the author:

Demobilization will be gradual rather than precipitate in character. It will extend over a period of two to three years—depending upon the time required to liquidate the Japanese after the Nazis are defeated. Industrial reconversion and re-employment are even now under way and the process will be rapidly accelerated after the termination of the European conflict, and from 6 to 7 million war workers and service men may well be demobilized before the end of the Asiatic conflict.

During the transition years the employment problem will be eased somewhat by the fact that the total number of potential workers will be appreciably smaller than in 1940. This results from the fact that substantial numbers will still be in the armed forces, while at the same time there will be a bulge in the number of schools and colleges.

In a dynamic society "full employment" does not imply complete employment of the labor force. Several millions would, for one reason or another, not be working at any given moment. A state of reasonably full employment at the end of the transition period would be realized with an employment level of 54 millions. This would mean an increase in employment over 1940 of about 8,000,000, or roughly 17 per cent.

The additional employment required will have to be found not in manufacturing alone but in all the major fields of economic activity, including transportation, public utilities, mining, agriculture, construction, trade, and service activities. Since there is good reason for believing that the level of production and employment will for some years be substantially above that of 1940, the outlook for satisfactory employment is distinctly encouraging.

Bolivia Increases Tungsten Output for U. S. War Effort

• • • **Bolivia is producing** increasing quantities of tungsten, a strategic metal needed by the United Nations for high-speed tool steel, armor plate and other war purposes. The country's tungsten production for 1943 is estimated at about 3600 metric tons. This compares with 3363.2 metric tons in 1942 and 2676.3 metric tons in 1941.

Before the war China was the leading source of tungsten, and the metal has continued to come out of that country by plane. The war, however, has increased the need. Bolivia and other American republics stepped up their production as part of the wartime program of inter-American cooperation.

Bolivian production has been stimulated by United States loans to miners for purchase of equipment and development work, the loans being returned through deductions from payments for tungsten produced.

Bolivia's economy long has been dependent on tin exports, but greater development of other metals and products is being sought as a means of diversifying and strengthening Bolivian economy.

. . . Cited for Awards . . .

• • • **The following companies** have received the Army-Navy E award for excellence in war production:

Electrolux Corp., Old Greenwich, Conn.
Baldwin Locomotive Works, The Whitcomb Locomotive Co., Rochelle, Ill.
Brill Corp., J. G. Brill Co., Philadelphia.
Chipman Knitting Mills, Inc., Ordnance Division, West Easton, Pa.
Ensign-Bickford Co., Avon Plant, Avon, Conn., and Simsbury Plant, Simsbury, Conn.
General Time Instruments Corp., Westclox Division, La Salle, Ill.
Hercules Powder Co., Missouri Ordnance Works, Louisiana, Mo., and Volunteer Ordnance Works, Chattanooga, Tenn.
Hump Hairpin Mfg. Co., Chain Store Products Corp., Chicago.
Mill-Rose Co., Cleveland.
New England Box Co., Keene Branch, Keene, N. H.; Mill "D," Concord, N. H.; Mill "X," West Swanzey, N. H.; Winchester Branch, Winchester, N. H.
Noblitt-Sparks Industries, Inc., Central Avenue Plant, Heater Plant, Radio Plant, Reel Plant, Columbus, Ind.
Southwestern Proving Ground, Hope, Ark.
Utica Cutlery Co., Utica, N. Y.
Amertorp Corp., St. Louis.
Soule Steel Co., San Francisco plant, San Francisco.
Heppenstall Co., Pittsburgh (fourth star).
American Bridge Co., Ambridge plant, Ambridge, Pa.

Maritime M

Ingalls Shipbuilding Corp., Pascagoula, Miss. (gold star).

WHY EXTRA SCRAP IS NEEDED AGAIN!

The morning news flash reads: "Another beachhead was established. . ."

Sounds matter-of-fact, doesn't it? Yet back of every successful new landing are weeks—even months of preparation. Thousands of troops must be trained; thousands of tons of steel fighting equipment must be ready.

Steel must provide the spearhead and protect precious lives. But the plain fact is *there won't be enough steel* unless American plants overcome the normal "winter lag" in scrap collections. It is estimated that an additional *15 million tons of scrap* will be required.

This is not an appeal for the ARMCO furnaces alone. Actually, every steel mill in the country must go full blast all winter if military requirements are to be met. And the only assurance of this will be a flood of millions of tons of *extra* scrap.

You "did the job" last winter. This year, with a second front in view, the need is even more critical. Get your salvage committee back in action. Collect everything that doesn't serve a useful purpose. Separate the ferrous and non-ferrous metals and then call the scrap dealer.

Remember, every ton of scrap you collect will help win a battle —*and save lives.* The American Rolling Mill Company, 381 Curtis St., Middletown, Ohio.

ARMCO

FOR EXPORT: THE ARMCO INTERNATIONAL CORPORATION

TURN IN ALL YOUR SCRAP

Fatigue Cracks . . .

BY A. H. DIX

Alien Interpolation

Did you hear what happened to a certain publisher—a windy fellow—who addressed a meeting of engineers in an Eastern city a few weeks ago? He was reading from a manuscript he had apparently not taken the precaution to proofread, and which must have been a terrible struggle for the typist. His words were something like this:

> *"The American businessman is tired. He has worked long and hard in the war effort. He is tired mentally, and he is tired physically. But he isn't a bit more tired than the poor stenographers who have to type eyewash like this."*

He had been reading mechanically. When the audience expressed its delight, he shouted indignantly, "I never wrote that!" It was the high point of the meeting.

—*S. H. Brams*

Aptronym—Once Removed

Right next door to the office of the Forest Service official in charge of forest fire prevention is Burnham Asch.

—*Berryman Davis,*
Federal Trade Commission, Washington

Curves in Your F.F.J.

• • • We had considered the Postmaster General's withdrawal of *Esquire's* second-class mailing permit as no concern of ours, but the *Philadelphia Record* pitchforks us into the controversy with this editorial:

> The Postmaster General says his action is taken on the ground that Esquire fails to meet the requirements of being "originated and published for the dissemination of information of a public character or devoted to literature, the sciences, arts or some special industry."
>
> If Esquire can be banned on such broad grounds, then Walker could ban almost any magazine in America with the possible exception of the National Geographic, Editor and Publisher and The Iron Age.

The editorial writer weakens his point by including the *National Geographic,* as that magazine frequently contains photographs of tropical belles who are no better insulated against drafts than is the Varga girl. Which leaves just us and *Editor and Publisher.* The latter publication can speak for itself, but as for us, the advent of women into our segment of the industrial field has brought voluptuous arcs into even our ordinarily monastic pages. As evidence, we offer this fragment of an illustration in one of last month's issues:

Not knowing how far the Postmaster General plans to go — or, for that matter, the brains department — we feel it wise to begin gnawing at this fetter on the freedom of the press. We think the Postmaster General exaggerates the potentialities for harm in Varga's airbrushed delicacies, and that he is to be criticized for failing to give due weight to Varga's contribution to the improvement of the species by providing a new ideal in chassis design.

Iron Negative

• • • Speaking of annealing, W. G. Conant, G. E. works laboratory metallographist, was recently examining a specimen of "educated" cast iron. Some fortuitously placed ferrite lines give a direct answer to the question of whether the specimen had been annealed.

Ferrous Sofa

CANADA RELAXING ON STEEL

—*Iron Age headline*

In the annealed state, of course.

Greeleys in Case Lots

This is the way I heard it: When Horace Greeley, who insisted that the word "news" is plural, was a cub reporter he received an out-of-town assignment.

Not having heard from him for several days, his editor wired "NO WORD FROM YOU. NO NEWS?" Greeley replied, "NO. NOT A SINGLE NEW."

—*Carl D. Anthony,*
Continental Screw Co., New Bedford, Mass.

The story is doubtless apocryphal, as Greeley was a great newspaperman and there are always news. Which gives us a good opening to clap hands over the harvesting job being done these days by your favorite family journal's Greeleys. The news crop is of bumper proportions, and the brains department is depositing in your lap every sound sheave.

To our biased eye, the reporting job done in last week's Annual Number is the most brilliant in our history. Some of its features establish new high marks in industrial journalism. As a whole, the book will be as useful to you as an X-ray machine is to a bonesetter.

Polar Parallel

In John L. Keenan's excellent book, "A Steel Man in India," which George R. (R. S. Stockvis & Sons) Woods gave us for Christmas, contains this chilly simile:

He had a manner as cold as snow on a convent roof.

Timing Is Everything

Your story about the speaker with the Phi Beta Kappa key reminds me of something that happened to me. I was doing some work for the old ....., which had hired one of those professional spellbinders to come in and needle the sales force.

The president, who was very enthusiastic about the guy, said to me, "He's conducting a sales meeting up on the top floor now. Why don't you go up and listen to him for a while?" So I went. The elevator, although I didn't know it, opened directly into one side of the meeting room. So when the elevator audibly stopped and the doors opened, everybody's head turned to see who it was. The speaker also stopped.

Like any gentleman invading a man I sort of oozed in on tiptoe so as to disturb things as little as possible. My arms were full of overcoat, briefcase, etc., as I sidled along the wall toward a seat.

I'll never know what he had just been telling them—I suspect it was something about Milquetoasts—but there was a roar of laughter from the assemblage that shook the window panes. I got red, completely blew my top, stood up and said, "Any you guys want to go outside?" But they only howled louder.

—*Deac*

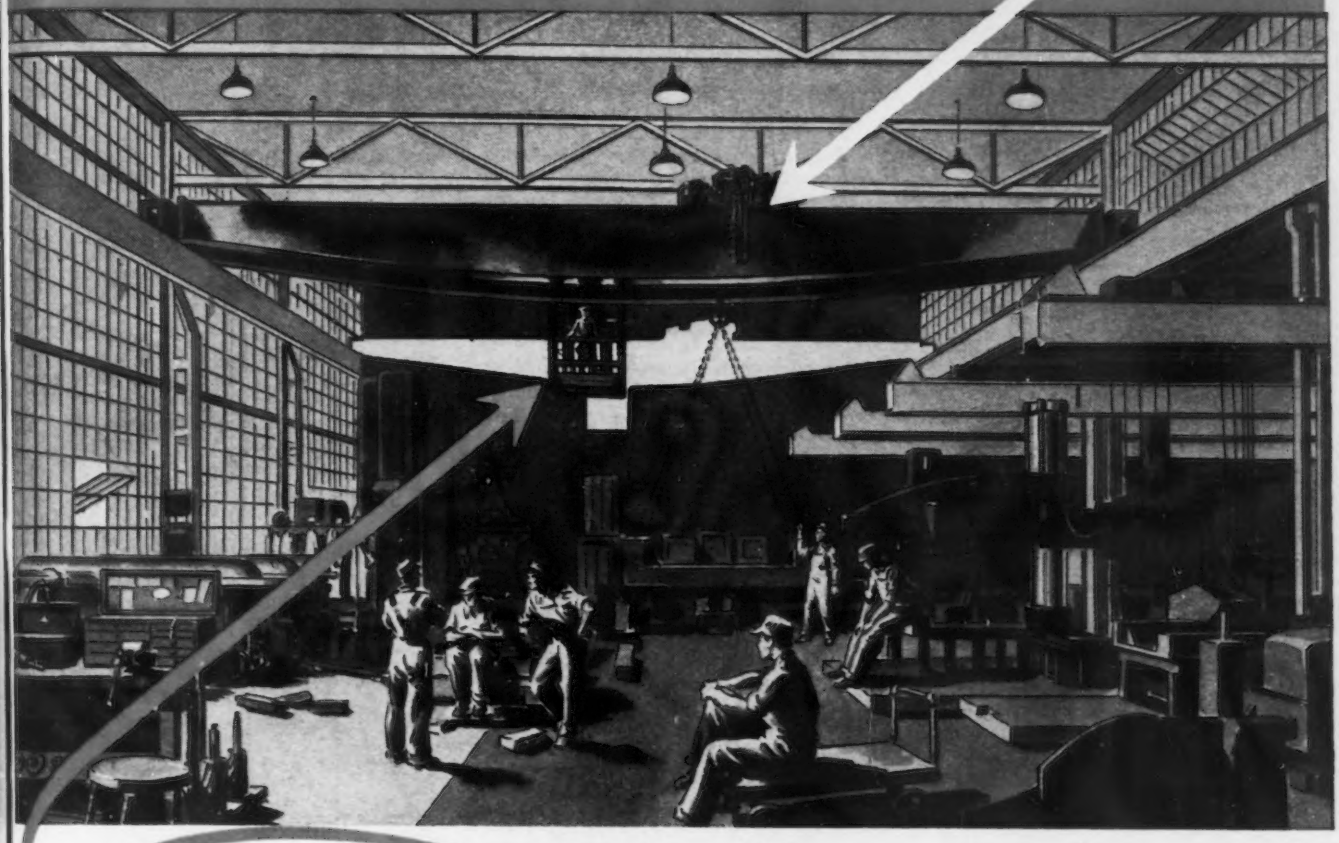
Puzzles

Last week's wind blew at 7½ m.p.h.

Four minutes should do for this:

Find a three-digit figure whose digits total 18, and subtract from it a three-digit figure whose digits total 12, and for a result get a three-digit figure whose digits total 6.

WAITING FOR THIS CRANE LOSES LOTS OF MAN HOURS



AN EXTRA Northern CRANE Would Save Them

Maybe they wait only a few minutes—but if they do it many times a day, plenty of man hours are lost—and you pay for them.

Moreover, the whole production schedule is slowed—time is lost everywhere—costing money and impeding your part of the war effort.

An extra Northern Crane on the runway will save all these countless minutes now being lost. Also, if you have an extra crane you need not fear breakdown—it won't tie up your shop.

Investigate the time saving possibilities of an extra crane.

Northern Cranes are fast, powerful, strong, have fine control. They are the fine machine tools of material handling.

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OFFICES IN PRINCIPAL CITIES

Dear Editor:

FEWER BONDS, MORE TAXES

Sir:

For quite a while now I have been reading of warnings of impending inflation in various columns of your journal. Which is fine.

Now, the other day I received a card from the Treasury Dept. asking me to help out during the Fourth War Loan. Maybe you did, too. Which is also fine.

But maybe it would be better, from the standpoint of stopping this inflation—if that time which I might spend vending bonds were spent in spreading the word—in whispers of course—that it would be much better for all of us if we have heavier and heavier personal income taxes *now*—not later!

If you know of any organization of one or more that is working on this, could you pass the word along? I would like to sign up.

ROBERT A. BEUTTLER
53 Annapolis Terrace
San Francisco 18

● We know of no group, not even Congress, dedicated to fewer bonds and heavier taxes. —Ed.

DUO-LIFE

Sir:

Could you give us the name of the steel company who makes a steel called "Duo-Life," which is used for making stamps for marking steel?

E. W. NESTOR
Reiff & Nestor Co.,
Lykens, Pa.

● Duo-Life is unknown to us.—Ed.

STELLITING

Sir:

We are very much interested in the article in your Dec. 23 issue, "Extending Gage Life by Stelliting."

We would appreciate your advising us of any outfits in Long Island City or vicinity who do this work.

LOUIS S. KROTO,
Asst. Treas.
Phoenix Machine Tool Corp.,
41-38 37th Street,
Long Island City 1, N. Y.

● Frank Roth Co., 4278 Park Ave., New York, and Weldrite Co., 29-23 40th Rd., Long Island City, N. Y.

PLASTER MOLDS

Sir:

On a recent trip to the United States the writer heard rather briefly of a process of making non-ferrous castings in plaster molds.

We should like to know if any information has been published on this subject.

JOHN GODDARD,
Experimental Engineer
The Frost & Wood Co., Ltd.,
Smiths Falls, Ontario, Canada

● See "Plaster Molds, Capaco Process," in Oct. 9, 1941 issue, and "Antioch Plaster Process," Apr. 9, 1942 issue.—Ed.

ANDERAN

Sir:

In your Dec. 9 "News Front" reference was made to the new word "Anderan," coined by Dr. E. J. Abbott.

We are interested in learning more about this unit of measurement. We would also like to receive the address and affiliation of Dr. Abbott.

JOHN L. FULLER,
Experimental Engineer
The Reliance Electric & Engineering Co.,
1068-1088 Ivanhoe Road,
Cleveland 10

● Dr. Abbott can be reached at the Physical Research Laboratory, Ann Arbor, Mich. "Anderan" was first mentioned in his talk at the A.S.M.E. annual meeting. You may be able to get a copy of it from A.S.M.E., 29 W. 39th St., New York.—Ed.

CHARCOAL IRON

Sir:

I liked Ralph Sweetser's article on charcoal iron in your July 1 issue. I know of no one better versed in how to run a charcoal blast furnace.

Charcoal is a farm crop and can be produced by man, while coke when burned is lost forever.

In my younger days there were 800 charcoal furnaces in the U. S. As a boy, with my father, the late P. L. Weimer, I saw about 600 of them.

EDGAR A. WEIMER, SR.,
Consulting Blast Furnace Engineer
245 Seneca St.,
Harrisburg, Pa.

VIBRATION TEST

Sir:

On page 90 of your Dec. 9 issue we noticed a paragraph concerning a paper by Benjamin J. Lazan entitled, "Some Mechanical Properties of Plastics and Metals Under Sustained Vibrations."

We are anxious to secure several copies of this paper.

D. D. BARBOR,
Asst. Chief Metallurgist
Kaiser Company, Inc.,
Iron and Steel Division,
Box 217,
Fontana, Calif.

● Write to Benjamin J. Lazan, Sonntag Scientific Corp., Greenwich, Conn.—Ed.

SEAPORCEL

Sir:

Can you tell me who manufactures the coating material referred to as Seaporcel in the "News Front" of Oct. 21?

J. H. BULL,
Chemical Engineering Dept.
The Dow Chemical Co.,
Texas Division,
Freeport, Texas

See below.—Ed.

Sir:

We note from your Dec. 16 issue that A. E. Flowers of the DeLaval Separator Co., Poughkeepsie, N. Y. is interested in knowing where Seaporcel can be obtained.

Seaporcel is our product.

M. J. SALTZMAN,
President
Porcelain Metals, Inc.,
38-20 Borden Ave.,
Long Island City 1, N. Y.

SEIZED PATENTS

Sir:

Enclosed is 24c. Please send set of reprints of seized patents covering metal products as published serially in THE IRON AGE.

KEN BROOMELL,
Purchasing Agent
Archer & Smith, Ltd.,
125 North Eastern Ave.
Lexington 34, Ky.

Sir:

Please send the 22-page reprint of seized foreign patents. If there are any future lists, please forward them.

H. MANDEL,
President
Wickman Corp.,
15533 Woodrow Wilson Ave.,
Detroit 3

● The 22-page reprint includes seized patents published up to and including the Nov. 25 issue. For additional lists see every subsequent issue except Dec. 30. The list in the current issue begins on page 154.—Ed.

NE STEEL CHART

Sir:

You published on May 6, 1943 "THE IRON AGE NE Steel—Standard Steel Chart." We have found this chart quite useful and if possible would appreciate receiving an additional two or three copies.

GEORGE L. BOND
Darby Corp.
Kansas City, Kan.

● Twenty-five cents each.—Ed.

TOOL STEEL DIRECTORY

Sir:

We are interested in your Tool Steel Directory. Please send us a copy at $1.

GLENN D. EASTON,
Engineering Dept.
Lovejoy Tool Co.,
Springfield, Vt.

"KNOW YOUR STEEL"

Sir:

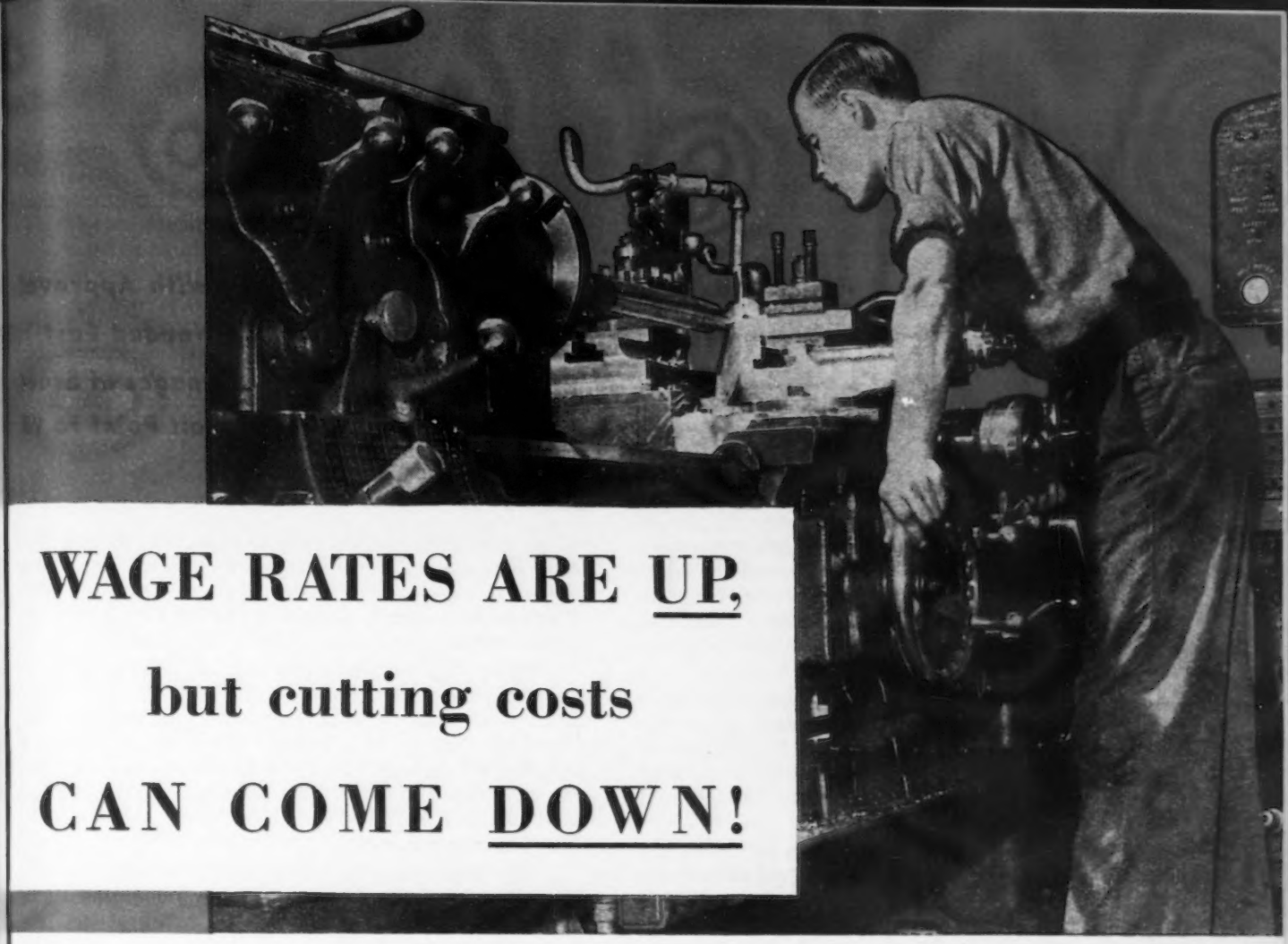
On the "Dear Editor" page of Dec. 30 you ask if anyone can supply the name of the publisher of "Know Your Steel." This is put out by H. M. Halvorsen, P. O. Box 63, Harper Station, Detroit.

R. C. ONAN
Lindberg Engineering Company
606 West Wisconsin Ave.,
Milwaukee

Sir:

"Know Your Steels" by Halfdan Halvorsen, edition 3, 109 pages, $1.50, was published in 1941 by the author. His present address is 15646 Eastwood Ave., Detroit.

E. H. McCLELLAND,
Technology Librarian
Carnegie Library of Pittsburgh
Technology Department
Pittsburgh 13



WAGE RATES ARE UP,

but cutting costs

CAN COME DOWN!

★ Sound postwar planning will include a searching analysis of mechanical equipment, to be sure no opportunity is lost to lower production costs. Only this way can the price of postwar commodities be kept within the reach of everyday buyers. Otherwise, sales will be scarce, production low, and "full employment" cannot be attained.

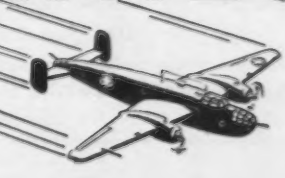
The use of modern machine tools in increased numbers, and at their highest efficiency, is one of the surest ways of cutting costs. For instance, Monarch lathes cut production costs and produce more parts with greater precision and fewer rejects. Such tools should be "musts" on your reconversion timetables.

It is time, now, to make your machine tool surveys. Monarch engineers can help you. Under the pressure of war production, they have devised many turning shortcuts that can be applied equally well to peacetime products. Our practical experience in utilizing the many timesaving features of Monarch lathes is at your service, to help you produce more goods for more people, at lower cost.

THE MONARCH MACHINE TOOL COMPANY · SIDNEY, OHIO

MONARCH LATHES

Save Time



This Industrial Week.

- **Baruch Uniform Termination Clause Greeted with Approval**
- **Steel Industry Expedites Invasion Equipment, Needed Fast**
- **Railroads and Can Makers Getting Heavier Tonnages of Steel**
- **National Steel Ingot Production Rate Up One-half Point to 98**

MANY uncertainties were cleared away this week for metals producers and users with the adoption of the Baruch-Hancock Uniform War Contract Termination clause, framed in less than two months following a long controversy between procurement agencies.

There is gratification among industrialists over the fact that a start has been made toward solving the intricate termination problem which still holds many ramifications. The fact that competitors will be treated similarly and with a minimum of delay has aroused favorable comment.

Meanwhile, the steel industry with its operating rate higher this week, is driving hard to expedite items needed for invasion equipment in increasing quantities and faster than expected. At the same time, heavier tonnages of steel for railroads and can-makers are indicated.

Steel for 10,000 domestic freight cars to be made in the first quarter has been provided for and material has been assigned for 10,000 more cars for second quarter. Passenger cars may be built in third quarter and close to 40,000 freight cars may be purchased for use abroad. Rail orders are heavy and mills look for a 20 per cent increase in output this year over 1943. With controls revised through Order M-81, output of tin plate in second quarter will exceed last year's output and may be 100,000 tons above estimated production this quarter. The tentative setup for second quarter calls for about 720,000 tons.

REPORTS that are considered reliable say that the President has promised the Russian government equipment and facilities to increase its steel capacity by 8,000,000 tons. The equipment, it is said, is to be furnished after the war ends, according to a Russian protocol in which the agreement is reported to appear. On the whole, the tonnages now being mentioned are lower than some market experts expected. British Dominions have been requesting new capacity also. This is said to have caused consternation to English Cartel Planners who oppose increasing the steel independence of the various parts of the United Kingdom.

Steel plate shipments, which set a new peak in December and rose to an all-time high mark of 13,382,390 net tons in 1943, are continuing heavy. The Maritime Commission's current inventory is estimated at 2,500,000 tons, or about five months' supply. By the end of June shipyards may have all the steel they need for 1944, and they may be thinking about disposing of excess material.

The steel plate situation is worthy of attention not only because it is one of the few remaining tight spots, but because of its widespread ramifications. As has happened previously in other items, demand may drop when the supply of plates begins to gain, because buyers will no longer feel it necessary to maintain high inventories. Then plate orders in many sizes can be removed from high speed continuous mills freeing the latter for strip and sheet output.

Last year's record production of 88,872,598 net tons of steel ingots, up nearly 3 million tons from 1942, will stand undisturbed for a long time, acording to all present indications. Excess ingots are just as great a problem now as they were two or three months ago. Four steel plant expansion programs have been cut back recently because they are not necessary for the war effort, and other projects are being reviewed for possible termination. About 480 beehive ovens have been blown out recently due to slackened demand for this type of coke.

INFLUENCED by the easier situation in steel products other than flat rolled, some consumers are beginning to shift their orders for a variety of reasons including unwillingness to pay higher than ceiling prices which a few producers are allowed to charge with OPA aproval, or desire to save on transportation costs. The policy of the WPB itself is to withdraw directives where prices have been above the ceiling, provided the material can be obtained elsewhere. A full return to normal steel distribution and selling practices obviously cannot take place until the war is over, but a partial return is likely.

With the industry on the brink of financial deficits, OPA has started a comprehensive study of steel prices, that is expected to be completed speedily. A price increase may be granted before the WLB acts upon demands of the steel union for higher wages. In the event of a wage boost, it is generally assumed OPA

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would recognize the necessity for a further adjustment in prices. Meanwhile, negotiations between steel companies and the union were continuing—with a good possibility that the union might drop its demand for a supplemental contract. It is believed that the WLB will soon be handed the union's demands. Several companies have indicated rejection of the wage demands.

An annual wage guarantee appears to be the demand that the steel union considers most important. In view of the severe depths to which steel operations plunge during depressions, granting an annual wage guarantee would be exceedingly difficult in the opinion of steel executives.

IMPORTS of scrap from battlefields have mounted to large proportions at Atlantic ports. It is becoming a question in the minds of some authorities whether the movement should be continued on such a scale, in view of the numerous accidents that have been caused by unexploded ammunition and "booby traps." Close to 100 shells were reported found in a single carload recently despite the fact the scrap had been screened once by prisoners of war at New York working under the supervision of the United States Army. Thousands of tons of battlefield scrap are piled on docks and barges at East Coast ports and in railroad yards. Storage costs are said to be sizable. Those who are inclined to favor curtailing the imports contend the scrap should be held abroad until after the war, when minute examinations can be made to preclude loss of life and personal injuries, damage to ships and other transportation equipment, as well as damage to valuable steel production facilities.

With some steel companies the subject of freight equalization or absorption on out-of-district orders is an important question now, since its use may have bearing upon proof of the need for higher prices.

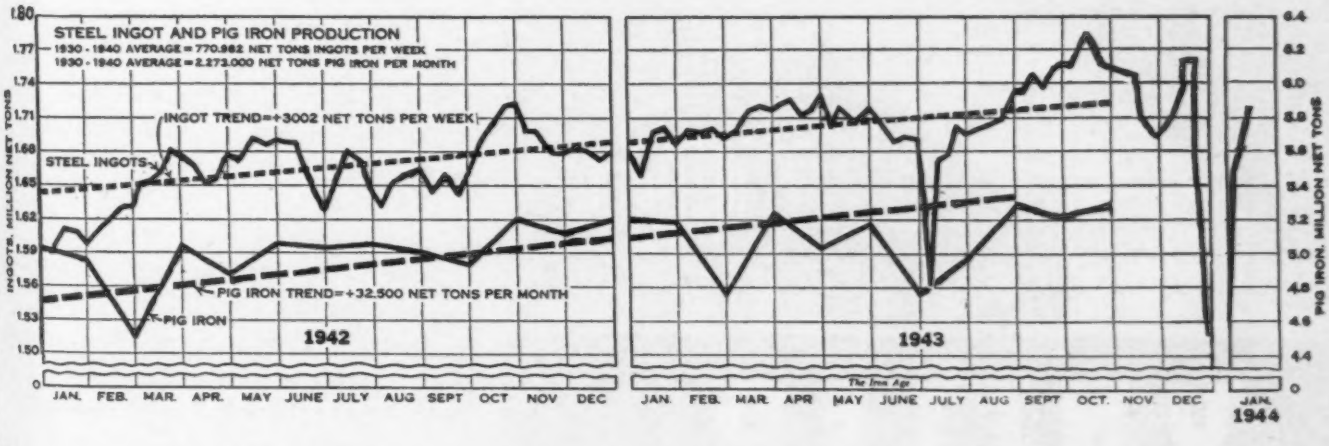
Warehouses anticipate an early lifting of the WPB restriction under CMP-4 limiting orders to less than 40,000 lb. unless special permission has been obtained to take a larger order. It is said this amendment also would raise the maximum orders which a warehouse can take without a controlled material allotment from $10 to $25.

Other highlights of this week include: Revelation by Maj. Gen. Lucius D. Clay that production of small arms ammunition during 1944 will be about 36 per cent below 1943; and circulation of reports to the effect that the Government may order aluminum sheets for landing mats, displacing some of the 1,600,000 tons of steel scheduled to be delivered this year for this purpose.

WITH demand for merchant pig iron much easier and allocations scheduled to be removed at the end of this month, conjecture centers around the possible fate of several high cost blast furnaces as well as the disposition of DPC stacks which still are to be blown in. The sale and possible disposition of the Sharpsville furnace may be a straw in the wind. The Mystic furnace in the east will abandon its OPA-approved above-ceiling prices effective Feb. 1 and will operate at least until its present ore supply is used up.

WPB faces an even bigger job this year than it did in 1943. It must grapple with the danger that regulations may not be altered quickly enough to make them realistic with new conditions immediately. Undue delay of this sort would result in the adoption of rules breaking practices by some firms, loss of business by others, and needless confusion for all.

THIS week's national steel ingot rate increased half a point to 98 per cent of rated capacity. Increases by districts include: Pittsburgh, up one point to 97.5 per cent; Youngstown, up two points to 97.5 per cent; Cleveland, up one to 93 per cent; and Buffalo, up three to 102.5. Chicago operations declined one and a half points to 102 per cent and output in the Wheeling district fell off one point to 95 per cent. At Detroit the operating rate dropped half a point to 103.5 per cent while in Cincinnati the rate fell two points to 95 per cent. Eastern district operations dropped to 85 from 95 per cent the previous week. Unchanged from last week are Philadelphia at 91; Birmingham at 99; and St. Louis at 104 per cent.



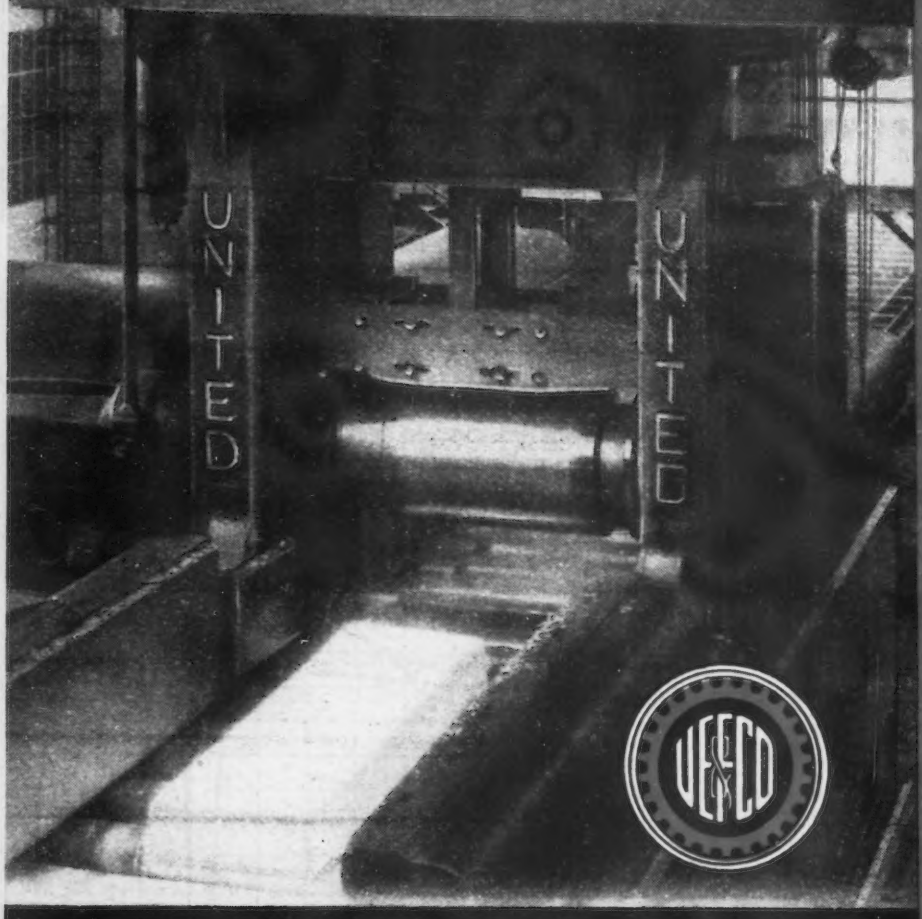
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 6	96.5	103.5	95.5	91.0	92.0	99.5	95.0	99.0	104.0	95.0	97.0	104.0*	95.0	97.5
January 13	97.5	102.0	97.5	91.0	93.0	102.5	95.0	99.0	103.5	95.0	95.0	104.0	85.0	98.0

* Revised

UNITED

ROLLS AND ROLLING MILL EQUIPMENT



Products Manufactured by United

MILLS

Blooming · Slabbing · Plate · Universal 2, 3, 4-high · 4-high Hot Strip · Bar · Rail & Structural · Merchant · Rod · Skelp · Pipe and Tube 2 and 4-high · Cold Strip · Sheet · Tin

In all types: Single Stand, One Way or Reversing, Tandem Continuous, etc. For Carbon Steel, Alloy Steels, Copper, Brass, Aluminum and other Non-Ferrous Metals.

ROLLS

"UNEFCO" Green Wabblers Grain and Chill
United Nickel Chill · United Moly. Chill
United Spec. Process
UX Chill and Grain · H. D. Spec. Process
United Straight Chill
Lincoln Special · United Unidense
United Special Steel · United Carbon Steel
United Adamite · United VAN-X
United Super X

AUXILIARY EQUIPMENT

Ingot Cars · Manipulators · Edgers
Mill Tables · Transfers · Hot Beds
Structural Straighteners · Bloom Shears
Vertical Shears · Hot and Cold Saws
Rod Reels · Hot Strip Reels · Flying Shears
Shearing Lines · Slitting and Trimming Lines
Precision Levellers · Cone Type Uncoilers
Coil Boxes · Upcoilers and Downcoilers (Strip)
Cold Strip Reels · Gear Reduction Units
Generated Gears and Pinions
Continuous Strip Picklers · Rotary Strip Pickling
Electrolytic Strip Cleaning Lines
Electrolytic Strip Tinning and Coating Lines
Material Handling Equipment
Steam Hydraulic Forging Presses
Electro-Hydraulic Forging Presses
Electro-Hydraulic Piercing Presses
Universal Couplings · Welding Manipulators
Squaring Shears · Portable Crop Shears
Lever Shears · Roll Lathes · Pressuremeters
Heavy Weldments · Annealing Boxes
Steel Castings

Illustrated is a 44-inch blooming mill

UNITED

ENGINEERING and FOUNDRY COMPANY

Pittsburgh, Pennsylvania

PLANTS AT PITTSBURGH—VANDERGRIFT—NEW CASTLE—YOUNGSTOWN—CANTON
DAVY AND UNITED ENGINEERING COMPANY, LTD., SHEFFIELD, ENGLAND
DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q. CANADA

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment

Annual Wage Guarantee Seen Union's Most Important Demand

NEWS ★ OF ★ INDUSTRY

• • • When the War Labor Board has the steel labor demands shoved in its lap soon, the most important one, from the union's standpoint, will be the request for an annual wage guarantee. Phil Murray regards this issue as something which the union should keep alive until it, or some form of annual wage guarantee, is won.

The annual wage guarantee demand, according to responsible union sources, springs from the experience of steel workers during depression periods. In 1932, it is said, the annual earnings of the average steel worker amounted to about $926. In the past several years, union research staffs have been keeping an eagle-eye on annual wage figures. Murray's request, which is believed to represent the views of the CIO, as well as the CIO affiliate, the United Steel Workers of America, is the first one of such a nature to be made upon a large scale industry.

The steel industry, while turning down any discussion of this union demand, is known, unofficially, to be greatly opposed to the whole idea apparently because it is one of those industries most severely affected by depressions. So much so is this the case, it is said, that the steel rate often drops as much as 10 to 20 points within a short time, and the records show that during depression periods the average ingot rate was hardly more than 40 per cent of rated capacity.

This "prince and pauper" existence, it is said, would prevent "beforehand" knowledge of how many employees would be needed, and thus make impractical the establishment of an annual wage. Over-simplified, the problem is: If the steel mills don't have the business, how can they operate? And, if they can't operate, how can they lay out money for a guaranteed annual wage?

Phil Murray, on the other hand, believes that no conclusions on the relative value or workability of an annual wage guarantee can materialize until the union has an opportunity to negotiate the demand with the steel companies. Since this request has been

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By TOM CAMPBELL
Pittsburgh Regional Editor

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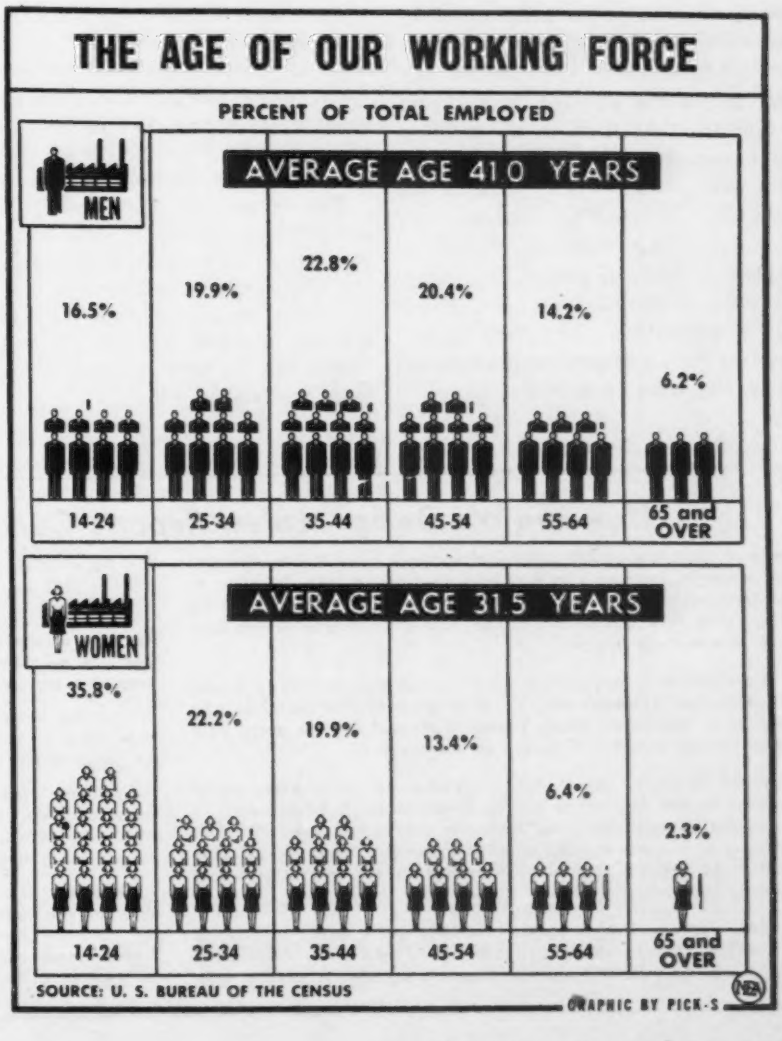
turned down, Murray will, in all likelihood, pose a serious question for the WLB by not only submitting the proposal to it, but by asking it: "Does this violate the 'Little Steel' formula?"

It is believed, on good authority, that the guaranteed wage envisioned by Murray is not a guaranteed wage for every worker in the steel industry, but a guaranteed wage for those workers for whom there is work. The basic principle, apparently, is that those for whom there is work should be allowed to receive a payment sufficient to supply a living wage, rather than spread the work among so many people that there is insufficient earnings for any.

This attitude of the union, apparently, is in direct contrast to the support given during the last major depression to the method known as "spreading-the-work." Murray believes that this is more "spreading-the-poverty" than anything else. His attitude, further, is believed to be that under the "spread-the-work" era the competition among the unemployed for jobs that require two or three days a week is so strong, that it not only brings down the wage rates but encourages cut-throat competition as well.

Just how the union would be able to negotiate a satisfactory figure, representing the maximum number of employees who would come under an annual guaranteed wage, is certainly not clear at this time. The union is working on the assumption that a guaranteed wage would remove uncertainties relative to security, and thus encourage an expanding purchasing



power, which, the union claims, would iron out some of the peaks and valleys in American industry. Apparently, the whole question is loaded with dynamite, and would require a considerable length of time before both sides even agreed to the principle of the plan. Steel men privately say that it won't work, and that the steel industry is subject to so many severe and sharp economic effects that it would appear to be the least likely one to initiate such a program.

The demand for an annual guaranteed wage involves so many complex matters, that no one steel company could grant such a request if the others did not. For that reason, it may be that the problem, itself, will not be a topic of mutual negotiation, until and unless Murray succeeds in dealing with the steel industry on an industry-wide basis, rather than company by company. The steel union has been after this type of negotiation for the past few years, but has made no headway. Some steel companies are believed to favor industry-wide collective bargaining.

The fact that the steel industry is already petitioning for price relief, to take care of accumulated raw material and labor costs, even before any wage increase is granted, would seem to indicate that it is in no position now to consider an annual wage guarantee plan which would increase its labor bill. If the WLB decrees that the annual wage question should be negotiated, then, of course, the union will have battered down the initial wall of opposition. The road to negotiating such a demand appears to be a long and winding one.

Steel Expansion Program Being Cut Back

Washington

• • • **Because** steel production for the war effort has become ample, further cutbacks are being made in the expansion program and additional ones are expected to be announced soon.

Under a procedure to be followed in all cases in the future, WPB last week in a letter to Jesse Jones, Secretary of Commerce and director of the Defense Plant Corp., recommended cancellation of fund grants for four Carnegie-Illinois Steel Corp. plants, located at Munhall and Braddock, Pa., Gary, Ind., and South Chicago, Ill.

These cancellation plans, details of which are to be worked out by DPC and Carnegie-Illinois, relate to slow cooling pits and hot topping equipment and in some cases to soaking pits and involved $1,658,000. These facilities, construction of which has not been started, were to have been installed to step up open hearth production of alloy and high quality carbon steel by 41,000 tons annually.

Cancellation of these four projects follows the recent termination of construction of the structural steel mill of the Geneva Steel Co., government-financed United States Steel Corp., subsidiary, at Geneva, Utah. Other government-financed steel expansion projects not yet completed, WPB officials pointed out, are being reviewed.

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OPA Starts Detailed Study of Steel Prices

Washington

• • • **Looking to** both the present situation as well as the effect of a further wage increase, OPA has begun a comprehensive study of steel prices covering all products and all producers. Cooperating with the Government price agency the industry is making its entire cost records available following three meetings with the Steel Advisory Committee.

The industry contends that its present earning position is poor and that it justifies higher prices regardless of the CIO United Steelworkers demand for higher wages. Should WPB grant a wage increase, whether all or part of the 17c. an hour demand, a higher price rise will be asked.

It is understood that preparations for the study have been so carefully made that it can be completed within a relatively short time. In the event of a price increase before WLB action on wage demands, it is assumed that OPA would recognize the necessity for further adjustment should labor be granted higher wages.

There has been no important change in published steel prices since June, 1938. OPA froze steel prices in 1942 on the basis of 1941 quotations. Steel companies, however, were enabled to gain a certain net increase under OPA approval by the allowance of some extras which were more or less dormant and also by the so-called emergency freight rate allowances.

How Are We Doing? Latest Reports Concerning War Output

• • • Sixty-five aircraft carriers of all types, some of them intended for lend-lease, were built in American shipyards in 1943, according to Undersecretary Forrestal. Included were six 27,000-ton carriers of the Essex type, nine light carriers of the 10,000-ton converted cruiser type and 50 escort carriers.

Development of jet-propelled fighter aircraft was revealed in a joint U. S.-British statement Jan. 6, which indicated that the craft soon will be in production. High altitude flight and extreme speed have been attained in tests. Propellers are eliminated.

In 33 months to Dec. 1, 1943, lend-lease aid to the Allies totaled $18,608,000,000. Up to the end of November the program took 13.5 cents out of every dollar of American war expenditures. Through October Russia was supplied with 7,000 planes, 3,500 tanks and 195,000 motor vehicles. Munitions comprised 48 per cent of lend-lease exports to Britain.

The American aircraft industry in 1943 set a record in building 667,000,000 lb. of military airframes, nearly two and one-half times the weight made in 1942 and about eight times 1941 production, says the Aeronautical Chamber of Commerce. Average weight of planes built in 1943 was nearly double that of 1941.

Iron ore production last year in the U. S. amounted to 113,554,000 net tons, according to the Bureau of Mines preliminary report. This was a 4 per cent drop from 1942. Shipments at 111,548,000 tons dropped 6 per cent.

American factories produced 8,802 planes in December to make the year's total 85,946, an increase for the year of 80 per cent in numbers as compared with the figures of 1942.

December production of wheeled tractors, used principally on farms, was the largest for any month in two years—in excess of 20,000 as compared with 4200 in December, 1942, according to Donald M. Nelson.

The Navy has received 20,000 landing craft ranging from 450-ft. ships to amphibian tractors, according to Undersecretary Forrestal. An additional 45,000 are being built in addition to 15,000 miscellaneous small craft, rubber boats, etc. More than $5,000,000 will be involved in building landing craft, exclusive of their ordnance.

Many Beehive Ovens Blown Out As Coke Shortage Disappears

Pittsburgh

• • • **Demand for** Beehive furnace coke in the Connellsville region has fallen off sharply in the past few weeks, and this is directly responsible for close to 480 ovens being blown out recently. Apparently coke, which was a bottleneck several months ago, is now relatively plentiful, and there will be no shortage in the near future.

In addition to this definite trend toward easier supplies, the largest consumer of furnace coke for blast furnace production has notified its suppliers that it will take no shipments on Saturdays and Mondays. This move is expected to affect about 1,000 beehive coke ovens in the Connellsville region, and will probably reduce the coke yield from 66 per cent to 60 per cent, due to burning off over the week-end.

Another development is the action of several large steel companies, in making commitments for beehive furnace coke on a monthly instead of a quarterly basis. This is believed to be due to increased by-product coke production, coupled with cutbacks in pig iron output.

The easiness in beehive coke supplies comes at a time when the OPA had just granted price relief, due to increased wage costs, for hand and machine drawn plants. The higher price has already resulted in less demand at those plants where quality has not been up to par.

Last week it became known that the OPA had granted a $1.00 a ton increase on machine drawn beehive foundry coke, and a $1.25 a ton on hand drawn beehive foundry coke. These increases, however, included the 50c. a ton which was granted some months ago on foundry coke. There is very little, if any, foundry coke which is machine drawn. The action makes the present price of hand drawn beehive foundry coke at Connellsville, $8.25 a ton.

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Union May Drop Contract Demand

Pittsburgh

• • • **Steel companies** and the United Steelworkers of America were still negotiating early this week, but it is believed that the union will not further press its demand for a supplemental contract, extending the old one and making reference to the War Labor Board decision on a retroactive date. Apparently, the refusal of steel companies to sign a supplemental contract, because they believed the WLB order was sufficient, has caused the union to drop its effort for a signed supplemental agreement. Apparently, both sides believe that the WLB decree is sufficient protection for both the union and the steel company.

It is believed that the WLB soon will be handed the steel union demands by Phil Murray. Three large steel companies have already definitely turned down all demands which involved an increase in the average wages paid. Other steel companies in their negotiations with the union have, it is understood, made it clear they are also opposed to granting any wage increases whatsoever.

Engineering Firm to Study Steel Job Rate Classification

Pittsburgh

• • • **The complex** and exceedingly great number of wage rates for specific jobs in the steel industry may soon come in for a complete overhauling, with the view towards simplification and coordination. Several steel companies have been studying job analysis and simplification of job rates for sometime. Others have started recently.

It is understood that a national engineering concern may soon open offices in the Grant Building, here, for the purpose of conducting a study and coordination of specific job rates, to be submitted to them by several steel companies. Apparently, some effort will be made to set up a master job rate list, the purpose of which would be to iron out, or eliminate, inequalities or duplications in titles or wage rates in the same or closely allied jobs.

Last year, an attempt along this line, involving the steel union, was made, when the United States Steel Corp. and the United Steel Workers of America formed a joint commission to study rate inequalities, etc. After several months of meetings and negotiations, the plan was thrown out of the window and the joint commission dissolved. The reason for the failure of the commission to reach satisfactory conclusions is believed to have been the inability of both parties to arrive at a wage rate which would be somewhere near the middle of those which were higher and lower for the same or similar work.

COMING EVENTS

Jan. 10 to 14—Society of Automotive Engineers, Detroit.
March 14, 15—National Association of Waste Materials, Inc., New York.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

Cut in Small Arms Ammunition Scheduled

Washington

• • • **Maj. Gen. Lucius D. Clay,** director of materiel, Army Service Forces Production revealed on Monday that the production of small arms ammunition during 1944 will be approximately 36 per cent below the 1943 total.

The United States produced approximately $2,000,000,000 worth of small arms ammunition in 1943, according to WPB officials.

"Monthly schedules are already in process of reduction in anticipation of the reduced objectives and production is scheduled to proceed at a relatively uniform monthly rate throughout 1944," General Clay told THE IRON AGE.

Said the General:

"Overall production of ground force equipment in 1944 as now scheduled isn't likely to differ materially from total production in 1943.

"There have been cutbacks among individual programs, such as in tanks, anti-aircraft materiel and small arms ammunition, but these are offset by increased production required during 1944 in other programs.

"On a monthly basis, production of ground force equipment during 1944 is scheduled to reduce somewhat from the peak attained during the last quarter of 1943, and will level out at approximately the third quarter, 1943 rate. This represents a drop of between 7 and 8 per cent from the average rate during the last three months of 1943."

Byrnes Adopts Baruch Clause Making Profit on Unfinished Work 6 Per Cent

By DONALD BROWNE
Washington Staff

Washington

• • • **Bernard M. Baruch** and John Hancock put out their uniform contract termination article and a statement of principles for determinations of allowable costs in final contract settlements, last Saturday. At the same time, Justice Byrnes, director of the Office of War Mobilization, issued a directive making the clause and the cost policy effective in all contracting agencies.

The Baruch clause and cost policy which has been agreed to by the joint contract termination board composed of representatives of the War, Navy and Treasury departments, the RFC subsidiaries and foreign economic administration differs from the existing War Department clause in four major respects:

1. A profit formula providing for a maximum of 6 per cent on work begun but not completed and 2 per cent on unprocessed inventory where the inventory is allocable to the contract.
2. Direction to contractors to assign to the government all of their interest under orders of contracts terminated. This opens the door to merged settlements of a number of contracts with the manufacturer, separate settlements with subcontractors where it is deemed proper and for subrogation of the contractor's rights to the government wherever the contractor settles with the supplier under the terms of the uniform clause.
3. Permission is granted to contractors to apply to the procurement agency for leave to charge higher prices to compensate for increased cost of doing business where it is directly attributable to partial terminations.
4. A greatly liberalized policy with respect to allowable costs.

In general the termination article sets forth two things: (1) The obligations imposed on a contractor when the government tells him to stop work; (2) the method of finding out how much money is coming to him.

Nine steps are provided for the contractor to follow when his contract is terminated:

1. Stop work on the date specified.
2. Place no further orders for materials, etc., except that required for unfinished work, which will be completed.
3. Terminate all orders and subcontracts on the contracts halted.
4. Assign to the government all right, title and interest in such contracts.
5. Settle all claims arising with subcontractors in the discretion and at the direction of the contracting officer.
6. At the contracting officer's direction, transfer all title and deliver to the government fabricated and unfabricated parts, work in process and plans, drawings, connected with the work.
7. Sell inventories and work in process at the direction and under the approval of the contracting officer at the best price obtainable. The contractor is not required to extend credit and may purchase the property himself.
8. Complete unterminated work.
9. Take any action necessary to protect and preserve property in which the government has an interest.

The amount due the contractor may be determined in two ways. He may negotiate his settlement with the contracting officer, including a reasonable allowance for profit, or he may resort to a profit formula. Negotiated settlements will be preferred by the Army, at least.

The formula provides for three elements. They are:

1. The contractor shall be paid "forthwith" for completed articles delivered and accepted at the contract price.
2. He shall be reimbursed for certain items of cost plus a fair and reasonable profit allowance not to exceed 6 per cent of a portion of such costs.
3. He may receive the reasonable cost of taking care of government property, plus any expenses incidental to the settlement.

The cost items to be allowed under the second element are:

1. The cost of unfinished work, including amounts paid or payable to subcontractors.
2. The cost of settling any claims arising out of the termination of subcontracts.

To these two cost items would be added two elements of profit, which are:

1. Up to 2 per cent of unprocessed inventory allowable to the particular contract.
2. A fair and reasonable percentage of the remainder of the unfinished work.

The aggregate of these two, however, may not exceed 6 per cent of the cost of the unfinished work.

The following costs were listed as allowable: common inventory, common claims of subcontractors, depreciation, experimental and research expense, engineering developmental and special tooling costs, losses on facilities specially acquired for performance of the contract, advertising, special leases, interest, expenses connected with the termination settlement, costs of protecting government property.

In addition, properly apportioned non-recurring initial costs, such as labor training, excessive rejections and unusual overhead will be allowed.

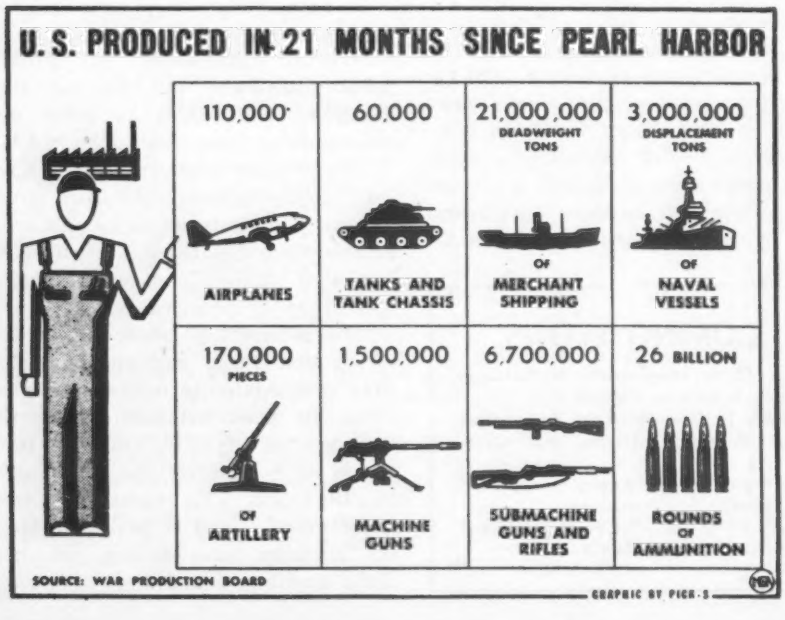
Costs which are not allowable are as follows: reconversion, other contract losses, expenses of reorganization or recapitalization, tax or anti-trust litigation, expenses losses on investments and premiums for insurance on the contractor.

While the procurement agencies concerned may agree with OWM's new policy, criticism is expected from the General Accounting Office and certain Congressional factions.

The GAO complains that the extent of the record to be made in settlement for audit purposes has not been set forth. The members of Congress who are critical say that this is one more case of where the executive is trying to usurp the prerogatives of the Congress.

Some WPB officials say that while they do not disagree with the clause and cost policy, they were disappointed that the report did not cover more territory. Yet the arrangement is not rigid nor too detailed, all parties agree. Regulations will have to be worked out.

Baruch and Hancock in their letter of transmittal to Justice Byrnes said that their first recommendations cover merely a part of the vast termination picture. Such problems as the keeping of adequate records, the special prob-



BERNARD M. BARUCH

lems of subcontractors, payments, loans, appeals, company wide settlements, the disposal of property and the need for legislation will be subjects for further reports.

The policy expressed by Baruch and Hancock has four objectives: Application of the termination article to subcontractors, quick payment of what the government owes, provision for adequate records to prevent and detect fraud, and the clearance of government-owned machines from war plants within 60 days. If contractors wish to incur the risk, they will be permitted to remove machinery and material before 60 days elapse after the filing of inventory lists, if they assume responsibility therefor.

The plan for the merging of the claims of major prime contractors, not as yet announced by OWM, is expected by other agencies to come out soon. Under this plan major prime contractors would not pay off their subcontractors. The suppliers would get paid directly by the government and the Baruch clause seems to be pointed this way through the provision for assignment of all claims of subcontractors to the government.

The merging of claims would obliterate contract lines and make it possible for the government to settle with 1650 contractors for 90 per cent of all contracts and 85 per cent of all the money owed by way of termination charges, some procurement agency officials think. Suppliers' claims, while numerically large, would represent relatively little money. The plan has been likened to PRP, using money.

Three important new costs which will be allowable are experimental and research expenses, engineering, developmental and special tooling costs, and loss on facilities where the machinery was specially acquired for the performance of the war contract and represents a loss on a peacetime basis.

These preliminary costs in fixed price contracts, while included in price, will fall heavily on the contractor where the contract is terminated when say 66 2/3 per cent complete. The allowance is based on the relation of the remainder of the contract to be finished to the portion complete. In other words, the contractor is reimbursed for the part of the cost which would have to be allotted to the unfinished part of the contract.

The steel industry will benefit by the cost embracing loss on facilities.

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Fears Are Allayed by New Clause

New York

• • • **War contractors** have greeted the Baruch-Hancock report as a uniform measure for settling contract terminations equitably and with a minimum of delay by government agencies.

Although the fixed profit limitation of 6 per cent on goods in process has been termed arbitrary by some, it does reassure contractors that all will be treated similarly. Any fears that competitors will have received more favorable treatment are allayed.

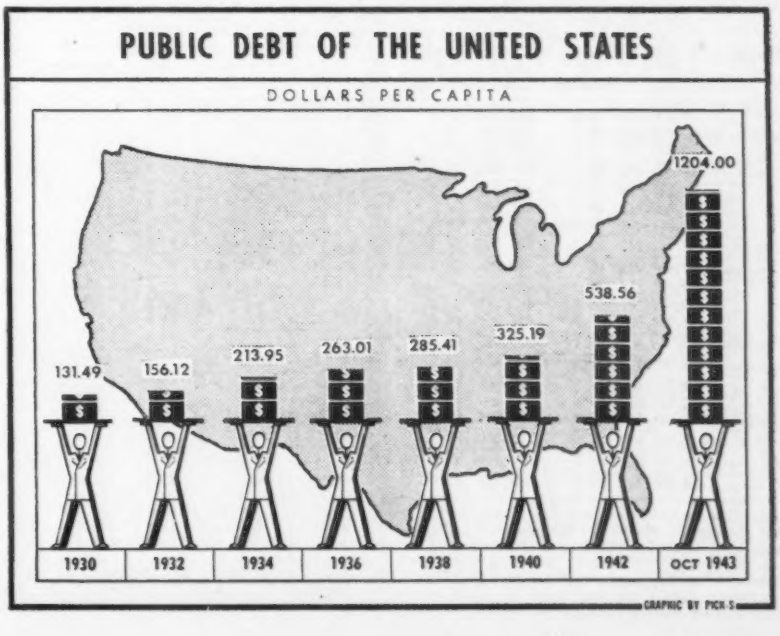
The recommendation that two per cent be allowed on raw material inventories is regarded as more generous than the procedure followed by the War Department under PR 15. These profit limitations will considerably reduce the time consumed in negotiation of settlements.

Under this provision, contractors will be reimbursed for expenses involved in setting up inventories, contacting subcontractors and other charges directly connected with the performance of the contract. However, the contractor must "use his best efforts to sell in any manner, to the extent, at the time, and at the price or prices directed or used by the contracting officer" completed parts or supplies acquired to fulfill the contract. Thus, contracting officers will still play an important role in the disposal of surpluses until a central agency is established to perform this function.

Since a profit ceiling of six per cent is established, contractors would very much like to see written into termination procedure a clause precluding termination settlements from future renegotiation. Now that a legal ceiling has been set up, it is thought that contracting officers would feel free to allow such a clause.

Whether subcontractors' claims are included in the 6 per cent ceiling is still not very clear and it is believed at present that such claims will have to be segregated and submitted separately.

The question of surpluses and subcontractors' problems still have to be settled, George Renard, executive secretary of the National Association of Purchasing Agents said. When these problems are solved, "everyone will be pretty well satisfied."



Mills Make December Plate Record

Washington

• • • **The nation's steel** mills hung up a new record of 1,169,196 tons in the last month of 1943 for plate production.

The previous monthly high production of plates was 1,168,000 tons in March, 1943.

December's all-time high in plate production came at a time when the industry suffered an output loss through strikes equal to an additional 20,000 tons, according to Steel Division officials.

(Total steel plate production for 1943 was 13,382,390 tons. This compares with output of 11,809,938 tons in 1942.)

The biggest factor in the plate demand situation is the huge requirement of the Maritime Commission. Steel Division records show that Maritime now has enough plates to build an additional 8,000,000 tons of shipping without receiving another ton.

This Maritime stockpile is estimated to amount in overall plate tonnage to 2,500,000 tons, or five months' supply. By the end of June, when Maritime will have received all the steel needed for the 1944 ship program, Maritime will have received another 3,300,000 tons of plates.

What perplexes WPB officials is how Maritime proposes to get rid of excess steel it will undoubtedly possess when the 1944 program is completed if the same rate of delivery is maintained by the steel companies throughout the first half of this year.

Maritime officials on the other hand deny the yards working for it have any surplus steel stocks.

In an OWI release last Friday, it was stated that Maritime's tentative 1944 program calls for the building of 20,000,000 deadweight tons of new ships in 1944, against about 19,000,000 tons built in 1943.

Inland Steel Co. produced during the 12 months ending Dec. 31 a total of 3,597,975 net tons of ingots, an increase of 170,464 net tons over the 1942 total. In the same period it shipped 2,727,398 net tons of finished steel, 116,674 net tons more than were shipped during 1942. A new all-time monthly high in plate shipments is represented in the 91,693 tons shipped in December.

Bethlehem Steel Co.'s all-time record of 13,000,000 tons of steel produced in 1943 included 1,938,952 tons of plates, 1,661,387 tons of alloy steel, and 300,325 tons of forgings.

Steel Employees Fewer

• • • Employment in the steel industry continued to decline in November, according to the American Iron and Steel Institute, reporting that 611,000 employees were on the payrolls in November, down 4000 from October. Payrolls during November amounted to $141,467,000.

Earnings of wage-earning employees in the industry averaged 116.1 cents per hour during November, highest on record.

Wage earners worked an average of 44.8 hours per week in November.

1943 Ingot Production Set at 88,872,598 Tons

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Open Hearth* Net tons	Open Hearth* Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total* Net tons	Total* Percent of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January	6,576,524	97.8	478,058	85.9	369,395	95.4	7,423,977	96.8	1,675,841	4.43
February	6,031,363	99.3	447,843	89.1	344,532	98.6	6,823,738	98.5	1,705,934	4.00
March	6,787,630	100.9	503,673	90.5	381,219	98.5	7,672,522	100.0	1,731,946	4.43
1st Quarter	19,395,517	99.3	1,429,574	88.4	1,095,146	97.5	21,920,237	98.4	1,704,529	12.86
April	6,510,563	99.9	481,810	89.4	382,532	102.1	7,374,905	99.3	1,719,092	4.29
May	6,669,436	99.1	483,024	86.8	398,057	102.9	7,550,517	98.4	1,704,406	4.43
June	6,202,640	95.2	453,599	84.1	384,645	102.6	7,040,884	94.8	1,641,232	4.29
2nd Quarter	19,382,639	98.1	1,418,433	86.7	1,165,234	102.5	21,966,306	97.5	1,688,417	13.01
1st 6 months	38,778,156	98.7	2,848,007	87.6	2,260,380	100.0	43,886,543	98.0	1,696,426	25.87
July	6,556,531	96.8	466,288	90.6	393,342	94.0	7,416,161	96.3	1,677,864	4.42
August	6,699,850	98.7	484,957	94.0	407,224	97.1	7,592,031	98.3	1,713,777	4.43
September	6,646,702	101.4	480,635	96.4	391,241	96.6	7,518,578	100.8	1,756,677	4.28
3rd Quarter	19,903,083	99.0	1,431,880	93.6	1,191,807	95.9	22,526,770	98.4	1,715,672	13.13
9 months	58,681,239	98.8	4,279,887	89.5	3,452,187	98.5	66,413,313	98.1	1,702,905	39.00
October	6,891,753	101.6	513,521	99.5	413,787	98.7	7,819,061	101.3	1,765,025	4.43
November	6,542,942	99.6	440,941	88.2	390,564	96.2	7,374,447	98.6	1,718,985	4.29
December	6,509,923	96.2	390,930	75.9	364,924	87.2	7,265,777	94.3	1,643,841	4.42
Total (year)	78,625,857	98.9	5,625,279	89.1	4,621,462	97.4	88,872,598	98.1	1,704,499	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,657 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

* Revised to include production of new facilities not previously reported.

YEAR 1942

Period	Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,322,215	95.3	490,874	86.0	299,017	94.2	7,112,106	94.5	1,605,442	4.43
February	5,785,918	96.6	453,549	88.0	273,068	95.2	6,512,535	95.9	1,628,134	4.00
March	6,572,930	99.0	493,191	86.4	325,990	102.7	7,392,111	98.2	1,668,648	4.43
1st Quarter	18,681,063	97.0	1,437,614	86.7	898,075	97.4	21,016,752	96.2	1,634,273	12.86
April	6,345,133	98.7	454,834	82.2	321,324	104.5	7,121,291	97.7	1,659,975	4.29
May	6,595,440	99.4	453,938	79.5	333,200	104.9	7,382,578	98.1	1,666,496	4.43
June	6,239,674	97.1	452,528	81.8	323,100	105.1	7,015,302	95.3	1,635,269	4.29
2nd Quarter	19,180,247	98.4	1,361,300	81.2	977,624	104.8	21,519,171	97.4	1,654,049	13.01
1st 6 months	37,861,310	97.7	2,798,914	83.9	1,875,699	101.1	42,535,923	96.8	1,644,218	25.87
July	6,345,315	95.7	453,686	79.6	345,957	96.6	7,144,958	94.5	1,616,506	4.42
August	6,414,637	96.5	467,293	81.8	345,725	96.3	7,227,655	95.4	1,631,525	4.43
September	6,286,855	97.9	437,961	79.4	332,703	95.9	7,057,519	95.4	1,648,953	4.28
3rd Quarter	19,046,807	96.7	1,358,940	80.3	1,024,385	96.3	21,430,132	95.4	1,632,150	13.13
9 months	56,908,117	97.3	4,157,854	82.7	2,900,084	99.4	63,966,055	96.3	1,640,155	39.00
October	6,750,829	101.5	461,897	80.9	366,788	102.2	7,579,514	100.0	1,710,951	4.43
November	6,371,750	99.0	458,469	82.9	349,593	100.5	7,179,812	97.8	1,673,616	4.29
December	6,471,261	97.6	475,204	83.4	358,075	100.0	7,304,540	96.6	1,652,611	4.42
4th Quarter	19,593,840	99.4	1,395,570	82.4	1,074,456	100.9	22,063,866	98.2	1,679,137	13.14
2nd 6 months	38,640,647	98.0	2,754,510	81.3	2,098,841	98.6	43,493,998	96.8	1,655,653	26.27
Total	76,501,957	97.9	5,553,424	82.6	3,974,540	99.8	86,029,921	96.8	1,649,979	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,498,022 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons Bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, Bessemer 6,721,400 net tons, Electric 4,225,890 net tons.

Easier Pig Iron May Doom High Cost Stacks; Fate of DPC Furnaces Posed

Pittsburgh

• • • There is a probability that a few high cost merchant blast furnaces may be blown out in the near future, in view of the easier situation in the supply of pig iron. The sale and possible demolition of Pittsburgh Coke & Iron Co.'s Sharpsville plant to the Hetz Construction Co., Warren, Ohio, appears to be a straw in the wind.

It is believed the Pittsburgh Coke & Iron Co.'s furnace was sold primarily because of its high cost operations, and because it was apparent that as long as consumers could obtain pig iron at ceiling price they would be reluctant to pay higher than these quotations. This same situation is expected to influence other merchant furnaces in the western Pennsylvania and northern Ohio area, and the trade looks for further curtailment by the second quarter in the operations of steel company owned furnaces as well as merchant stacks.

The Hetz Co., in case it cannot find a buyer for the Sharpsville, Pa., furnace, will attempt to sell the plant for dismantlement, to be re-erected in other sections of this country or possibly South America.

While some pessimists look for large scale shutdowns in merchant blast furnaces, present market conditions do not seem to entirely support this viewpoint. While it is true that some furnaces have had to charge an OPA-approved price higher than the ceiling price, the taking of pig iron off allocations may enable some companies to go back to their normal practice of supplying consumers relatively close to the stack. This will not help plants which have unduly high costs, however. The blowing out of stacks owned by steel companies, because of lack of business, appears to definitely indicate a downward trend in pig iron production, and probably poses a difficult problem concerning the disposition of DPC stacks which are still to be blown in.

"Production for Sale" Steady in November

Source: American Iron and Steel Institute

	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS					
Ingots, blooms, billets, slabs, sheet bars, etc.	xxxxxxx	750,325	197,821	7,818,445	2,245,866
Heavy structural shapes	5,412,580	335,691	xxxxxxx	3,511,228	xxxxxxx
Steel piling	338,000	7,586	xxxxxxx	38,069	xxxxxxx
Plates—Sheared and Universal	9,489,740	1,108,460	1,949	11,805,440	34,675
Skelp	xxxxxxx	61,246	39,896	719,564	436,167
Rails—Standard (over 60 lbs.)	3,629,260	170,724	xxxxxxx	1,735,571	xxxxxxx
Light (60 lbs. and under)	309,690	8,362	xxxxxxx	150,083	xxxxxxx
All other (Incl. girder, guard, etc.)	102,000	1,084	xxxxxxx	20,145	xxxxxxx
Splice bar and tie plates	1,120,270	54,669	xxxxxxx	572,797	xxxxxxx
Bars—Merchant	xxxxxxx	627,797	81,833	6,562,460	879,173
Concrete reinforcing—New billet	xxxxxxx	34,507	xxxxxxx	384,790	xxxxxxx
Rerolling	xxxxxxx	5,976	xxxxxxx	73,482	xxxxxxx
Cold finished—Carbon	xxxxxxx	152,692	xxxxxxx	1,625,823	xxxxxxx
Alloy—Hot rolled	xxxxxxx	214,711	30,049	2,759,631	384,653
Cold finished	xxxxxxx	32,180	xxxxxxx	418,716	xxxxxxx
Hoops and baling bands	xxxxxxx	4,808	xxxxxxx	80,405	xxxxxxx
TOTAL BARS	14,719,525	1,072,671	111,882	11,905,307	1,263,826
Tool steel bars (rolled and forged)	200,840	11,918	xxxxxxx	165,452	xxxxxxx
Pipe and tube—B. W.	2,231,040	108,751	xxxxxxx	1,212,366	xxxxxxx
L. W.	845,400	43,215	xxxxxxx	512,827	xxxxxxx
Electric weld	1,149,250	83,370	xxxxxxx	949,492	xxxxxxx
Seamless	3,082,400	175,893	xxxxxxx	2,000,710	xxxxxxx
Conduit	190,000	3,804	xxxxxxx	51,274	xxxxxxx
Mechanical Tubing	597,800	61,888	xxxxxxx	684,351	xxxxxxx
Wire rods	xxxxxxx	106,693	17,303	1,108,346	206,041
Wire—Drawn	2,356,550	175,370	2,518	1,831,287	47,124
Nails and staples	1,116,640	60,511	xxxxxxx	739,772	xxxxxxx
Barbed and twisted	482,280	19,117	xxxxxxx	222,742	xxxxxxx
Woven wire fence	778,060	27,078	xxxxxxx	235,426	xxxxxxx
Bale ties	128,420	6,104	xxxxxxx	98,629	xxxxxxx
All other wire products	78,220	4,635	xxxxxxx	53,888	xxxxxxx
Fence posts	112,065	6,397	xxxxxxx	44,472	xxxxxxx
Black plate	339,700	39,794	85	318,709	85
Tin plate—Hot rolled	483,620	-	xxxxxxx	10,597	xxxxxxx
Cold reduced	3,841,340	135,655	xxxxxxx	1,960,451	xxxxxxx
Sheets—Hot rolled	xxxxxxx	539,038	16,583	5,483,207	187,579
Galvanized	xxxxxxx	69,213	xxxxxxx	747,085	xxxxxxx
Cold rolled	xxxxxxx	155,430	xxxxxxx	1,398,397	xxxxxxx
All other	xxxxxxx	27,471	xxxxxxx	326,353	xxxxxxx
TOTAL SHEETS	13,497,570	791,152	16,583	7,954,982	187,579
Strip—Hot rolled	3,201,690	131,527	14,861	1,418,984	173,299
Cold rolled	2,059,740	95,313	xxxxxxx	1,070,602	xxxxxxx
Wheels (car, rolled steel)	424,820	19,376	xxxxxxx	207,363	xxxxxxx
Axles	453,470	14,081	xxxxxxx	148,451	xxxxxxx
Track spikes	308,350	9,905	xxxxxxx	126,499	xxxxxxx
All other	xxxxxxx	16,165	xxxxxxx	183,209	xxxxxxx
TOTAL STEEL PRODUCTS	xxxxxxx	5,718,490	402,898	61,593,530	4,594,662

Mystic to Abolish Premium Price Feb. 1

Boston

• • • **Despite the fact** the WPB will discontinue pig iron allocations Feb. 1, and MRC financial support will be withdrawn on the same date, plus the fact that Mystic Iron Works has been operating in the red even with government financial support, that furnace will continue to operate at least until its supply of high priced Lake ore has been liquidated.

In announcing this decision the furnace informed the trade that effective Feb. 1, its prices will revert to their former basis. In other words the base price on foundry iron will be lowered $2 to $25 a ton, and on malleable to $25.50, delivered basis. The revised prices will apply to all undelivered allocated iron, as well as to new contracts.

The furnace has sufficient unliquidated ore to keep it in operation for several months and in addition has a modest supply of pig iron in stock. In acting as it has, the furnace assumes that domestic business conditions will be sufficiently improved by the time its present Lake ore supply is liquidated to warrant continued operations.

U. S. Steel Shipments 20,244,830 Tons in 1944

• • • **Shipments** of finished steel products by subsidiaries of United States Steel Corp. in 1943 amounted to 20,244,830 net tons, subject to year-end adjustments, compared to 20,615,137 net tons in 1942, a decrease of 1.8 per cent.

In December shipments amounted to 1,719,624 net tons, compared to 1,660,594 in November and 1,849,635 in December, 1942.

WPB Authorizes Production of More Than Million Trucks and Truck Trailers

• • • **The WPB** on Jan. 4 issued Limitation Order L-1-E providing for the production of more than 1,000,000 trucks and truck trailers for military and civilian use during 1944. A direct result of this order, however, is the prohibition of manufacture of truck, truck trailers or other vehicles unless specifically authorized, but authorizations have already been issued by WPB establishing production schedules for the year.

Terms of the order provide that production and shipment of these vehicles must be made without regard to preference ratings or directions of any governmental agency other than WPB. These schedules will be reviewed monthly and revised when necessary.

In order to secure production on time of various components going into trucks and trailers and other products using automotive type components, the order provides that WPB, as the necessity arises, will issue specific directions to suppliers of components which will fit the timing of their production into the schedules for the end products.

No producer or supplier will be permitted, except when authorized by WPB, to accept an order for any product, the production of which will delay or interfere with his "frozen" schedule under the order, nor may any producer or supplier place an order with another supplier for a total quantity of any component in excess of his actual requirements. The order also assigns a preference rating of AA-1 to producers of motor trucks and truck trailers and suppliers of components for material entering into the production of these items.

Simultaneous with the issuance of this order, WPB announced the revocation of Limitation Order L-1-G. Truck trailers will hereafter be produced under the terms of the new order.

CMP Developments

• Dir. 40 to Reg. 1 rules that railroad frogs and switches will be Class B products, rather than controlled materials beginning Jan. 1. (Release No. WPB-4764)

•

• Dir. 41 to Reg. 1 spells out special directions for filing applications for allotments of controlled materials needed to make two classes of products required for ship repairs. (Release No. WPB-4765)

•

• Dir. 43 to Reg. 1 orders aluminum producers to remove from their production schedules by Jan. 1 all authorized controlled material orders bearing a 1943 CMP allotment number which are not in production by Dec. 31, 1943. This does not include orders for fourth quarter which have not been produced or entered into production because of inability of the producer to meet his production schedules.

C. E. Wilson Given Broad WPB Powers

Washington

• • • **The gradual shift of** power over the WPB from Chairman Donald M. Nelson to Executive Vice-chairman C. E. Wilson became concrete on Jan. 3 with the issuance of WPB Reg. 1 as amended which in effect assigned all of the powers of the chairman to Mr. Wilson, with certain exceptions. The exceptions were those powers delegated to the chairman by the Smaller War Plants Act. The new order, which became effective Dec. 31, virtually empowers Mr. Wilson to take full charge of WPB.

In part, the powers assigned to C. E. Wilson included the authority to direct the activities and functions of all officials of the WPB, Aircraft Resources Control Office and Aircraft Scheduling Unit; denial powers over allocations of material and assignment of preference ratings, or administrative and appeal actions.

Full powers were also given Mr. Wilson over other agencies and officials operating with or for the WPB as well as authority over directives, new orders and similar powers previously enjoyed only by the chairman.

WPB Increases Types of Rotary Files to Be Produced

• • • **The quantity of** special (nonstandard) rotary files that a machine tool accessory manufacturer may make was increased Jan. 4 when WPB issued an amendment to Schedule IV of Limitation Order L-216.

The quantity that the manufacturer may make in any month was increased to 25 per cent of his total file production in the preceding month. The previous figure was 10 per cent. The increased quota had been recommended by the Rotary File and Burr Industry Advisory Committee because the lower quota caused a hardship to the industry. The amended schedule also permits a manufacturer to supply "chip breakers," or tranverse grooves, in the cutting section of a rotary file.

Razors and Blades Given Open Steel Quota

Washington

• • • **Production of razors** and razor blades in 1944 will be limited only by the amount of materials that can be allocated for the purpose under CMP or are available outside CMP, the WPB announced Jan. 4. The order L-72, setting forth these restrictions, has been revoked.

It has become possible for WPB to take this step because the facilities required for the manufacture of razors and blades, generally speaking, are not needed to produce war items. Also, since the production of both razors and blades is a highly mechanized process, labor is not a factor.

Amended MPR 188 Establishes Refractory Pricing Method

• • • **To relieve manufacturers** of undue burden and delay in establishing maximum prices for certain essential refractory (heat-resisting) products, the OPA on Jan. 6 authorized a specific pricing method for the products. The action is covered in Amendment 23 to Order A-1 under MPR 188.

Items affected include fireclay, super duty fireclay, high alumina, silica, and insulating refractory shapes.

Price Briefs

• Amdt. 2 to MPR 77 authorizes producers and distributors of beehive oven coke to add $1.00 for machine-drawn and $1.25 for hand-drawn coke produced in the Connellsville, Pa., district.

•

• Amdt. 1 to MPR 465 provides that sellers of installed used vessels, such as underground gasoline and fuel oil storage tanks, be compensated for a portion of the original installation cost when that cost was in excess of $100. (Release No. OPA-3750)

•

• Amdt. 23 to Order A-1 of MPR 188 relieves manufacturers of undue burden and delay in establishing maximum prices for certain essential refractory products by authorizing a specific pricing method for the products. (Release No. OPA-T-1604)

•

• Amdt. 72 to SR 14 establishes maximum prices for sales of used airplanes powered with a single engine of not more than 500 hp. (Release No. OPA-3736)

22 New Items in '44 Can Pack Quota; 1,900,000 Tons of Prime Plate Allocated

• • • On Jan. 4 WPB announced a list of 169 different products that may be packaged in metal containers this year, in making estimates of 1944 quotas. The list of quotas contains 22 items that could not be packaged in metal containers last year. The action was taken by the issuance of Conservation Order M-81, Schedules I, II, and III, as amended. The schedules of the amended order have been correlated with glass container order L-103-b, permitting increased packs in some cases.

To make possible the 1944 packs, an estimated total of 1,900,000 tons of prime plate has been allocated, as compared with 1,550,000 tons of prime plate used in 1943.

The 22 new items to be packed in metal containers are: Alcohol, inflammable cleaning fluid, hydraulic brake fluid, movie film, polishes and waxes, roof coatings, turpentine, lubricating oils, motor oils, putty and caulking compounds, lacquers, shellacs, liquid disinfectants and germicides, antifreeze, varnishes, liquid insecticides and fungicides, varnish remover, lemon juice, sweet syrups, cranberries, pimientos, and boned chicken.

This year there will be a small quantity of orange juice and blended orange and grapefruit juice packed in cans for U. S. civilians. None was packed in cans last year for their use.

o o o

Steel Warehouse Allotments to Continue

Washington

• • • WPB intends to continue its practice of designating which dealer in steel products may be considered a warehouse and to receive warehouse privileges under such classification. Only those so designated may obtain allotments of steel for replenishment of their stocks. The notice sent to warehouses by J. T. Whiting, director of the Steel Division, reads:

Enclosed herewith is a copy of Form GA-996, "General Steel Warehouse Certificate and Base Tonnage Record." This form replaced Forms PD-83-b and PDL-2228 and represents your authorization from the War Production Board to conduct warehouse operations with respect to General Steel Products under Order M-21-b-1.

You are required to send a copy of the front page of this form to each of your producer sources of supply. Since a coming amendment to Order M-21-b-1 will omit any further reference to Forms PD-83-b or PDL-2228, it is suggested that you do this promptly in order that any steel scheduled for shipment to you when the amendment is issued can go forward without delay.

On the back of Form GA-996 is a record of your base tonnage of General Steel Products. All carbon steel figures, except tool steel, originally reported on Form PD-83-a, or as adjusted by WPB, have been rounded off to the nearest net ton. All alloy steel figures, except stainless and tool steel, have also been rounded off to the nearest net ton. It is these figures which you should report as your base tonnage when filing your quarterly report on Form WPB-2888 with the Bureau of the Census.

New WPB Forms

WPB-1229—Diamond dies: Consumers' report on stocks, receipts, and requirements of dies and shipments of wire drawn through small dies.
WPB-3433—Aluminum critical castings: Foundry's semi-monthly report.
WPB-3424—Plugs and flanges: Closures and fittings for steel drums. Manufacturer's monthly report of production.
WPB-3442—Report of disposition and stocks of materials under allocation.
WPB-3159—Copper-base alloy ingot operations: Ingot maker's report.
WPB-3009—Copper wire mill warehouse: Shipment report.
WPB-3449—Laboratory equipment: Manufacturers' monthly report.
WPB-1041—Application for authorization to contract or arrange for importation of strategic materials.
WPB-1039—Application for authorization to dispose of or process imported strategic material pursuant to General Imports Order M-63.

WPB Amends E-10

Washington

• • • General Preference order E-10 was amended to provide that antifriction bearings may be disposed of to fill any order rated AA-5 or higher placed by the armed services of their prime or sub-contractors who "will incorporate the bearings into or will deliver them as spare bearings with a product being manufactured by him."

Priority Changes

E-10—Amended order more strictly defines the type of prime or subcontractor to whom surplus anti-friction bearings may be sold. (1-4-44)

•

L-30-d—Int. 1 rules that small hardware used with curtain rods and fixtures is to be regarded as joining hardware under the terms of the order. (1-5-44)

•

L-42—Dir. 1 authorizes production of 50,000 cast iron bathtubs for war housing projects. (12-30-43)

•

L-54-c—Revised order lifts some restrictions on output of office machines. (1-5-44)

•

L-74—Revised order frees dealers' stocks of oil burners for new installations provided that PAW has approved in writing the delivery of fuel oil for such a burner on the premises in question. (1-4-44)

•

L-79—Revised order adds oil burners to the list of exceptions from control, under specified conditions. (1-4-44)

•

L-123—Amended order extends to Feb. 1 permission for farmers to purchase fractional horsepower motors and certain other items of general industrial equipment on a farmer's certificate declaring that the equipment is needed for farming pursuits. (1-4-44)

•

L-140-b—Amended order rules that the quarterly production quota assigned to each flatware manufacturer in a local area designated as being critical by WMC may not be greater than the manufacturer's average production in the third and fourth quarters of 1943. (1-6-44)

•

L-187—Amended order provides for production of cast-iron boilers during 1944 equal to 100 per cent of the number produced in 1940. (1-1-44)

•

L-216—Amended order increases the quantity of special (non-standard) rotary files that a machine tool accessory manufacturer may make. (1-4-44)

•

L-252—Amended order grants permission to use either brass or bronze in making nuts for several categories of valves. (1-6-44)

•

M-1-i—Amended order permits the use of aluminum in the manufacture of collapsible tubes. (1-7-44)

•

M-11-b—Amended order relaxes controls on the use of zinc. (12-31-43)

•

M-29—Order revoked. (12-30-43)

•

M-39—Amended order removes restrictions on the delivery and sale of cobalt. Vendors of more than 1000 lb. of this material in any one month will be required to report all sales during that month. (12-30-43)

•

M-81—Amended order sets up quota on cans for food packs. (1-3-44)

•

M-261—Amended order permits appeals on restrictions of metal strapping for shipping containers to be filed in regional WPB field offices. (1-7-44)

•

M-293—Dir. 1 rules that without specific authorization from WPB no manufacturer is permitted to begin production of certain types of stationary boilers, boiler units or auxiliaries if he believes the product will be held in stock by a wholesaler or dealer rather than shipped directly for installation. (1-6-44)

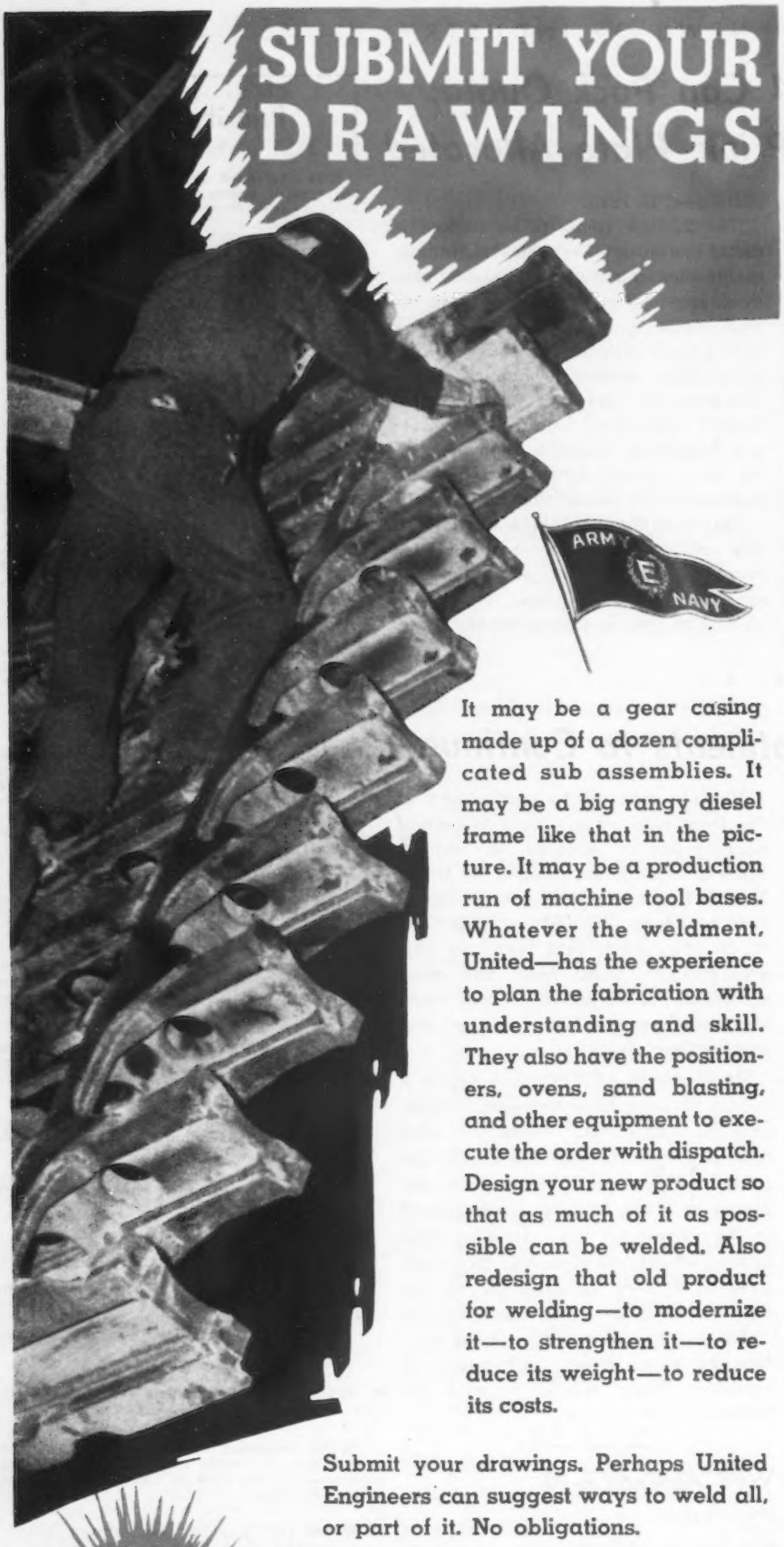
•

Int. 8 to Reg. 3 rules that blanket MRO ratings may be used to add stations to an existing wire intercommunicating system to bring it to its designed capacity. (1-6-44)

•

Reg. 11 and **11-a** have been revoked. (1-6-44)

SUBMIT YOUR DRAWINGS



It may be a gear casing made up of a dozen complicated sub assemblies. It may be a big rangy diesel frame like that in the picture. It may be a production run of machine tool bases. Whatever the weldment, United—has the experience to plan the fabrication with understanding and skill. They also have the positioners, ovens, sand blasting, and other equipment to execute the order with dispatch. Design your new product so that as much of it as possible can be welded. Also redesign that old product for welding—to modernize it—to strengthen it—to reduce its weight—to reduce its costs.

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Warehouses Study Marketing Policies

Cleveland

• • • **At the annual** meeting of the Steel Products Warehouse Association in Chicago a short time ago, members of the Warehouse and Jobbers Section of the Office of Price Administration and the WPB Steel Warehouse Branch made several references to coming changes in policy and procedure that will affect warehouse and mill sales.

OPA wants the industry to consider the desirability of extending the zone price structure to rejects and secondary steel products sold through warehouses. The foundations for such a system would be the mill base prices for rejects, wasters, waste wasters, etc. Freight from governing basing point to destination would be added to the base prices. The spreads mght vary for each zone and might be the same as provided in the prime schedule, and present extras for rejects and seconds might continue.

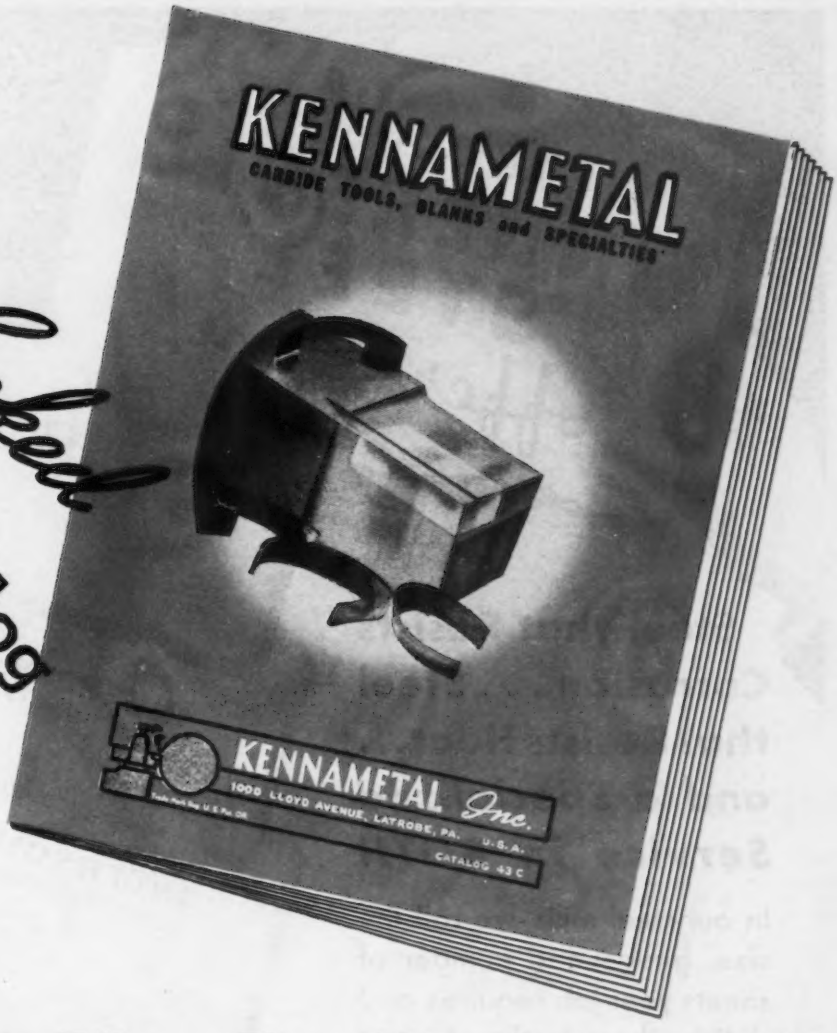
Dislocated tonnage provisions would apply only on inter-zone shipments. A preliminary survey by the OPA has shown that the level of maximum prices would not be generally affected, otherwise OPA would not be interested. It remains to be determined whether any change would give greater facility in calculating prices.

Ore Supply Ample

Cleveland

• • • **November Lake Superior** iron ore consumption of 7,409,213 gross tons by furnaces in the United States and Canada pushed ore consumption during 1943 to 81,518,593 gross tons. This compares to the 1942 consumption up to Dec. 1 of 78,466,094 gross tons. Iron ore stocks on hand at furnaces in the United States and Canada and on Lake Erie docks on Dec. 1, 1943, were 49,371,030 gross tons, as compared with stocks of 53,703,458 gross tons of a year ago. These stocks must carry the steel mills through the winter and into the spring when lake shipping is again possible. However, with the greatest monthly consumption 7,765,174 gross tons (January, 1943) and the average monthly consumption 7,410,781 gross tons, it can be seen that for the coming six months ending May 31, 1944, there will be a little over 8,000,000 tons a month available.

You Have Looked at our New Catalog



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- ☐ Manual of Welding and Fabricating Procedures for IngAclad

Standard Certification Special Jobber Forms

Cleveland

• • • **Wider use of** the standard certification form originally applicable only to certain types of CMP orders will result from a recent revision of Priorities Regulation 7 as applied to warehouse and jobber steel sales. The standard form of certification may now be used instead of various special forms called for in WPB orders except as follows:

(1) The standard form may not be used if its use is specifically prohibited in a WPB order. It cannot be used instead of a WPB form which is required by any regulation to accompany a purchase order. This means that a standard certification cannot be used in place of WPB-2444. (2) It cannot be used in the case of WPB orders enumerated in List A of PR 7. There are about 40 orders included in List A. For example, the standard form may not be used to place a warehouse order for distress stock under M-21-b-l or M-21-b-." Also, it cannot be used on an order placed with a warehouse by a dealer under either of these regulations. (3) It cannot be used on a Canadian order. On the other hand, apparently the standard form of certification again is valid on orders placed with the warehouse under paragraph (d) (4) of CMP Regulation 4.

When the standard form of certification is used—and most warehouse customers probably will use it—the allotment number or symbol must also be given as much other information required by the regulations which are applicable to the customer.

If a warehouse receives an order without a certification, in many cases the certification may be written in if it is certain that the customer is authorized to make the purchase. In that case the warehouse must sign the certification and assume responsibility for it. Changes must be made in the form of the certification so that it will apply to the seller rather than the buyer. However, an allotment number or symbol to a customer's order may not be added except on his written authority. Also, in a few cases specified in List B of PR 7, a certification may not be written in for a customer.

List C of PR 7 enumerates 20 WPB orders for which a certification has to be presented to a supplier only once.

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Annual Farm Tool Allotments Granted

Washington

• • • **Firm allotments** of 100 per cent of farm machinery manufacturers controlled materials requirements have been made for all four quarters of 1944, and as a result, such manufacturers will not be required to file Form CMP4-B applications for the second quarter of 1944, the WPB announced Dec. 31. This action, is a part of WPB's over-all program to reduce paper work.

•

New Application for Magnesium Deliveries

• • • **A new application** form, WPB-3462, has been issued for users of magnesium castings, forgings, sheet and extrusions, who must fill it in by Jan. 15 to obtain authorization for April deliveries.

Aircraft consumers must also file the form, which replaces Form ASU-13, with the Aircraft Scheduling Unit, Wright Field, Dayton. Other consumers must file with the Aluminum and Magnesium Division, Washington, 25.

•

Wheels Defined by WPB

• • • **The term "wheels,"** as used in Order L-158, does not include hub caps, wheel caps and wheel trim rings which are used as ornaments. Hub caps which serve as grease retainers, however, are considered components of wheels.

This clarification was contained in Int. No. 2 of the order which provides for the production and distribution of replacement parts and components essential to the operation of automotive vehicles.

•

Tinned Scrap Order Changed

• • • **WPB has issued** an amended order M-325, regulating the collection and disposal of tinned and detinned scrap. Because of the lack of sufficient plants, the original order provided different methods of disposing of scrap in the various states. The amendments affects the distribution only in the counties of Kansas, Missouri and Texas heretofore listed in Schedule A. These have now been deleted and those states added to Schedule C, where the order provides for the delivery of scrap to detinning plants just as has been the case heretofore in the East.

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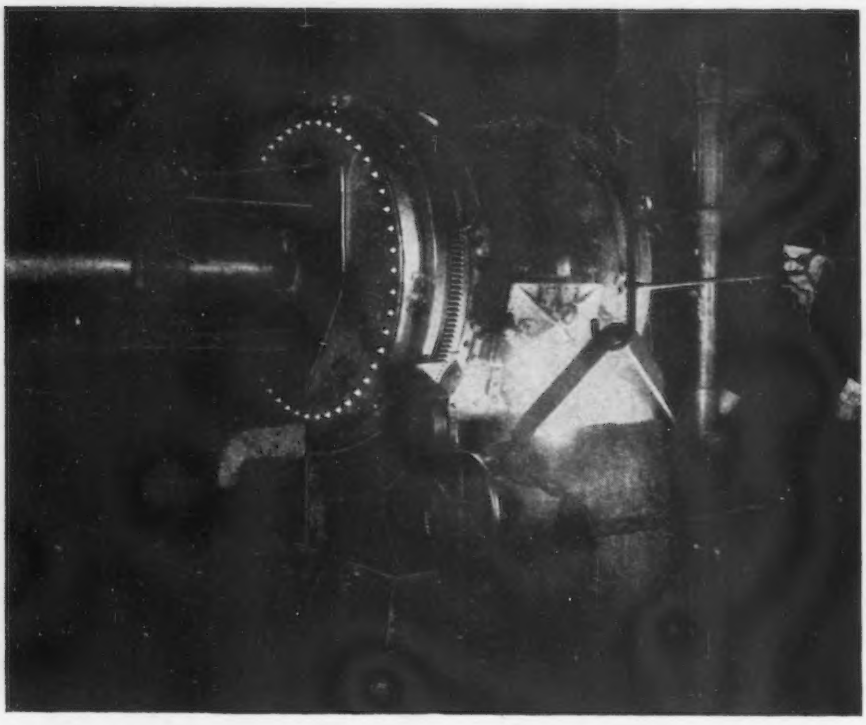

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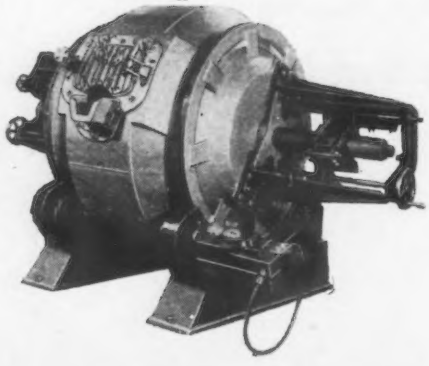

DETROIT ELECTRIC FURNACE DIVISION
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Army Carbine Passes Major Campaign Test

New Haven, Conn.

• • • **The Army** has a new .30 cal. carbine, light in weight, equal to the Garand rifle in speed of fire. It met its major test in the Sicilian campaign.

The carbine weighs little more than half as much as the Garand, is only three feet long, and each of its 15 shots is fired with only a pull of the trigger. It can be fired with one hand, like a pistol, if necessary.

It is a new weapon for paratroopers, rangers and other shock troops and for the 60 per cent of American soldiers, engineers, signal corpsmen, officers, and the like, who previously did not carry rifles.

The new bullet is .30 caliber, slightly less than one-third of an inch in diameter.

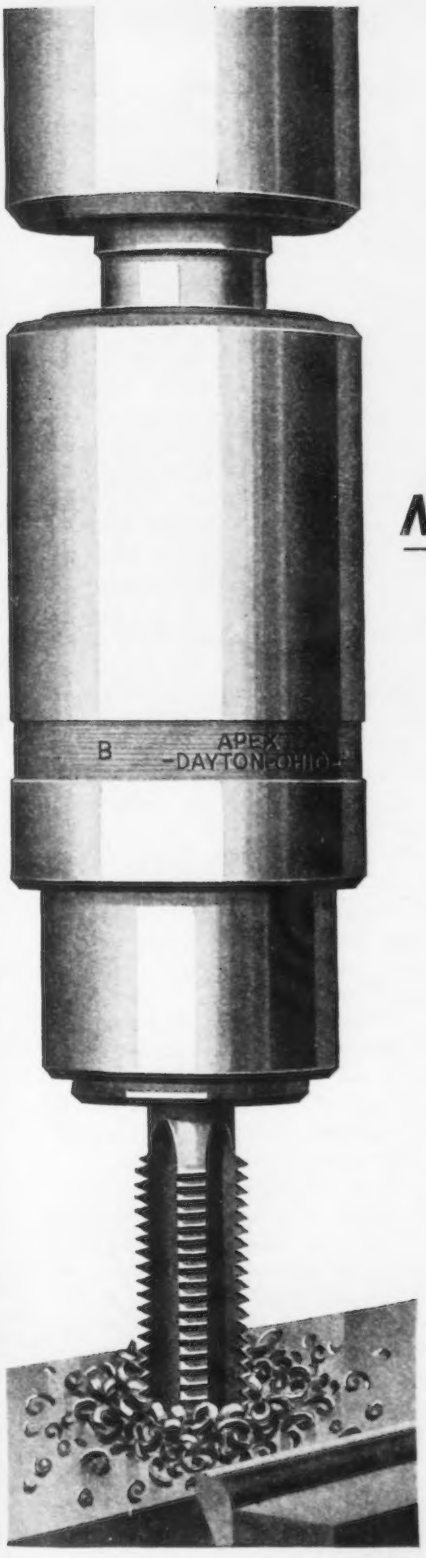
The job of making the cartridge was given to the Winchester Repeating Arms Co. here, a division of the Western Cartridge Co. The specifications were an effective range of 300 yd., a muzzle velocity of about 2000 ft. per second. This is not as fast as standard .30 caliber government ammunition, but is about 500 ft. faster than the ammunition used in the Japanese Arisaka rifle.

Next the Army asked gun inventors to tackle the problem of a weapon to shoot the cartridge, and six designers participated. The Winchester Co. was not at first among them, but when sample guns were submitted in June, 1942, Winchester made some suggestions and the Ordnance Department then asked Winchester also to work on a model. The company made a model gun in thirteen days, beginning Aug. 1. One of the parts for this gun was borrowed from a peacetime sporting rifle.

At Aberdeen, in competition with six other guns, the carbine was the choice of the Army board of judges.

New WPB Forms

WPB-2447—Platinum metals: Refiners' estimate of 1944 production and imports.
WPB-2889—General steel products: Steel warehouse report. Quarterly.
WPB-1228—Diamond dies: Suppliers' report on production, shipments, receipts and stocks.
WPB-1122—Beryllium: Quarterly application for allocation pursuant to M-160.
WPB-3462—Magnesium products: Consumer's application for allocation.
WPB-2892—Merchant trade products: Steel warehouse report.
WPB-1770—Ferroalloys: Detailed request for permission to use.



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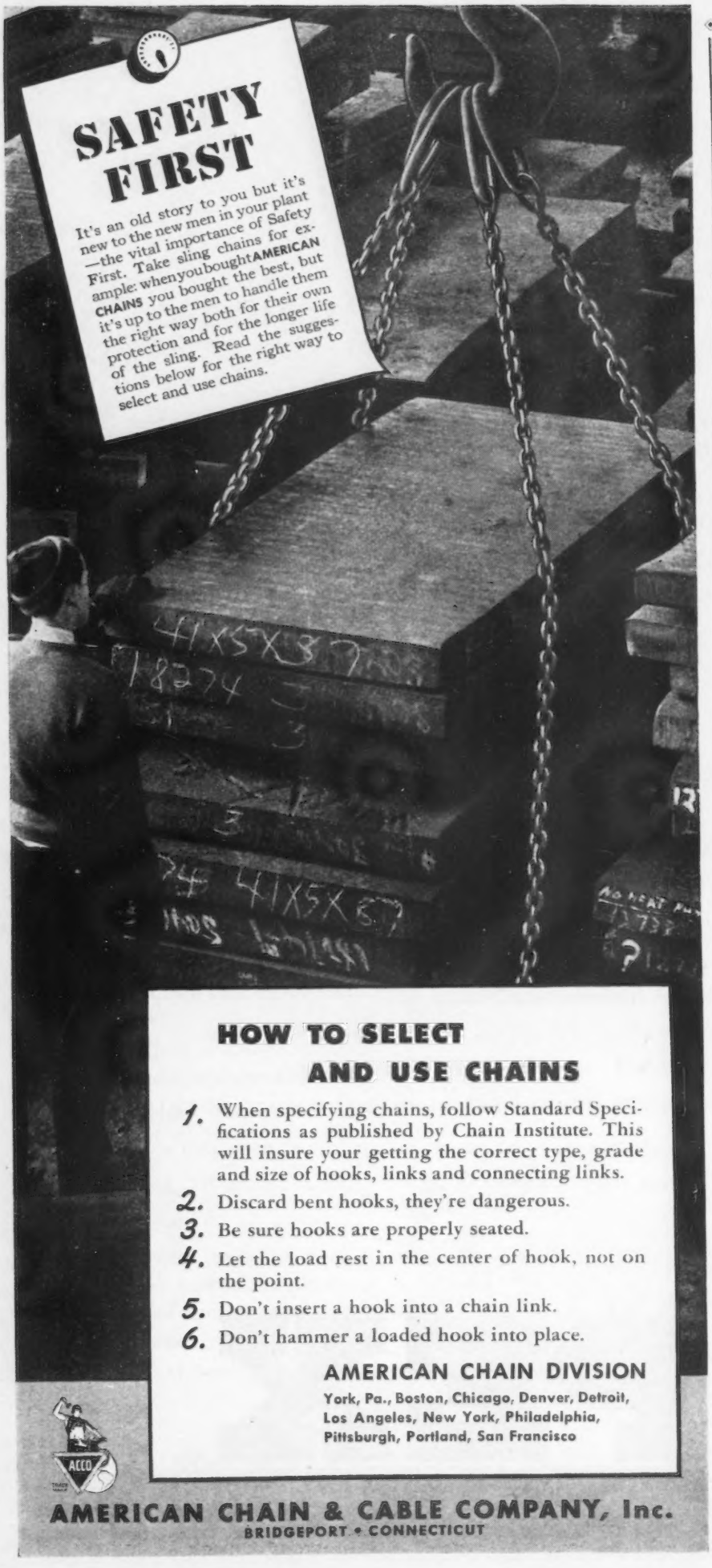

Answers to Steel Jobber Questions

Cleveland

• • • **A question** and answer summary, issued by the Steel Products Warehouse Association, Inc., outlines procedures of warehouses and jobbers on some of the more difficult phases of OPA and WPB rulings.

A warehouse is forced to cancel a mill order. It then wishes to place a new order supported by the same sales as the original order, but due to the lapse of time, some deliveries which had been used originally were older than the maximum 90 day limit. Is there any way in which a warehouse can use such deliveries to support replacement orders?

Yes. Apply to the WPB Warehouse Branch for special permission. If warehouse is unable to replace deliveries older than 90 days because of conditions beyond control, permission may be granted to use these old deliveries to support a replacement order.

The Canadian government has relaxed control of secondary steel products. What effect does this have on orders for seconds, placed by Canadian customers with American warehouses?

No effect. American warehouses are governed by WPB regulation and cannot sell steel except as directed by that agency. So far as this country is concerned, secondary steel remains a controlled material.

(a) A manufacturer produces a part which is sold for MRO purposes. The manufacturer receives an MRO order from his customer for this part. He extends the MRO symbol to a warehouse in order to obtain the material needed for the manufacture of the part. Is this permitted by CMP Regulation No. 5?

(b) The same manufacturer, instead of extending his customer's MRO, uses his own MRO symbol to obtain material needed to fill an order from a customer. Is this permitted by CMP Regulation No. 5?

The answer to both questions is "No." The following explanation is given:

"A manufacturer of a part to be sold for MRO must apply for the material needed to make it on Form CMP-4B as provided in paragraph (k-1) (2) of CMP Regulation No. 1. The material needed to make the part is clearly production material and is not MRO either as to the manufacturer or as to his customer. For the

To Get Better Metal Working Production

See What Others Have Done With Special Machine Tools!

Production line of W. F. and John Barnes Center Column Machines tooled specifically for the machining of armor piercing projectiles.

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● Here is a set of five new bulletins which illustrate and describe an unusual variety of metal working production solutions. Machining operations include boring, facing, drilling, reaming, milling, honing and tapping. Each machine represents an economical solution of a problem involving one or more of these operations. Deep-hole drilling machines, Unit-type machine tools performing multiple operations, and boring and honing machines are but a few covered in these five bulletins. Machines for low, moderate and high production requirements are also included. These booklets may give you an idea for a more profitable approach to *your* metal-working problems. Write for them today. Ask for bulletins 144.

★ ***HOW YOU CAN GET A SPECIAL MACHINE TOOL TO SUIT YOUR JOB*** is illustrated and described in this set of 8 bulletins. Each bulletin traces a machining problem from the preliminary survey to the final machine design. Each may suggest a more productive tooling set-up that you can use today. Write for bulletins J4.

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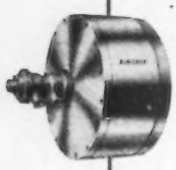

"Airgrip" Chucks, made in both two-jaw and three-jaw types, permit heavier cuts, coarser feeds—faster production—more parts per hour—at lower cost per unit.

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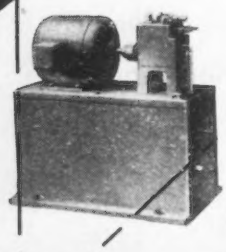

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same reason, the manufacturer of the part cannot use his own MRO symbol to buy material needed to make a part which he sells for MRO. Again, the material needed to make the part is production material and is not bought for MRO purposes."

Is any special form used to apply for deferment for a foreman or other worker in one of the 149 critical occupations?

Use the regular 42-A form. Be sure, however, to indicate that a critical occupation is involved. The Local Board is then supposed to ask USES to check whether or not the applicant for deferment is actually doing the job it is claimed he is doing and whether or not there are any replacements for him available locally. If the local board fails to follow through in accordance with their instructions an appeal should be filed.

A carload shipment of primes consists of two or more items which are priced from different basing points. How is the recent pro-rata interpretation applied?

When a carload shipment is composed of products from two or more basing points, freight charge is prorated only on the tonnage from one basing point, and only then when the quantity involved is sufficient to warrant pro-rating procedure.

A warehouse which sells material to an exporter for his own account is permitted to charge the delivered price applicable at exporter's location. What does the phrase "exporter's location" mean?

The exporter's location is his assigned port of exportation. When a warehouse sells material to an exporter (for exporter's own account), it should charge the maximum delivered price applicable to a domestic customer at that customer's destination. The "customer's destination" in the case of an exporter obviously would be the port of exportation.

It has been stated that warehouses could apply to WPB for permission to make a trade with a customer of one size of hot-rolled sheets for another size of hot-rolled sheets. What about a trade involving two different products or different gages of the same product?

WPB Warehouse Branch will consider applications for permission to make such trade if equal tonnages are involved and if the warehouse has a base tonnage for the product it would receive in trade. You must give WPB the whole story—including the reasons for the trade and the names of all parties in the transaction.

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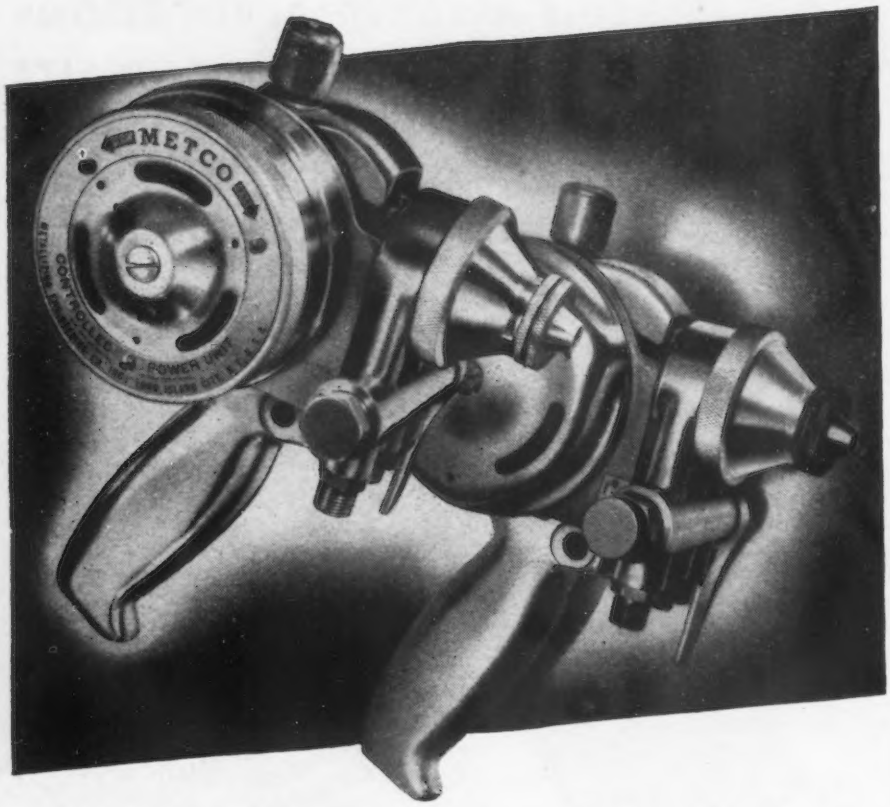

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WORLD'S FINEST METALLIZING EQUIPMENT

Army Stops Building Springfield Rifle

• • • The Army has discontinued the manufacture of the modified "Springfield rifle," designated as the M1903-A3, it was learned at the War Department.

Col. Frank J. Atwood, Chief of the Rochester Ordnance District, explained that the Remington Arms Co. will continue through August, 1944, in the manufacture of spare parts for the rifle. This company also will continue to produce the Army's long-range sniper rifle, the M1903-A4, which is the same weapon equipped with a telescopic sight.

New Super Dive Bomber Perfected by Curtiss-Wright

• • • **Designed by** Curtiss-Wright engineers in response to the Navy's demand for a super dive-bomber that would carry a greater bomb load faster and farther than any similar aircraft type in the world, the Curtiss (SB2C-1) Helldiver is a two-place, all-metal, low-mid-wing monoplane "plus a lot of striking power." It is powered with a high-output Wright Cyclone engine and equipped with a three-bladed Curtiss electric "full feathering" propeller. Split flaps give good braking control in power dives.

The Helldiver incorporates advances and combat lessons learned about dive-bombing in the current conflict. Possessing maximum striking power at extreme range, it is fast enough to keep up with the Navy's speedy new fighter escorts and thus hit the enemy with a maximum of surprise.

The initial design of the Helldiver was completed just before the Japanese attacked Pearl Harbor. As a result of combat experience Curtiss engineers completely redesigned combat equipment and combat loading features; 150 lb. of armor plate were added behind the pilot and around the gunner; self-sealing fuel tanks and protected fuel and oil lines were installed.

Radio equipment was changed numerous times. The flap mechanism was completely re-designed to enable a pilot to open or close the flaps three times faster than on the early experimental type Helldiver, a tremendous advantage in the split-second timing of combat flying. Other major changes of a restricted nature were made.

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He will talk about faster milling that decreases the cutting time on some jobs as much as 200%. He'll mention feeds in cast iron and nonferrous materials of .002" to .005" per tooth and in steel of .0005" to .0025" per tooth at surface speeds of 400 to 800 feet per minute. He will tell you, too, of the greater accuracy that results from these faster speeds because of less work distortion. And when you ask about finishes, he will show you finishes that compare favorably with ground surfaces.

Then ask about Economy. That's when his eyes will *really* sparkle! For the prices on these milling cutters permit their use on short as well as long run jobs. And they are designed to be used for plain milling, slotting or side milling without alteration. Try Super Carboloy Tipped Milling Cutters once and you, too, will say they're "Super." Write today for descriptive folders and prices.

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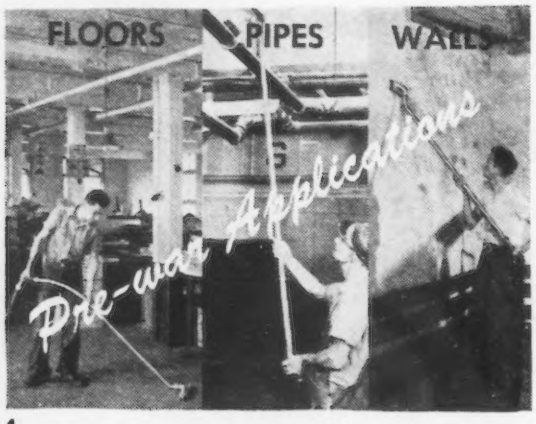

WARTIME APPLICATIONS

PLANES — removes chips and rivets, cleans before painting. Cleans hangers, equipment, hulls, wings and tanks.

INSTRUMENTS — bench work, assembly, inspection, vacuum for schools and testing.

CHEMICAL — cleans goods, prevents explosions in alcohol, paint, TNT, asbestos, and synthetic rubber plants. Reclaims lime, rubber, flux and valuable dusts.

METALS — reduces danger of explosions of magnesium dust, eliminates health hazard, removes chips, scale and abrasives. Collects ores, conveys slag, recovers metals.

SHIPS — Saves manpower, from bench work to final inspection. Removes sand blast and shot, cleans before painting.

Look what the War did to SPENCER VACUUM!

We show the pre-war applications for Spencer Vacuum above because we are not yet allowed to secure photographs of the many new and revolutionary applications listed at the left.

In all cases Spencer has speeded up operations with less man-power required for the job.

Some say that bench and assembly cleaning is the most valuable use of the Spencer. Others point to the reclamation of materials, reduction of fire and health hazards, or the fact that Spencer provides a new conception of stream-lined production where cleaning between operations is necessary.

POST-WAR production will find these applications a necessity in order to compete with other plants that already have Spencers installed. Why not ask for the bulletins?

SPENCER HARTFORD VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.

2

Here's Latest List of Patents Seized by U. S.

• • • **Starting** with the issue of Nov. 4, lists of seized patents have been appearing in this magazine week by week, except for the Dec. 30 issue. Seized patent applications were listed July 8. The patents are grouped in classes, with sub-class number appearing in parenthesis. Date patent was issued is at end of each item.

Class 219—Electric Heating

(1) **1,619,627.** Method and apparatus for electrically-cutting metal. O. Neiss, Germany. 3-1-27.

(1) **1,891,831.** Machine for manufacturing twist drills. M. Okochi, and M. Okashi, Japan. 12-20-32.

(2) **1,978,363.** Method and apparatus for electric riveting. G. Fuchs and H. Spath, Germany. 10-23-34.

(2) **2,203,099.** Art of bonding metal to insulation. W. Osenberg, Germany. 6-4-40.

(3) **1,692,327.** Electric upsetting or jolting machine. F. Brero, Italy. 11-20-28.

(3) **2,113,583.** Upsetting appartus in which the chuck and the press ram are used both as current conductors for the electric resistance heating of the piece work. H. Finzel, Germany. 4-12-38.

(3) **2,203,100.** Art of bonding metal to insulation. W. Osenberg, Germany. 6-4-40.

(3) **2,247,979.** Method and appartus for hot shaping magnesium alloy plates. W. von Tannenberg, Germany. 7-1-41.

(4) **1,636,676.** Electric welding apparatus. R. Mack, Germany. 7-19-27.

(4) **1,663,137.** Electric spot-welding machine. R. Mack, Germany. 3-20-28.

(4) **1,762,085.** Apparatus for jointlessly welding rails. C. Stedefeld, Germany. 6-3-30.

(43) **1,792,390.** Electric heating apparatus directly attached to the bottom of an enameled iron kettle for boiling water and food, etc. T. Okamoto, Japan. 2-10-31.

(4) **1,801,805.** Apparatus for the production of wire gratings by electric welding. V. Dobrick, Germany. 4-21-31.

(4) **1,995,001.** Flash butt welding apparatus. M. Ito, Japan. 3-19-35.

Copyright, 1944

(4) **2,137,909.** Double spot welding. G. Hagedorn, Germany. 11-22-38.

(4) **2,155,095.** Electrowelding of wire nettings. W. Kramer, Germany. 4-18-39.

(4) **2,183,908.** Manual spot welding tool. W. Gladitz, Germany. 12-19-39.

(4) **2,213,136.** Electric welding pliers. W. Gladitz, Germany. 8-27-40.

(4) **2,217,468.** Welding appartus and more especially to means for connecting by welding large workpieces which are difficult for a single man to handle. W. Borstel, Germany. 10-8-40.

(4) **2,222,906.** Electric welding apparatus. F. Hentzen, Germany. 11-26-40.

(4) **2,228,867.** Device for forming a permanent juncture as by riveting or welding. W. Borstel, Germany. 1-14-41.

(4) **2,232,450.** Method and apparatus for resistance welding. G. Hagedorn, Germany. 2-18-41.

(4) **2,233,526.** Apparatus for double spot or seam welding. G. Hagedorn and W. Hass, Germany. 3-4-41.

(4) **2,238,419.** Apparatus for electric spot welding. W. Hass, Germany. 4-15-41.

(4) **2,263,038.** Welding appliance comprising an electrode roller adapted for the spot welding of, for example, sheet metal objects on a word-supporting electrode. G. Heim, Germany. 11-18-41.

(6) **1,626,524.** Device for the electrical welding of seamed tubes. P. Gedien and K. Schwade, Germany. 4-26-27.

(6) **1,692,245.** Electric machine for welding metallic tubes or pipes. F. Brero, Italy. 11-20-28.

(6) **1,748,551.** Electric pipe-welding apparatus. C. Helle, Germany. 2-25-30.

(8) **1,732,900.** Apparatus for welding the tie-plates to steel ties. L. Kuhl and C. Ritz, Germany. 10-22-29.

(8) **1,935,593.** Method of and means for converting the electric arc into an elongated flame. E. Wist, Austria. 11-14-33.

(8) **2,028,780.** Method and apparatus for electric arc welding. M. Ito, Japan. 1-28-36.

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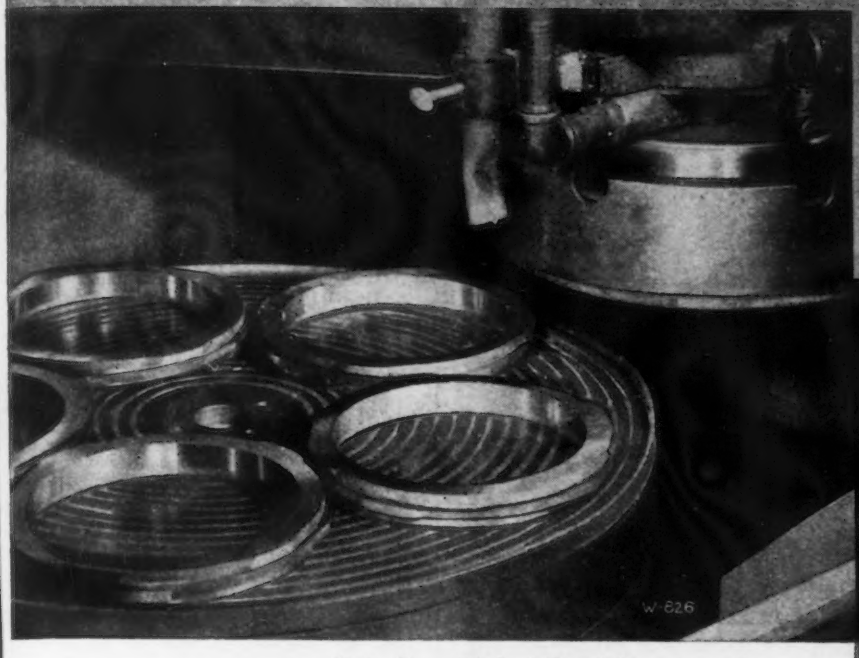

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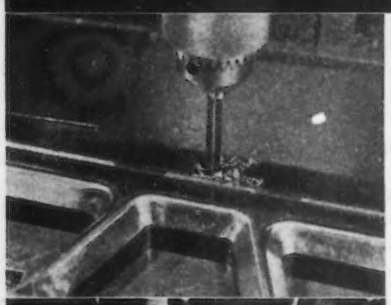
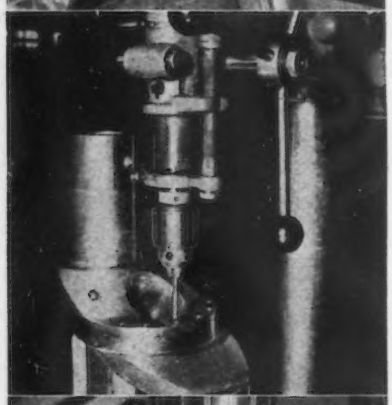
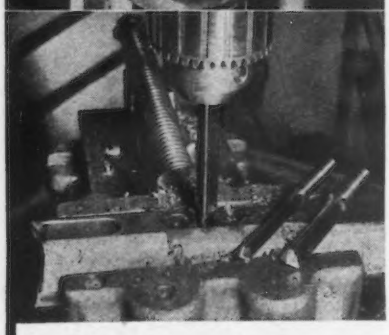


SAVES DIES. On a crimping die for making aluminum mess trays for the Navy, the diemaker forgot to drill for the gage pins before final hardening. On the stamping die he neglected to drill a vent hole before the die was hardened. All holes were drilled after hardening with "HARDSTEEL" drills and two expensive dies were saved.



SAVES MACHINED PARTS. "HARDSTEEL" drills are now regularly used to remove broken taps in blind holes in Wright engine crankshafts without defacing the threads. This method requires only 2 to 2½ hours—saves 6 hours compared with the former grinding method and results in 100% parts recovery. Hardness of the taps is Rockwell "C" 60-65.



SAVES TOOLS. This big broach broke through the slot while in service. It was full high-speed steel—yet with "HARDSTEEL" drills it was found possible to drill three half-inch holes through the shank and the broach was quickly placed back in service.

"You Harden It . . . We'll Drill It"

Parts recovery saves labor costs, machine costs and critical material. Having "HARDSTEEL" drills on hand for emergencies may mean the difference between meeting a production quota and falling behind.

No charge for "HARDSTEEL" Operator's Manual telling how to drill steels hardened by any process.

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"HARDSTEEL"

DRILLS · REAMERS · TOOL BITS · SPECIAL TOOLS

(8) **2,097,386.** Electrode for electric arc welding. G. Bock and E. Schroder, Germany. 10-26-37.

(8) **2,112,578.** Sheathed electrode. H. Rohrig, Germany. 3-29-38.

(8) **2,124,255.** Process for the production of core-electrodes. F. Leitner, Austria. 7-19-38.

(8) **2,140,237.** Welding wire for carbon electrode arc welding. F. Leitner, Austria. 12-13-38.

(8) **2,140,238.** Welding wire for electric arc welding. F. Leitner, Austria. 12-13-38.

(8) **2,141,995.** Welding wire. F. Leitner, Austria. 12-27-38.

(8) **2,141,996.** Wire for electric welding. F. Leitner, Austria. 12-27-38.

(8) **2,156,299.** Austenitic steel welding rod for fusion welding of non-austenitic alloy steels. F. Leitner, Austria. 5-2-39.

(8) **2,156,307.** Austenitic steel welding rod for fusion-deposition welding hardenable ferritic steel. F. Kapatz, Germany. 5-2-39.

(8) **2,167,565.** Method of connecting the electrodes in automatic electric arc welding. G. Erber, Austria. 7-25-39.

(8) **2,204,412.** Weld rod consisting of a hard embedding sintered alloy having "hard metal" particles distributed there through. J. Hinnuber, Germany. 6-11-40.

(8) **2,239,465.** Welding rod. A. Nepoti, Italy. 4-22-41.

(8) **2,240,672.** Method of producing crack-resistant welding rod. R. Scherer and H. Hougardy, Germany. 5-6-41.

(8) **2,248,279.** Electric arc welding rod. A. Nepoti, Italy. 7-8-41.

(8) **2,280,223.** Coated electrode and welding rod. R. Dumpelmann and P. Eniers, Germany. 4-21-42.

(8) **2,293,079.** Electric welding apparatus and method. H. Ranke, Germany. 8-18-42.

(10) **1,699,434.** Method of uniting metallically the seams of aluminum-plated sheet iron, and vessel manufactured after this method. F. Jordan, Germany. 1-15-29.

(10) **1,707,036.** Process of arc welding by means of at least two electrodes of different natures used simultaneously. M. Zack, Germany. 3-26-29.

(10) **1,736,811.** Process for the manufacture of electrical condensers. B. v. Wysocki, Germany. 11-26-29.

(10) **1,736,832.** Manufacture of articles from molten carbon. S. Munch, Germany. 11-26-29.

(10) **1,762,086.** Method of jointlessly welding rails. C. Stedefeld, Germany. 6-3-30.

(10) **1,943,123.** Process for electric welding work pieces without the formation of a ridge on the weld. W. Kreutz, Germany. 1-9-34.

(10) **2,018,263.** Method of flash butt welding. M. Ito, Japan. 10-22-35.

(10) **2,091,871.** Method of welding alloys to a base metal. E. Meier, Germany. 8-31-37.

(10) **2,190,621.** Process for welding a series of thin sheet metal lamellae or foils by spot welding. E. Baer, Germany. 2-13-40.

(10) **2,217,546.** Method of electric resistance spot welding. G. Hagedorn, Germany. 10-8-40.

(10) **2,269,369.** Process and device for electric arc welding. G. Hafergut, Germany. 1-6-42.

(10) **2,278,487.** Method of electrical welding bodies of metal or alloy along a desired seam. A. Rakos, Austria. 4-7-42.

(12) **1,802,079.** Soldering apparatus in which a transformer is used for electrically heating the soldering iron. C. Helle, Germany. 4-21-31.

(14) **1,892,325.** Means for converting the electric arc into an elongated flame. E. Wist. Austria. 12-27-32.

(14) **2,215,108.** Electric heating system. G. Nigra, taly. 9-17-40.

(17) **1,720,222.** Welding apparatus for attaching tie plates to steel railroad ties. L. Kuhl and C. Ritz, Germany. 7-9-29.

(19) **1,980,719.** Heating element for electric cooking and heating apparatus which are composed of individual incandescent rods filled together in grid shape. L. Egger, Austria. 11-13-34.

(19) **2,102,487.** Defrosting screen which is to be used for the wind-screens of power vehicles and which is provided with one or more heating wires and with a switch which automatically breaks the circuit of the heating wires in which it lies. A. Schwarz, Germany. 12-14-37.

(19) **2,171,977.** Heating plate particularly for use in a veneer press. A. Friz, Germany. 9-5-39.

(19) **2,210,629.** Small size electroapparatus to be used as toys and for educational and domestic purposes. A. Marquardt, Germany. 8-6-40.

(19) **2,212,794.** Apparatus for heating solid foodstuffs, more particularly small sausages, by passing an electric current directly through them. B. Salinski, Germany. 8-27-40.

TO BE CONTINUED

Behind every FIRING *Line* there MUST be a PRODUCTION *Line*

Official U. S. Signal Corps. photo

AMERICA'S production lines are backing her fighting men with the greatest armada of naval vessels in the world—with thousands upon thousands of the best bombers and fighter planes she can produce—and with all the other vital materials of war in such staggering quantities that a complete Allied victory is the only answer.

When victory is won, Industry's task is only half accomplished. Industry must turn its tremendous resources to backing up America in winning the peace.

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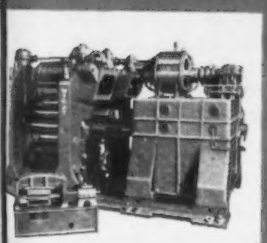
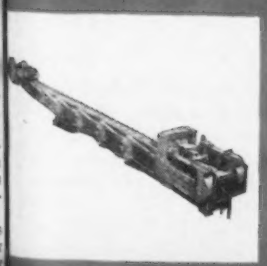
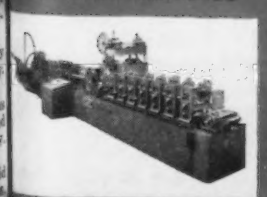


McKAY LEVELLER



McKAY DRAWBENCHES



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ASSOCIATE COMPANY

THE WEAN ENGINEERING CO., INC., WARREN, OHIO

BROAD BROOK COMPANY.
WOOLENS & WORSTEDS.
Broad Brook, Conn. Oct. 19, 1904

40 Years of Proof!

Sirs,
Will you send me particulars of your rolling doors, including the cost of doors, installing them etc.
We want a couple of doors which would be suitable for our boiler room and we would like to know if rolling doors would be durable in such a place and how they would stand snow and ice in the winter. The doors would have to be opened and closed a dozen times a day. The doorways are 10 feet wide by 10 feet high.
Yours truly
Benj S Hanson. Engineer
Box 221
Broad Brook Ct

1904

1944
its 40th year!

Also still on the job is Benj. S. Hanson, Engineer who instigated the original purchase of the Kinnear Door in 1904.

40 years of daily service . . . maintenance costs nil . . . and still on the job with highest efficiency! 40 years of savings in floor and wall space . . . of extra protection against fire, theft, wind and weather! Here again is dramatic proof of how ruggedness and economy are combined with smooth time-saving convenience in Kinnear Rolling Doors. Many similar records in the Kinnear files tell of such long, low-cost efficiency. The *coiling upward action* of the famous interlocking-steel-slat construction (originated by Kinnear), plus skilled engineering and fabrication by door specialists, are reasons for the record performance of Kinnear Rolling Doors. They are the right answer to every service door problem! The Kinnear Mfg. Co., 1760-80 Fields Ave., Columbus 16, Ohio.

SAVING WAYS IN DOORWAYS
KINNEAR ROLLING DOORS

News in Brief

• The Boston store in Milwaukee, one of the city's leading department stores, has petitioned the Civil Aeronautics Board at Washington for permission to inaugurate a delivery service to cover most of Wisconsin by means of helicopters that would land and take off from the top of the store's parking station.

•

• *Col. Merle H. Davis, chief of the St. Louis Ordnance District, announced Dec. 30 that a considerable number of ordnance contractors in the 8½ states comprising the district had during the last month made substantial voluntary reductions in the unit price of ordnance items, or had made substantial voluntary cash refunds on their 1943 contracts. Col. Davis pointed out that this surge of reductions and refunds was due to the fact that most companies have fiscal years which end Dec. 31 and that these companies were about to close their books on 1943.*

•

• Domestic bookings of electric industrial trucks and tractors during October, 1943, totaled 402 units, according to the Industrial Truck Statistical Association, Chicago. The net value of chasses only booked during October totaled $1,896,-921.20.

•

• Unanticipated profits over and above original estimates made possible the voluntary return of $20,000,000 to the Government by Western Cartridge Co., according to E. W. Taft, treasurer.

•

• The Austin Co., industrial builders, announced that its industrial building cost index advanced from 115 to 119 during 1943 as a direct result of the concentration of plant construction in critical labor areas.

•

• The U. S. Supreme Court on Jan. 3 denied the Alliance Brass & Bronze Co., Alliance, Ohio, permission to institute proceedings—without going first to lower courts—attacking the constitutionality of the War Department's authority to renegotiate war contracts.

•

• Another unit in the new expansion of steel producing facilities built under DPC sponsorship by the Copperweld Steel Co. at its Warren, Ohio, plant is a new 24-21 in. rolling mill. Flexibility of operation is a feature of this new mill. In the 24 in. train there are three stands side by side spaced 14 ft. and 12 ft. 7 in. apart. These stands are driven by a 1400 hp., 405-600 r.p.m., 2300 volt Kramer drive through a gear set of 5.2:1 ratio. The roll passes on the first two stands which are three-high and have roll faces of 66 in., while the third stand which is two-high, uses a roll with a 54 in. face. The 21 in. train, which consists of four stands side by side is spaced 130 ft. from the end of the 24 in. train. The first three stands are in line with the three stands of the 24 in. mill. They are three-high with rolls of 60 in. face.

New DPC Awards

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

National Smelting Corp., Cleveland, to provide plant facilities in Cuyahoga County, Ohio, at a cost in excess of $825,000.

Aeroquip Corp., Jackson, Mich., to provide equipment and machinery at a plant in Jackson County, Michigan, at a cost in excess of $100,000.

Peoples Transport Corp., Muskegon, Mich., to provide facilities at a plant in Muskegon County, at a cost in excess of $90,000.

Republic Steel Corp., Cleveland, to provide equipment at plants in Cuyahoga, Mahoning and Trumbull Counties, Ohio, and Beaver County, Pa., at a cost in excess of $450,000.

Federal-Mogul Corp., Detroit, to provide equipment and machinery at a plant in Fresno County, Cal., at a cost in excess of $100,000.

American Cyanamid & Chemical Corp., New York, to provide additional equipment at a plant in Nueces County, Tex., at a cost in excess of $190,000, making a total commitment of more than $840,000.

Pettibone-Mulliken Corp., Chicago, to provide equipment at a plant in Cook County, Ill., at a cost in excess of $100,000.

General Motors Corp., Detroit, to provide additional equipment at plants in Mercer County, N. J., Westchester County, N. Y., and in Baltimore, Md., at a cost in excess of $275,000, making a total commitment of more than $11,100,000.

Willys-Overland Motors, Inc., Toledo, Ohio, to provide additional equipment at a plant in Lucas County, Ohio, at a cost in excess of $150,000, making a total commitment of more than $3,630,000.

American Radiator & Standard Sanitary Corp., Pittsburgh, Pa., to provide additional equipment at a plant in Loraine County, Ohio, at a cost in excess of $45,000, making a total commitment of more than $660,000.

American Locomotive Co., New York, to provide machinery and equipment at a plant in Schenectady County, N. Y., at a cost in excess of $400,000.

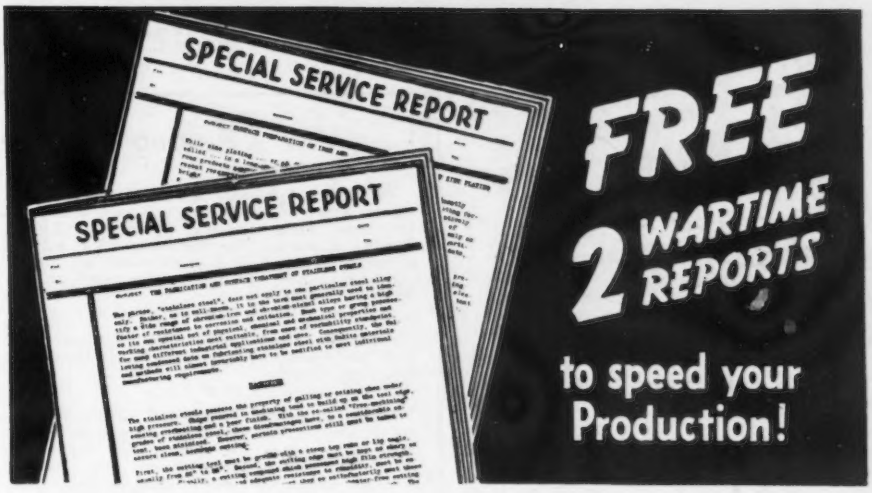
George T. Stagg Co., New York, to provide machinery and equipment at a plant in Bullitt County, Ky., at a cost in excess of $140,000.

Olds Lauds American Industry; Sees Break in War

• • • **American** industry today faces new problems as the United States enters the decisive phase of the war, according to a year-end statement by Irving S. Olds, chairman, U. S. Steel Corp.

"The men and management of America's mines, factories and transportation facilities have demonstrated the vigor and resourcefulness of our industrial system," he said. "The battle of production has been won, and we can look forward hopefully to a favorable termination on the European phase of the war in the not too distant future.

"We of the steel industry feel that there is reason for pride in that industry's accomplishments during the past two war years. In 1943, approximately 90,000,000 tons of steel ingots have been produced in the United States. Of that quantity, about 30,000,000 tons were produced by the men and women of the U. S. Steel.



COMPLETE yet concise, these reports describe Oakite materials, methods and techniques now being successfully used to simplify and expedite a wide range of essential degreasing and related operations required in ordnance, munitions, aircraft, electrical manufacturing, automotive and other war plants.

Fabrication and Surface Treatment of Stainless Steels

In this 4-page Special Service Report, you will find much valuable information on the fabrication and surface treatment of stainless steels. Gives data on EIGHT different jobs . . . machining, grinding, forming, drawing, cleaning before welding and annealing, pickling, removing soldering fluxes and cleaning parts before assembly or shipment.

Preparing Iron and steel for Bright Zinc Plating

Here is a timely, 6-page technical review of surface preparation procedures for bright zinc plating. It describes still tank, cathodic cleaning and anodic degreasing methods employing Oakite alkaline materials that provide the chemically-clean, smut-free surfaces so essential in securing durable, uniform bright zinc coatings. Also contains helpful hints on scale, oxide and rust removal.

Send for Your FREE Copies of These Helpful Reports TODAY!

These factual, informative guides to increased production efficiency are yours merely for the asking. Just fill in the coupon below and your FREE copies will be sent promptly. Every works manager, production superintendent or other executive responsible for stainless steel fabrication or bright zinc plating should have these reports for ready reference!

Remember, too, that your nearby Oakite Technical Service Representative is readily available to give you the benefit of his specialized knowledge and experience on any metal surface preparation problem you may have. Write today!

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Technical Service Representatives Located in All Principal Cities of the United States and Canada

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2042

Among the Week's Trade Notes

Pittsburgh Equitable Meter Co.-Merco Nordstrom Valve Co. have opened new offices at 411 Bona Allen Building, Spring and Luckie Streets, Atlanta. The Memphis office will be closed at the end of December and all Southern operations will be handled through the Atlanta office.

American Brake Shoe Co.'s Kellogg Division has acquired the Crown Spray Gun Mfg. Co., Los Angeles.

Black Industries, Cleveland, announce the formation of the Mec-Rad Division which will manufacture the mechanical components of all types of radionic devices. The division will be under the supervision of John Altmayer, chief engineer.

Claud S. Gordon Co.'s Cleveland office will move to larger quarters at the beginning of the year at 7016 Euclid Avenue.

Peninsular Steel Co., Cleveland, will expand their activity in Ohio for the distribution of Graphitic Tool Steels to include Dayton and Cincinnati.

Rolled Thread Die Co., Worcester, announce the appointment of L. C. Bigelow & Co., Inc., 250 West 54th Street, New York, as its sales and service representatives in the New York area.

General Electric Realty Co., Schenectady, has expanded its holdings in Milwaukee to include the eight-story building constructed in 1930 by the Milwaukee Electric Railway & Light Co. in that city and which occupies several floors and will continue as a tenant. Most of the structure is used as headquarters for the General Electric firm.

Ray-O-Vac Co., Madison, Wis., manufacturer of dry cells, batteries and flashlights, is reported planning to take over the huge ordnance plant on Milwaukee's northern outskirts which was abandoned recently by the Army ordnance department early in December as part of the government's plan to cut down on small arms ammunition. Tentative plans call for the employment of about 3000 workers.

Brillion Iron Works, Brillion, Wis., has an expansion program under way including an extension to its cleaning room and machine shop, new engineering department quarters, general office and garage.

F. L. Jacobs Co. has purchased the Continental Die Casting Co., Detroit, for an undisclosed consideration. The transaction will place Jacobs among the first three producers of automotive hardware for the post-war period.

Blaw-Knox Co. has appointed H. Russell Loxterman engineer in charge of sales of furnace equipment throughout the Middle West, with an office in Peoples Gas Building, Chicago. He has been in charge of similar work in the Pittsburgh district.

Modern Collett Co., Ecorse, Mich., burned almost to the ground in a Christmas week-end fire. Damage was estimated at $1,000,000. An explosion in the boiler room appeared to have caused the flame, which spread rapidly, fed by coolant oils.

Graham Transmissions, Inc., Milwaukee, manufacturer of variable speed drives, has appointed five sales engineering organizations as representatives. They are: Frank Campbell Coe, 15th and Market Streets, Philadelphia 2; John B. Foley Jr. Co., 249 Erie Boulevard, West, Syracuse; Paul M. Kline, 2030 East 22 Street, Cleveland; Bruce W. Rogers, Box 172, Akron; D. W. Smith, 149 Broadway, New York 6.

National Battery Co., St. Paul, has acquired its tenth plant which is located in Zanesville, Ohio. The plant will manufacture batteries for Army and Navy use.

Corrosion Control Corp., Norwalk, Conn., has changed its name to Cordo Chemical Corp.

James Russell Boiler Works Co. will now be known as the James Russell Engineering Works, Inc.

Monarch Machine Tool Co., Sidney, Ohio, has opened a sales and engineering office at 209 Upper Carnegie Building, Cleveland 6. H. W. Robinson is in charge.

Spencer Lens Co., Buffalo, has announced the sale of its Doat Street four-story optical plant to the Royal Bedding Co., Pittsburgh. Spencer will retain possession under lease until after the war when it will consolidate all departments in its new plant near Buffalo.

Gerrard Co., Inc., a United States Steel Corp. subsidiary, has changed its name to Gerrard Steel Strapping Co., to link it more closely with its field of business.

Hydro-Arc Furnace Corp., LaGrange, Ill., has been acquired by the Whiting Corp., Harvey, Ill.

Vibration Engineering Co., New York, has taken over the business formerly conducted by B. T. Butterworth, Jr.

Gehnrich Corp., Long Island City, N. Y., has been purchased by W. S. Rockwell Co., New York, and will be operated as Gehnrich Oven Division of the Rockwell company.

Woburn Degreasing Co., Harrison, N. J., has changed its name to Woburn Chemical Corp.

Forging & Casting Corp., Ferndale, Mich., a subsidiary of Allegheny Ludlum Steel Corp., now will function as Forging and Casting Division of the corporation.

Industrial Machining Co., Racine, Wis., has been organized by John Gellert, Ray J. Eckenrode and Walter H. Hammond to manufacture jigs, dies, tool fixtures and metal parts.

Delaware & Hudson Co. directors approved Dec. 29 the sale of the Chateaugay Ore and Iron Co., Lyon, N. Y., to the Republic Steel Corp. for an undisclosed price. The Chateaugay company has low-phosphorous iron ore bodies leased to Republic in 1939.

Bethlehem Steel Co. is reported to have leased space in the Lincoln Building on E. 42d Street, New York.

Gabriel Co., Cleveland, has purchased International Metal Hose Co., Cleveland. Gabriel has been a large supplier of automotive parts such as snubbers, shock absorbers, and hydraulic systems. The purchase of International Metal Hose Co. will permit expansion of the company into the field of flexible tubing and gasoline hose couplings, as well as tubing for encasing flexible drive shafts in control mechanisms.

Julian E. Jackson has been appointed New England representative of the federal Division of Patent Administration, and at his Boston headquarters, 17 Court Street, he will maintain a complete file of the 40,000 enemy patents seized by the Alien Property Custodian and now made available to American manufacturers.

Cincinnati Planer Co. has appointed the following exclusive sales representatives in the North East: Harrington-Wilson-Brown Co., Chrysler Building, New York City, for Northern New Jersey, Eastern New York and Connecticut; Lynd-Farquhar Co., Park Square Building, Boston, for Massachusetts, Rhode Island, New Hampshire, Vermont and Maine; C. H. Briggs Machine Tool Co., Inc., Onondaga Hotel, Syracuse, N. Y., for the Syracuse area, and George Keller Machinery Co., 1807 Elmwood Avenue, Buffalo, for Western New York State.

North Bergen Brass & Aluminum Foundry, Secaucus, N. J., will hereafter be known as the Koons Foundry.

Detrola Corp., New York, has completed its merger into the International Machine Tool Corp. and is now known as the International Detrola Corp.

SUN ROLL OILS

Knock "soft spots" out of cold sheets

stop staining . . . cut six passes to four . . . speed output

Rolling cold sheets to perfection is a job in any mill. But rolling manganese steel sheets in fewer passes and eliminating spots is an achievement that makes Sun Oil Engineers proud of Sun Roll Oils.

Tough sheets for helmets were being cold rolled from rough sheets to the desired finished thickness. With a competitive vegetable oil, this operation required six passes. At the same time, temperatures generated caused the oil to stick to the strip. This subsequently caused carbon spots that often resisted final heat treatment with the danger of developing soft spots in this vitally needed steel.

Spots stopped when a Sun Oil Engineer recommended a change to Sun Roll Oil. The strip now passes through the rolls clean and free from any trace of carbon—danger of soft spots in finished sheets has been "knocked out."

Two passes were eliminated at the same time with Sun Roll Oil. Now, these cold sheets are reduced in just four passes. Production has been stepped-up . . . a better finish obtained . . . and costs lowered.

In your plant—whether it is cold or hot rolling, lubrication or processing—let a Sun Oil Engineer show you the possibilities of speeding up your output and lowering costs with Sun Industrial Products. Write . . .

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Get the Facts about
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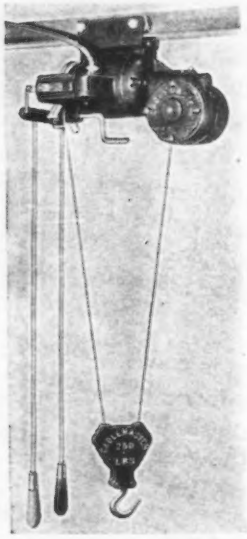

ESPECIALLY DESIGNED IN 3 CAPACITIES

• The new CABLEMASTER hoist is available in 250, 500 and 1,000 lb. capacities. Each size hoist is individually designed and built for its specific rating . . . not a geared up or geared down make-shift. This special design results in minimum weight and maximum performance. Available for hook mounting, as shown, or rail.

Phone, write or wire for details.

MASTER
THE MASTER ELECTRIC COMPANY
INDUSTRIAL EQUIPMENT DIV. — DAYTON, O.

Preparation for Termination Suggested

New York

• • • **Evidence that the** seriousness and imminence of contract termination for both the contractor and subcontractor is a matter for immediate action was presented recently in a letter mailed to all subcontractors and suppliers of Allis-Chalmers Mfg. Co. Emphasizing that ways and means of getting quick money settlements and orderly and economical disposition of materials and facilities depended upon preparations now, the letter offered suggestions which could be carried out in the interim.

The letter suggests in part:

"Claims of government contractors and subcontractors including any claims that you may have on a prime contractor's purchase order covering products for the government, are subject to government audit. It is vital, therefore, that you keep accounting and other records in such manner and in such detail, and maintain such adequate cost accounting system as will enable you to produce the cost and other information necessary to prove your claims. Some claims have already been disallowed because of the inability to support them with proper records.

"**An inventory** of the items involved showing extent of completion will also be required. Careful study of such documents as Army Procurement Regulation No. 15 and Army Termination Accounting Manual for Fixed-Price Supply Contracts will greatly assist in obtaining an idea of the accounting data and other information that will be required.

"It is becoming clearer every day that the government, upon contract termination, will not pay for facilities, materials, work in process, or items beyond the reasonable requirements of the contract at the time of termination. Of at least equal importance to adequate records, therefore, is careful procurement, inventory, and production control, which will insure that commitments, inventories, and work in process are not ahead of the requirements of a sound production program. In general, this requirement will be met by observance of the WPB priorities and CMP regulations and general preference and scheduling orders."

o o o

Koppers Completes 18 Coke Batteries

Pittsburgh

• • • **Eighteen Batteries** of Koppers-Becker coke ovens, totaling 1,142 ovens with an annual coal carbonizing capacity of 9,196,000 tons, were completed or under construction by Koppers Co., engineering and construction division, in the United States, Canada and Brazil during 1943, according to Joseph Becker, vice-president of Koppers and general manager of the division.

Largest of the coke oven projects is that for the new Geneva Steel Co. plant at Geneva, Utah. One battery of 63 ovens is in operation, and three batteries of 189 ovens are ready for operation. The four batteries will have a total carbonizing capacity of 1,766,000 tons. Coke capacity is roughly 70 per cent of coal carbonizing capacity.

One of three batteries, totaling 171 ovens, for the Bethlehem Steel Co. at Lackawanna, N. Y., is operating, with two still under construction. They will have a total capacity of 1,363,000 tons. A battery of 70 ovens, with 703,000 tons capacity, was completed for the Bethlehem Steel Co. at Steelton, Pa.

Another project of more than a million tons capacity was completed for Inland Steel Co., at Indiana Harbor, Ind. Two batteries totaling 146 ovens have a capacity of 1,185,000 tons.

At Sault Ste. Marie, Canada, a battery of 86 ovens with a capacity of 766,000 tons, was built for the Algoma Steel Corp., Ltd.

Other projects completed were: Republic Steel Corp., Cleveland, one battery, 75 ovens, 665,000 tons capacity; Tennessee Coal, Iron & Railroad Co., Fairfield, Ala., one battery, 73 ovens, 550,000 tons; Donner-Hanna Coke Corp., Buffalo, one battery, 15 ovens, 114,000 tons.

Near completion is a battery of 55 ovens for the new plant of the Brazilian Steel Co., Volta Redonda, Rio de Janeiro, Brazil. The ovens have a rated capacity of 570,000 tons.

Ever look at a hot mass of steel and imagine it as the hull of a battleship, or the front of a fighting tank, or maybe only the barrel of a buck private's gun? For over 117 years it has been our business to help turn these imaginings into facts . . . It has been our business to produce the best steels possible to meet America's rigid requirements. If you are engaged in war production and have a carbon or alloy steel problem, "A.W." Quality Steels are ready to serve you.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

STAR for EFFICIENCY

Quality . . . in the steel that goes into the making of STAR Hack Saw Blades is closely guarded by Clemson. Continuous tests assure uniformity in the metallurgical structure of each type of STAR blade.

In the race to keep up with increasing production schedules for critical war machines and materials, there can be no slowing down because of inferior tools. That's why STAR high-speed steel "MOLY" Type* Hack Saw Blades are chosen by so many shops for fast-cutting metal-sawing jobs where accuracy counts. The same holds true for the Unbreakable Special Flexible Blade for cutting tough metal in awkward positions.

In the Maintenance Department the emergency repair man knows the value of STAR Blades when he's called on for a rush job. STAR products have proved their dependability under all sorts of circumstances.

*T.M. Reg. — Blades bearing the name "MOLY" are made only by Clemson Bros., Inc., and affiliated companies.

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MIDDLETOWN • NEW YORK
Makers of Hack Saws, Frames, Power Saws, Band Saws, and the Clemson D-17 Lawn Machine

5036

Vinson Outlines WPB-OPA Plan To Insure Essential Civilian Production

• • • **OES director Fred M. Vinson** last week announced details of a program for insuring adequate production of essential civilian goods to be effectuated jointly by the WPB and OPA.

A broad policy statement addressed to WPB Chairman Donald M. Nelson and OPA administrator Chester Bowles lays down procedural responsibilities of the two agencies in carrying through the program. It also establishes the framework for changes and modifications in existing price control techniques when such action will result in stepping up production of specific items.

Primarily, these changes will result in a greater equalization of profit margins for all products and price lines of individual consumers' goods industries when such action is needed to improve production of essential items. There is also provision for special handling of price control affecting marginal producers, and affecting producers whose current profits are at excessively high levels.

The policy statement incorporates two major principles on which will be based any future joint operations of the two agencies in formulating programs for production of essential civilian goods. These are:

1. The WPB is responsible for formulating plans and programs to assure needed volume production of essential civilian goods. When WPB finds that existing price regulations "constitute a serious impediment" to fulfillment of the programs, certification to this effect will be made to the OPA.

2. OPA is empowered, under certain conditions, to revise existing price schedules as a production stimulant, but in every case pricing formulas spelled out in the policy statement must be adhered to as a preventive against inflationary or uncontrolled price increases.

Particular emphasis is placed by the program on the need for improving output of essential low-cost goods where serious shortages have developed in recent months.

The WPB is directed to utilize its full authority in getting production of essential consumer goods particularly in controlling distribution of facilities, raw materials, and processed commodities.

In certifying to OPA that the supply of a particular essential consumer product is or threatens to become inadequate for basic civilian needs, WPB must indicate that it has prepared and is ready to carry through a production program with "its full legal authority." The certification, a copy of which must be transmitted to the director of Economic Stabilization, is required to include a description of all steps WPB has taken or is prepared to take.

o o o

Pittsburgh Workers to Go on Priorities

Pittsburgh

• • • **With local manpower** officials insisting that the essential worker shortage here will be much less serious after March 1, and with the chance that the district may struggle through until that time, workers may soon be rationed on a priority basis in order to forestall being placed in the so-called Group 1 "Critical Class."

If the district becomes classified as critical, it would compel all employers, essential as well as non-essential, to place their workers on a 48-hr. week. It might also cut off future production contracts, curtail expansion programs, and even necessitate war contract cutbacks.

The only possibility of correcting the situation according to WMC officials in case the rationing system does not work would be a mass migration of non-essential workers to essential jobs, coupled with an increase in the hiring of women.

Spot checks here indicate that the response to help wanted ads for essential war industries is far below expectations, while available non-essential jobs are said to find plenty of applicants.

Aside from official pronouncements, it is understood that within the manpower labor-industry committees here there is considerable difference of opinion as to the reality of an actual labor shortage. Nevertheless, WMC Director Paul V. McNutt is reported to have been trying to clamp down the critical label on the Pittsburgh district for some time.

The Pennsylvania State WMC has declared that the Pittsburgh region will be made a critical labor shortage area unless the labor picture is substantially changed, for the better, by Jan. 23.

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Track Foreman
Tony Marich

"Big Dan" Markovitch
Blasting Foreman

CONTROLLED QUALITY STEEL FOR WAR

MESABI

Quiet blue lakes, endless miles of rolling, dark green forests of spruce, pine and balsam, accented by bold slashes in silver and white of slender birch and aspen; shelter for deer and moose; lair of bears, lynx, bobcats, wolverines and foxes; with trout, bass and pike hiding in crystal waters; ducks and geese feeding on lakes; partridges and prairie chickens nesting in cut-over timber lands—this is the Mesabi country.

Mesabi meant giant in the red man's tongue when Chippewas were driving Sioux out of the north woods and shoving Sacs and Foxes eastward. White men, long after, applied the name to the vast iron ore range stretching 100 miles in a narrow belt across Northern Minnesota—a giant among ranges.

Other Lake Superior ranges are the Cuyuna, and Vermillion in Minn., the Marquette in Mich., and the Menominee and Gogebic in Mich. and Wisc.

Open iron ore pits, 30 stories deep, wide enough to hold several football stadiums, yawn in the sylvan setting of the Mesabi. Far down deep in these man-made canyons, long ore trains and huge heavy-duty trucks, toy-like in the distance, crawl along winding ledges and switchbacks in continuous procession, bringing topside millions of tons of rich red, black, blue, purplish iron ores dug out of the depths by giant electric shovels and shipped by rail and water to blast furnaces to be converted into iron; then on to become steel, backbone of war and peace.

Winter stops production at open-pit mines on the Lake Superior iron ranges. But, on the job now, in snow, ice, sub-zero temperatures, are geologists, metallurgists, mining engineers and their crews. These hardy men are busy laying out the work in preparation for the next season's production, that the tonnage of iron ore mined and shipped this year may be greater than the 84½ million tons in 1943.

"Big Swede," the giant of the electric shovels at the J&L Hill Annex iron ore mine, is as big as a house, has a boom of structural steel beams towering 10 stories high and weighing as much as a freight locomotive, a structural steel dipper "stick" nearly as big, with huge steel bucket on its end that "crowds" into the hard ore body and comes up with sixteen tons in every "bite".

Four of "Big Swede's" bites load a freight car. One 8-hour turn with "Big Swede" produces enough iron ore—12,000 tons—to fully load a Great Lakes ore boat.

Steel for a ship a day to put the Axis away is a record established in steel plate production at the Jones & Laughlin Pittsburgh Works, during a recent month, the War Production Board announced. It was "enough steel to build 33 merchant ships . . ." the official announcement said. The Maritime "M" was recently awarded to the J&L Pittsburgh Works which, with the J&L Aliquippa Works, also holds coveted Army-Navy "E."

BRONZE BEARINGS
OILLESS BRONZE BEARINGS
GEAR BLANKS
MACHINED BRONZE PARTS

S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

Our equipment and manufacturing methods enable us to meet the most exacting specifications and design.

INDUSTRIAL BEARINGS

S. & H. Bearing and Manufacturing Co., Inc.
340-344 North Avenue, East
Cranford New Jersey

A.I.S.I. HY-TEN S.A.E. N.E.

ALLOY STEELS FOR OFFENSE

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

WHEELOCK, LOVEJOY & CO., INC.
126 Sidney Street Cambridge, Mass.
Cleveland, Chicago, Newark, Detroit, Buffalo, Cincinnati

U. S. Steel Issues Isothermal Transformation Diagrams

• • • **Fifty-six diagrams,** so-called "S-Curves," have been brought together in the new "Atlas of Isothermal Transformation Diagrams" published by United States Steel Corp. Each "S-Curve" represents the time of response of a particular steel to specified conditions of temperature and therefore serves as a map to guide the practical man to the proper heat treatment of each of these steels.

These diagrams represent the results of a systematic experimental investigation which has been carried out over 15 years at the Kearny Research Laboratory. The booklet, which will be distributed to war material producers who are users of steel, to metallurgists and technologists in industrial and educational laboratories, and to others interested, has been termed a significant contribution by U. S. Steel to the science and practice of ferrous metallurgy.

In the practical heat treatment of steel, as ordinarily conducted, the steel is first heated to a temperature higher than its so-called transformation temperature at which the carbon goes into solution, and then it is cooled in some specified way, as by quenching in water or oil, or allowing it to cool slowly in the furnace. In this process the step which most significantly influences the properties developed in the steel is the initial rate of cooling, which is a matter of both temperature and time; because of this the results are difficult to interpret usefully in general terms. This difficulty can be obviated by separating the effects of temperature from those of time at temperature; and this separation is the fundamental idea on which these diagrams are based.

Two Civilian Items Returned to Production

Washington

• • • **Manufacture of** 2,000,000 electric irons and 50,000 bathtubs in 1944 was authorized Dec. 30 by the War Production Board, this being the first important resumption of civilian manufacture since the war started.

The 1944 output of bathtubs will be reserved for installation in war housing projects. The irons will be distributed through normal trade channels, not rationed, and should be generally available by summer.

Aluminum Founders Warned About Orders

Washington

• • • **Aluminum foundries** and fabricators are cautioned not to accept orders for any month in excess of 105 per cent of their capacity. Even though the foundry may be able to deliver in the succeeding month, the order must be classified as a "carry-over" order. Albert Butler, chief of the accounting and statistics branch of the Aluminum Division, has written all foundries and fabricators that they may not consider they have any period of grace in which to pile up their orders. The letter reads:

Your attention is called to paragraph (t) (2) (iii) of CMP Regulation No. 1. This paragraph requires that you reject orders when your expected production for particular products has been booked to 105 per cent. An analysis of Form WPB-2685 for the third quarter shows that aluminum fabricators have accepted more orders than allowed by the regulation. It would appear that a number of mills accepted orders on the assumption that they were permitted to do so if they could deliver them during the 30-day period following the month of delivery called for on the order. The regulation specifically provides that you must not accept orders beyond the 105 per cent limit. There is no longer provision in the regulation allowing a 30-day grace period, and even the provision in the earlier issues of the regulation never permitted the acceptance of orders with the intent of making delivery in the grace period.

Where a foundry or fabricator has accepted an order within the 105 per cent limit which it cannot deliver in the month of delivery called for by the order, it is a "carry-over order." In determining whether the mill's total orders are within the 105 per cent limit for any one month, "carry-over" orders, for previous months of the same and preceding quarters must be considered.

Two Blades Instead of One Yielded by Taper Rolling

• • • **The story** of the taper rolling process, whereby airplane propeller blades are rolled from alloy steel close to the finished shape and contour of the blade, has been detailed in part by the American Iron and Steel Institute.

Rehabilitation of an old hand mill and the use of an old crew, "grown gray in service," played a large part in the development. Taper rolling works three ways to speed up propeller production:

Two blades now can be made with the same amount of special propeller-blade alloy steel formerly used for one; the 30 machine tools ordinarily required to machine and shape the blades have been reduced to three or four, man-hours have been cut drastically.

After a distinctive process of rolling, the blades are about the same length and width as those made under conventional methods. They are six-tenths of an inch thick at one end point, tapering to 13 hundredths.

Early Purchase Orders Required on Critical Materials

• • • **WPB has revoked** Dir. No. 1 of Priorities Reg. 18, which required the early placement of purchase orders for specified items of a critical nature on which delivery is required during 1944.

It was pointed out that the direction had been substantially effective in stimulating the early placement of orders for certain components, and since demand of others could not be predicted because of their nature, the direction would result in confusion and delayed production.

WMC Amends Method of Determining Essential Firms

Washington

• • • **The WMC has** announced the amendment of instructions for the determination of the essentiality of an establishment by providing that the end-use of a product be considered as an additional test.

The essentiality of an establishment, it was explained, depends not only upon its being engaged in an activity included in the List of Essential Activities, but also upon the extent to which the product or service is used to meet war needs or minimum civilian requirements under wartime conditions.

WMC's ruling in earlier instructions, which are still in effect, provided that whenever the essential and unclassified activities are not separate, as in the case when the same workers are engaged in both departments, the establishment will be classified as essential only if 75 per cent of its activities are devoted to production of items on the essential list.

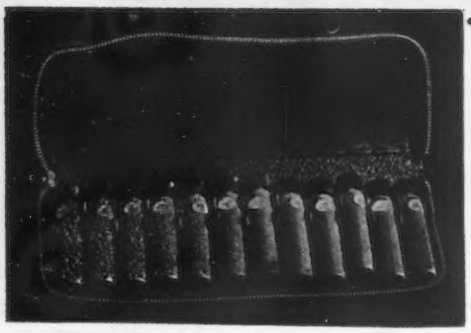
Memo for Post-War Production

LOOK TO Adeco

FOR FABRICATION OF PRECISION PARTS and ASSEMBLIES

Here is a dependable source of supply with the experience, engineering skill and complete facilities for all types of close tolerance production.

AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 North Ravenswood Avenue,
Chicago 40, Illinois
"Your Partners in Production"



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

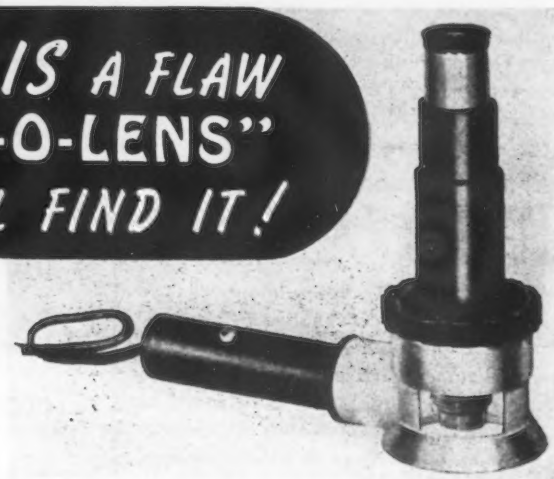
•

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

IF THERE IS A FLAW "FLASH-O-LENS" WILL FIND IT!



The new FLASH-O-LENS offers foundry-men, machinists, and many others engaged in producing metal parts for war contracts an efficient, economical means of examining the most minute defects during routine inspections.

FLASH-O-LENS consists of a portable 40x microscope combined with a perfect source of illumination in one convenient, compact unit . . . They are available in several models—powered by either standard flash light dry cells or by current from any AC or DC outlet—and with a selection of various combinations of lenses, all interchangeable in the one lens housing.

Send today for illustrated catalog describing the new FLASH-O-LENS

E. W. PIKE & COMPANY

PIKE

Manufacturers ELIZABETH, N. J.

New Book

• • • "Steel in Action," by Charles M. Parker, secretary of the technical committees, American Iron and Steel Institute, covers the steel situation both at home and abroad, and will help overcome public lack of understanding in the steel industry.

Many previously unpublished statistics are included.

According to Mr. Parker, the steel industry accounts for 45 per cent of the income of the United States and 40 per cent of the jobs. (Jacques Cattell Press, $2.50.)

Fabricated Structural Steel Bookings Show Sharp Decline

• • • **The November, 1943 bookings** of fabricated structural steel for bridge and building construction reported to the American Iron & Steel Institute by companies representing 75.6 per cent of the total average bookings of the industry during the years 1923-25, totaled 29,205 tons as compared with 61,721 tons reported for the preceding month and 49,637 tons estimated for the entire industry for the corresponding month of last year. Reported shipments totaled 35,152 tons as compared with 130,425 tons estimated for the entire industry the same month last year. The reported tonnage available for future fabrication at November 30 was 134,610 tons.

District WPB Manager Quits

Pittsburgh

• • • **Known for his understanding** of industry and its problems, and credited with as prompt service as red tape would allow, (and sometimes beyond this), Albert H. Burchfield, Jr., has resigned as the Pittsburgh district manager of the WPB. He returned to his former post as vice president and director of the Joseph Horne Co. Jan. 1. C. C. Morrison, former district manager of priorities, succeeds Burchfield as WPB director.

Can Makers Elect Governors

New York

• • • **F. J. O'Brien,** president of the Can Manufacturers Institute revealed that four new members were elected to the board of governors: W. H. Funderburg, Continental Can Co.; Victor LeComte, LeComte & Co., Inc.; J. E. Macry, Empire Can Corp.; R. S. Solinsky, Cans, Inc.

(Advertisement)

SURFACE FACTS ABOUT METALS

First of a series of articles on the preparation of metal surfaces for protective finishes

PICKLE BATH TONERS

IMPROVED PICKLE SOLUTIONS PRODUCE BRIGHTER AND CLEANER WORK

Research Chemists in the American Chemical Paint Company laboratories, some years ago, made a valuable contribution to metal finishing which revolutionized the acid pickling of iron and iron alloys. The inhibitor—Rodine—which was developed at that time controls the pickling action to the removal of scale and prevents needless attack on clean metal. In addition to making it possible to greatly increase the speed of production, the savings in acid, metal, and the reduction of hydrogen embrittlement makes the use of Rodine standard in most pickling operations today.

In the continuing research on the pickling of metals, the ACP Laboratories have developed a further aid for pickling baths—"ACP Pickle Bath Toner" for use with or without Rodine. It fills a definite place in improving the finish of pickled metals and greatly reduces waste due to excessive dragout.

ACP Pickle Bath Toners are supplied in either a powder or liquid form for use in either sulphuric or muriatic acid solutions, producing brighter and cleaner surfaces. The emulsifying action of Pickle Bath Toners reduces the contamination of the pickle solution by oil, admirably adapting them to the pickling of work slightly oily and in conjunction with Rodine for the pickling of alloy steels that are difficult to pickle.

These Pickle Bath Toners, in both the powder and liquid grades, are furnished with and without inhibitor action. The uninhibited types are recommended where the advantages of the Pickle Bath Toner can be combined with the many advantages of the inhibitor, Rodine. In such cases the Toner *and* the Rodine are added to the new pickle bath and as future additions of acid are made only the Rodine is added.

In a few operations where strong inhibitor action is not required, for example in cold pickling solutions, or where actual attack or "etching" of the metal is wanted for subsequent operations, the use of the mildly inhibited form of Toner is recommended to obtain the improved cleaning action and still retain sufficient inhibition to prevent excessive etching.

Any sulphuric or muriatic pickle solution will be improved by the addition of ACP Pickle Bath Toner. Generally the powdered forms are recommended for use in sulphuric acid and the liquid forms for use in muriatic acid solutions. ACP Pickle Bath Toners are now supplied as follows:

Pickle Bath Toner No. 101—Powdered form without inhibitor for use with or without Rodine.

Pickle Bath Toner No. 102—Mildly inhibited powdered form for use without Rodine where but little inhibitor action is wanted.

Pickle Bath Toner No. 1—Non-inhibited liquid form for use with or without Rodine.

Pickle Bath Toner No. 2—Inhibited liquid form for use without Rodine where but little inhibitor action is wanted.

While ACP Pickle Bath Toners will be generally beneficial there are several operations where little inhibitor action is deemed necessary, including electroplating, galvanizing, pickling in cold solutions or in some electrolytic pickling units, etc. In addition, Pickle Bath Toners also improve the penetration, the wetting and the spreading action of zinc or ammonium chloride fluxes in preparation for galvanizing, tinning, etc.

Steel requires pickling to remove scale whether the fabrication is for steel plates for battleships, airplane parts, motor vehicle or ordnance parts.

Rodine in the pickling bath confines the acid action to removing the scale and inhibits acid action on the clean metal. This controlling action of Rodine in preventing the acid from dissolving clean steel, saves acid by eliminating a needless waste. The life of the pickle bath is increased and better pickling is accomplished.

Our technicians are available to adapt Rodine or other ACP Products to your individual production problems. Time will be saved if you will give us as complete details as possible concerning your methods and requirements.

Manufacturers of Inhibitors & Metal Working Chemicals

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP **PENNA.**

Note—West Coast Plants may address inquiries and orders for prompt delivery to Leon Finch, Ltd., 728 East 59th St., Los Angeles, California.

AMERICAN CHEMICAL PAINT COMPANY, AMBLER, PA.

Please send me general Technical Service Data Sheets on

Name_____ Title_____ ☐ *Rodine*

Company_____ ☐ *Pickle Bath Toner*

Address_____ E-1

Welding Organization and Training

(CONTINUED FROM PAGE 61)

ward a uniform and educationally sound welding training program through the establishment of certain procedures as being basic instructional practices.

Supervision Unsatisfactory

At the time we were establishing an on-the-job training program we had not lost sight of the other two conditions disclosed by the survey. Apparently these two conditions, namely conflicting and insufficient supervision, are peculiar to any new enterprise of major proportions where there is no prior organization or nucleus of established supervision to use as a foundation for an organization.

As has been indicated, the arrangement of shift supervision as shown in Fig. 1 was entirely unsatisfactory because of two reasons:

1. The conflicting supervision resulting from the three shipway welding arrangement.
2. The insufficient supervision resulting from one foreman attempting to direct the work assignment of an entire shipway alone.

These problems were easily solved by making the organizational changes as shown in Fig. 3. This confined the welding supervisors' activity to two shipways and left him in complete charge of the daily welding activity on those shipways. At the same time the shift welding foreman was given three subforemen—one each for the forward, midship and aft sections of the hull. (It is to be understood that this arrangement is the product of emergency conditions.)

As soon as this supervisory arrangement was functioning smoothly J. K. Doolan, general manager, inaugurated a series of supervisory training conferences under the direction of David F. Jackey from the Division of Education, maintained by the State Department of Education in cooperation with the University of California.

This has led to problem solution conferences being held regularly with the supervisors and foremen and has contributed to a feeling of mutual effort and the solution of many production problems. From a problem solution conference, for instance, came the work assignment by shifts as shown in Fig. 4.

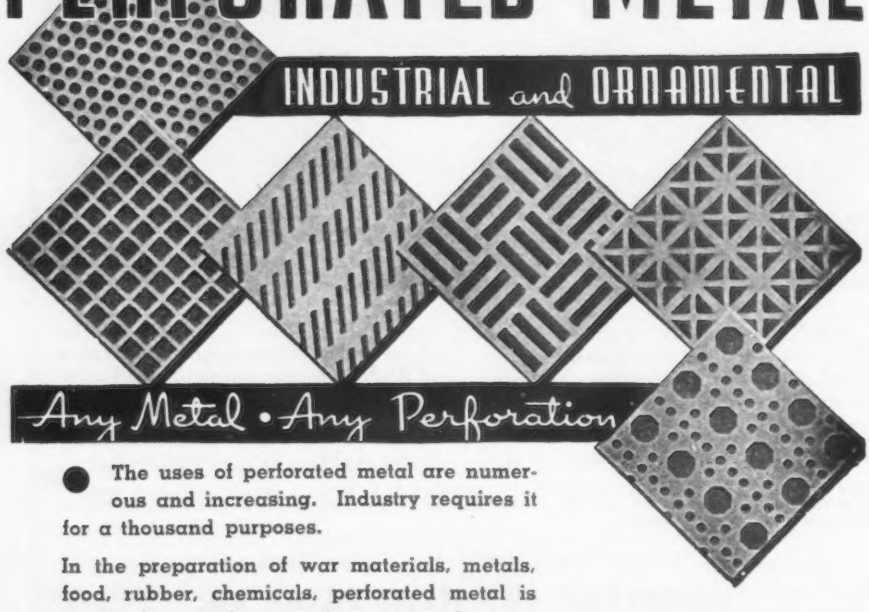
We had been troubled by both a duplication of pickup work and a reluctance on the part of some of the welding foremen to fully pickup behind the completion of production welding. A conference was held and the result was a breakdown of shift responsibility for the completion of all pickup in designated areas.

At the present time we are engaged in a job relations training program. Moreover it is with the knowledge that future welding activity is limited to the number of men who are qualified and willing to assume responsibility for the direction of welding operations that we plan further supervisory training on such subjects as:

The art and science of welding
Metallurgy of welding
Stress analysis
Welding sequence
Job organization
Supervision and management

And any other knowledge or skill necessary to good welding supervision.

PERFORATED METAL



● The uses of perforated metal are numerous and increasing. Industry requires it for a thousand purposes.

In the preparation of war materials, metals, food, rubber, chemicals, perforated metal is required to perform an important role.

The Harrington & King PERFORATING Co.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office, 114 Liberty Street, New York 6, N. Y.

Mass Production of Bombs

(CONTINUED FROM PAGE 66)

a Wheelabrator cabinet, which removes any sand adhering around the ingates, after which they are placed on the floor for the ingates to be parted. The now separated bombs are distributed by means of an electrically operated transfer bogie to the various gantries along which they roll to the various cutting-off machines, where the casting head is parted from the bombs. From here the bombs are transferred on gantries to a battery of swing grinders, where the external portion of the bomb, particularly the ingate, is trimmed off.

From this point, the castings are passed along gantries to the testing machines and are then loaded into trucks. Any slight surface defects are remedied by electric welding before despatch.

The mechanization is completed by a very useful overhead chair conveyor, which has a circuit of more than 850 ft. Among its duties, is the return of the corebars from the stripping station to the wood wool wrapping machines, and collecting of cut-off heads for transfer to wagons outside the buildings.

PERSONALS

• **L. D. Granger** has been elected vice-president, **George H. Creveling** elected treasurer and **Franklin Berwin** elected secretary of American Wire Fabrics Corp., New York, a subsidiary of Wickwire Spencer Steel Co.

• **D. W. Figgis**, executive vice-president of American Can Co., New York, has become president. **C. H. Black**, vice-president in charge of sales, was chosen to succeed Mr. Figgis and **S. Sloan Colt**, president of the Bankers Trust Co., New York, was elected a director.

• **Benjam' H. Gilpin** and **Milton E. Chandler**, both of Chandler-Evans Corp., South Meridan, Conn., and **John B. Byrne** of Hartford-Connecticut Trust Co., were elected directors of Niles-Bement-Pond Co.

• **Ralph L. Wilson**, former chief of the constructional steels section of the metallurgical and conservation branch, steel division, of the WPB in Washington, D. C., became chief metallurgical engineer of the Timken Roller Bearing Co., Canton, Ohio, January 1. Mr. Wilson's experience includes 6 years with the metallurgical departments of the United Alloy Steel Corp. and Central Alloy Steel Corp., after which he was for ten years employed by the steel and tube division of the Timken Roller Bearing Co. as metallurgical engineer, specializing in alloy steel tubing applications in the various process industries.

• **E. L. Berry**, vice-president and general manager of Link-Belt Ordnance Co., Chicago, has been elected vice-president of Link-Belt Co., the parent organization. Mr. Berry, who began his Link-Belt career in 1914, has for many years devoted his time particularly to matters of production and personnel. **Richard F. Bergmann**, company chief engineer, has also been elected a vice-president of the company. Mr. Bergmann came to Link-Belt in 1924, through the purchase of Howe Chain Co., Muskegon, Mich. **John E. Martin** has been appointed manager of Link-Belt Ordnance Co., with headquarters at the plant. Mr. Martin started with the company in 1927, and since Pearl Harbor has been assistant to Brigadier General G. M. Wells, War Dept., Washington, D. C.

• **Pinkney W. Love** has been appointed manager of the Washington, D. C. office of Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc. Mr. Love succeeds **Charles A. Carlson** who is resigning to establish his own business for the manufacture of the Carlson Internal Combustion Engine.

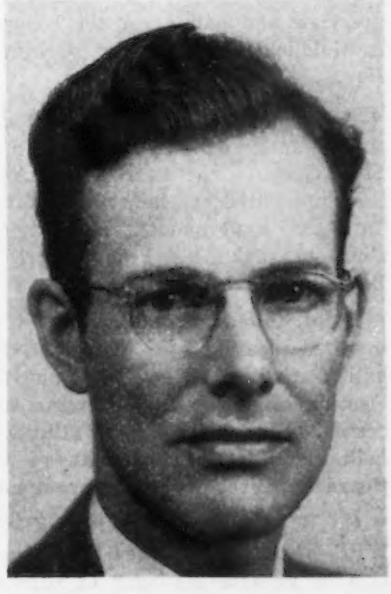
• **Mr. Gordon Groth** has been appointed assistant to the president of the Pennsylvania Rubber Co., Jeannette, Pa. Previously he was affiliated with Carnegie-Illinois Steel Corp., Pittsburgh, and Simmons Mfg. Co. of Cleveland.

• **Edmund J. McSweeney**, former superintendent of motive power for the Baltimore & Ohio Railroad, was named president of the Vulcan Iron Works, Wilkes-Barre, Pa. He will succeed **Perry Holder**, who resigned to become president of the Wickwire Spencer Steel Co.

• **Harold C. Cox** has been appointed superintendent of the steam and combustion department of the local plant of Bethlehem Steel Corp., Johnstown, Pa. **George W. Kerr** has been named assistant superintendent.

• **Marvin G. Sedam** has been appointed director of research for the Alloy Rods Co., York, Pa. He will have complete supervision of new technical developments and materials control. Mr. Sedam was formerly associated with the Harnischfeger Corp., Milwaukee, Wis., as chief metallurgist in charge of welding rod research and development.

MARVIN G. SEDAM, director of research, Alloy Rods Co., York, Pa.



• **V. N. Crasnoff**, has been named assistant general superintendent of Western Cartridge Co., East Alton, Ill. Mr. Crasnoff will supervise product engineering and manufacturing phases of the company's operations. **R. W. Merkle**, assistant to Mr. Crasnoff when he was superintendent of the company's ammunition division, has been named to succeed him. **D. R. Jones** was named assistant superintendent of the ammunition division, and **S. R. Irish** will continue as assistant general superintendent handling administrative matters.

• **James H. Jewell** has been made an assistant manager of industry departments of Westinghouse Electric & Manufacturing Co. Mr. Jewell, manager of the company's agency and specialties department since 1940, will continue to head that division. In his new position Mr. Jewell will supervise all activities of the industry departments except application data and training and general contract.

• **W. L. McGrath**, executive vice-president of the Williamson Heater Co., Cincinnati, for the past 10 years, was elected to the presidency of the firm. He will take the position which became vacant upon the recent death of **W. C. Williamson**. Mr. McGrath was head of the National Warm Air Heating & Air Conditioning Assn. for two years, and was also chief of the code authority of N.R.A. for the furnace industry.

• **Joseph W. McDougal** has been elected president of the Miller Tool & Mfg. Co., Detroit. Previously secretary-treasurer, Mr. McDougal succeeds **Alvin L. Miller**, founder of the company, who remains as a director. Mr. McDougal continues as treasurer, but has been replaced as secretary by **George H. Wilson**.

• **S. D. Mahan** has been appointed director of advertising and public relations of the manufacturing division of Crosley Corp. Cincinnati. In his new connection with the Crosley Corp. Mr. Mahan returns to the electrical appliance field where he spent over eight years, first as merchandise advertising and promotion manager and later as general advertising manager of the Westinghouse Electric & Manufacturing Co.

• **Leon R. Ludwig**, formerly head of Westinghouse Electric & Mfg. Co.'s circuit breaker and protective devices division, has been named manager of the motor division. He succeeds **R. W. Owens**, resigned.

ERNEST J. MEUTEN, assistant secretary of Niles-Bement-Pond Co.

• **H. I. Lewis** an official of American Hardware Co., Pettersburg, Va., will fill the newly created position of executive vice-president at the Weatherhead Co., Cleveland. **Henry F. Bailey**, a Cleveland banker, will take over the company's position of vice-president in charge of finance.

• **John U. Anderson,** secretary-treasurer of Pittsburgh Steel Co., Pittsburgh, has been elected a vice-president.

• **V. C. Mekell,** superintendent of foundries of Ampco Metal, Inc., of Milwaukee, Wis., has resigned to accept the management of product engineering and sales development for Syncro Machine Co., Rahway, N. J.

• **Willis Rabbe,** formerly with Upjohn & Co., Kalamazoo, Mich., has been elected vice-president and a director of the LeRoi Co., Milwaukee, to succeed **J. R. Frantz,** who is retiring.

• **James S. Duncan,** president and general manager of Massey-Harris, Ltd., Toronto, Canada, has been named to head the agricultural and food machinery commission of the United States, Canada and the United Kingdom.

• **Jasper Long,** formerly factory manager, has been promoted to the position of chief engineer and will be directly under the supervision of the general manager of Wade Electric Products Co., Sturgis, Mich. **Roger Ort,** formerly superintendent, has been made assistant production manager and **Daniel L. Wertz,** formerly of Hudson Motor Car Co., has been appointed sales manager.

• **Richard W. Banfield** was elected secretary and **Ernest J. Meuten** was elected assistant secretary of Niles-Bement-Pond Co., Hartford, Conn. Mr. Banfield first entered the company in 1935. He became assistant secretary in 1936 and office manager in 1939, which position he will retain along with his new promotion. Mr. Meuten has served as chief cost accountant of the company since 1935 and will continue those duties along with his election as assistant secretary.

• **Grover E. Leveque** has been made vice-president of Inter-State Iron Co. and Jones & Laughlin Ore Co., subsidiaries of Jones & Laughlin Steel Corp. Mr. Leveque's headquarters will be in Pittsburgh.

• **Dr. Harvey N. Davis,** president of Stevens Institute of Technology and director of the office of production research and development, WPB, has been elected an honorary member of the Institution of Mechanical Engineers in England.

• **Edward A. Kreller,** formerly with Detroit Alloy Steel Co., has been appointed manager of the Jessop Steel Company's cast-to-shape department in Detroit.

• **Milton Kutz** has been made acting assistant general manager of the electrochemicals department of E. I. du Pont de Nemours & Company, Wilmington, Del. The appointment marks the return of Mr. Kutz to the post which ill-health forced him to relinquish 18 months ago.

• **Col. T. H. Kruttschnitt** of San Mateo, Cal., has been appointed vice-president and manager of the Tonopah & Goldfield Railroad Co., Goldfield, Nev.

• **A. L. Grinnell,** for many years district manager for Rustless Iron & Steel Corp. in the Detroit office, has been appointed special representative on special assignments. He will continue to make his headquarters in Detroit.

• **E. M. Allen** announces his retirement as president of Mathieson Alkali Works, Inc., New York, and the election of **G. W. Dolan** as his successor. Mr. Allen will continue to hold his office as chairman of the Board of Directors of the company.

• **C. W. Garvey,** formerly of the WPB, has been appointed to the position of general manager of Gilmore Steel & Supply Co.'s Oakland plant.

RICHARD W. BANFIELD, secretary of Niles-Bement-Pond Co., Hartford, Conn.

• **Walter N. Westland** of Marion Steam Shovel Co., Marion, Ohio, has been appointed the company's sales manager. Mr. Westland joined the Marion organization in 1925. He previously held the position of district manager of the New England sales branch.

Also **L. C. Mosley** has been appointed manager of the mining division, a position left vacant by the recent death of **Homer Littlefield.** In addition to coal mining, Mr. Mosley will have charge of metallic and nonmetallic mining activities. Mr. Mosley has been with the company since 1925.

• **Paul D. Mallay** has joined the staff of Lukens Steel Co., Coatesville, Pa., and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc., as manager of the companies' railroad division.

• **Charles Lindmueller,** manager of Metal & Thermit Corp. plant at East Chicago, Ind., since it was founded in 1911, is retiring. He will be succeeded by **W. G. Midnight,** heretofore assistant manager.

• **R. H. Grant** is retiring as vice-president of General Motors Corp., New York. He supervised the merchandising activities of all General Motors divisions and was recognized as one of the leading sales executives of the country.

• **Bruce A. Fleming** has been elected vice-president in charge of sales at Edwin L. Wiegand Co., Pittsburgh. He succeeds **Ernest N. Calhoun,** who recently became president of the company.

M. D. HOWELL, assistant to the president, U. S. Steel Corp., Del.

• **M. D. Howell** has been appointed to the position of assistant to the president, Benjamin F. Fairless, U. S. Steel Corp., Del., a newly created post. Mr. Howell will also continue as vice-president, secretary and treasurer of the Delaware Corp. in addito his new duties. Mr. Howell was formerly vice-president of Carnegie-Illinois Steel Corp. prior to which he was a vice-president of Chemical Bank and Trust Co., New York City.

• **Fay Keyler,** former vice-president and account manager, has been appointed first vice-president of the O. S. Tyson & Co., Inc., New York. **Elizabeth M. O'Neill,** former secretary, has been made secretary and treasurer. **George Balsam** has been made account manager. Previously he was assistant account manager. **Ernest S. Green,** who was an assistant on copy preparation, has been appointed manager of the copy department. **Herbert V. Mercready** joins the staff as a vice-president and **Kenneth W. Bailey** as an account manager.

• **C. Howard Paul,** treasurer and assistant to the president of Macintosh-Hemphill Co., Pittsburgh, and **Edmund L. Stewart,** treasurer of the Sandusky Foundry & Machine Co., Sandusky, Ohio, have been elected to membership in the Controllers Institute of America.

• **Jack Manildi** has been appointed manager of sales of Pacific Tube Co., Los Angeles. Mr. Manildi was for 10 years with the Oil Well Supply Co. and General Petroleum Corp. The past two years he assisted Mr. Harmon in forming and developing Pacific Tube.

• **L. V. Tuttle** has been appointed foundry manager at Gisholt Machine Co., Madison, Wis. Mr. Tuttle has been associated with the Koehring Co., Milwaukee, in a similar capacity for the past 12 years.

• **David Gross** has been appointed sales director of the materials test division of Allen B. Du Mont Laboratories, Inc., Passaic, N. J. Mr. Gross has been identified with Du Mont for several years past, specializing in television equipment sales until the outbreak of the war.

• **Hobart W. Seyler,** formerly assistant general superintendent, has been appointed general superintendent of Carnegie-Illinois Steel Corp. Clairton, Pa., Works. He succeeds **Frank F. Marquard,** who is retiring after more than 45 years of service.

• **Daniel C. Mills** has been made manager of industrial relations of Bethlehem Steel Co. Mr. Mills, who succeeds the late **G. W. Vary,** has been with Bethlehem Steel for 20 years.

• **F. N. Keithley** has been appointed district engineer of the thermit department by the Metal & Thermit Corp., New York. His headquarters will be at the corporation's South San Francisco branch.

• **Kenneth K. Stokes** has been appointed superintendent of transportation, Rock Island Lines, with headquarters in Chicago. Mr. Stokes has been acting superintendent of transportation since the death of **J. R. Pickering. T. O. Jennings,** general coal agent of Rock Island Lines, has retired recently.

• **Roland Whitehurst,** assistant sales manager of Electric Storage Battery Co. since 1940, has been assigned the title of sales manager. Mr. Whitehurst has been in the employ of the company since 1908, and was manager of its Washington branch for 20 years.

• **George M. Carvlin** has been elected a vice-president of Koppers Co., engineering and construction division. Mr. Carvlin had been an assistant to **Joseph Becker,** vice-president of the company and general manager of the division since 1940.

• **H. C. F. Mockridge,** of Toronto, member of the law firm of Osler, Hoskin & Harcourt, was elected a director of The International Nickel Co. of Canada, Ltd.

• **Leighton M. Long,** formerly chief metallurgist and foundry superintendent of the Bunting Brass & Bronze Co., Toledo, Ohio, has been named as an assistant research supervisor at Battelle Memorial Institute, Columbus, Ohio. Mr. Long has had over 20 years' research and supervisory experience in the metallurgical industries.

• **George L. Craig** has recently been appointed director of research of Calumet & Hecla Consolidated Copper Co., Detroit. Mr. Craig, metallurgist and research engineer, joined the Calumet & Hecla organization in 1934.

• **Frederic C. Weyburne** has been named general manager of the Marshall-Eclipse division of Bendix Aviation Corp., Troy, N. Y. Mr. Weyburne has been with Bendix since 1926, succeeding **Furber Marshall,** who resigned to become president of the Pharis Tire & Rubber Co.

• **John Maypole,** former sales engineer for the Kiekhaefer Corp., Cedarburg, Wis., has been appointed Chicago district sales manager for the firm.

• **B. F. Stauffer,** identified with the B. F. Goodrich Co. for the past 50 years, was elected president and general manager of American Anode, Inc., Akron, Ohio. Mr. Stauffer succeeds **Raymond W. Albright,** general manager of American Anode since 1926 who has been named vice-president and general manager of Distillation Products Inc., of Rochester, N. Y.

B. F. STAUFFER, president and general manager, American Anode, Inc., Akron, Ohio.

OBITUARY...

• **Carl A. Heins,** president and founder of National Electrotype Co., Inc., died on Dec. 27. He founded the company in 1907.

• **Harry T. Odenkirk**, sales manager of Keen Foundry Co., Chicago, Ill., died on Dec. 14.

• **Curtis H. Veeder,** inventor, manufacturer and director of the Veeder-Root Co., Hartford, Conn., died recently at the age of 81.

• **Frederick W. Wood,** who built the plant of the old Maryland Steel Co. at Sparrow's Point, which is the predecessor of Bethlehem Steel Co., died on Dec. 23 after an illness of little more than 24 hours. Mr. Wood was born March 16, 1875, and was 86 years old.

• **Walter L. Hague** died on Dec. 17, 1943, at his home in Pittsburgh, Pa. He was 71 years of age. Mr. Hague was one of the pioneers in the contract and jobbing electroplating industry, having operated Walter E. Hague & Son, Inc.

• **Robert F. Hamilton,** superintendent of Vance Iron & Steel Co., Chattanooga, Tenn., died suddenly of heart attack on December 30. Mr. Hamilton joined the company in 1919.

• **Hugh J. Homewood,** treasurer of Gisholt Machine Co., Madison, Wis., and affiliated with the company organization for nearly 20 years, died at his home on November 7 at the age of 49. Prior to his election as treasurer of the firm in 1940 he had served in various capacities culminating in his appointment as chief accountant and office manager, which positions he held for 10 years.

• **Byron V. Covert,** pioneer auto manufacturer, was found dead December 18 at his home in Lockport, N. Y. With **Alfred P. Sloan** he was one of the backers of the late **Herbert C. Harrison** in founding the Harrison Radiator Corporation, now a division of General Motors, in Lockport. He was 80 years of age.

• **Charles L. Nutter,** treasurer since 1902 and manager of the Old Colony Foundry, East Bridgewater, Mass., died December 28 in his 71st year. Prior to 1914, Mr. Nutter was an official of the Carver Cotton Gin Co.

• **Edgar H. Reed,** prominently identified with the Worcester, Mass., machine tool industry for years, died December 26 at Boothbay Harbor, Me., where he had lived since his retirement several years ago.

• **Erle F. Whitney,** assistant district manager of the General Electric Co.'s East Central district, for the past 14 years, died in Cleveland on Dec. 12.

• **George W. Vary,** manager of industrial relations, Bethlehem Steel Co., died Dec. 25, after a short illness of heart trouble and other complications. Mr. Vary had spent most of his business life with Bethlehem Steel Co. having started in 1903.

• **Nicholas L. Moon,** president of the Upper Merion & Plymouth Railroad Co. at Conshohocken, Pa., died on December 27 at Norristown, Pa., His age was 77. Mr. Moon was connected with the Delaware and Hudson Railroad from 1887 to 1907, and as division superintendent of the Lehigh Valley Railroad at Wilkes-Barre, Pa., from 1907 to 1910. After his term of service with the Lehigh Valley Railroad, he joined the Alan Wood Steel Co. as traffic manager. Later he became vice-president in charge of operations of the Upper Merion & Plymouth Railroad Co., and his final capacity was as president of the railroad, which position he held at the time of his death.

• **John S. Richards,** director of research of American Steel & Wire Co., died suddenly at his home in Cleveland on Dec. 23. He was 49 years old.

• **Roland J. Houck,** 51, plant manager and director of Motch & Merryweather Machinery Co., Cleveland, died Dec. 25 at Tuscon, Ariz., after a short illness.

• **Walter J. Allison,** tool expediter for General Motors Corp., passed away recently. He was 47 years of age.

• **Oscar T. Roder,** assistant to the general manager of Globe-Union, Inc., Milwaukee, died Dec. 26.

• **Chester H. Pape,** president of the Independent Foundry Co. and Peerless Pattern Works at Portland, Ore., died recently. He was 58 years old, a member of Portland's Metal Trades Assn. and past president of the Pacific Metal Trades & Gray Iron Foundry Assn.

• **Harold K. Ferguson,** founder and president of H. K. Ferguson Co., Cleveland, died of a heart attack, Dec. 9 at the age of 60. As an industrial engineer and builder Mr. Ferguson made at least two contributions to his profession that brought him recognition in his field. The first was the "standard factory" principle which provided for building plants from stock plans with structural steel already fabricated. The second was the assembling of an organization which could actually "manufacture" industrial plants.

Mr. Ferguson was born in Albion, Mich. He was graduated from Ohio Wesleyan University in 1905 and began his career as a timekeeper with the Austin Co. In 1909 he went to General Electric and rejoined Austin in 1912 as secretary of the company. In 1918 he founded the H. K. Ferguson Co.

• **Alexander G. Howard,** senior engineer, production department, Remington Arms Co., Lowell, Mass., died suddenly Dec. 12 while playing tennis at a country club. Mr. Howard was born in Ireland 58 years ago.

• **Paul C. DeWolf,** vice-president of Brown & Sharpe Mfg. Co., Providence, R. I., for the past 19 years, died Dec. 19. He was 61 years old.

• **Frank P. Weisbeck,** general superintendent of J. H. Williams & Co., Buffalo, died while at work Dec. 23. He was 59 and had been with the firm 30 years.

• **Louis Birkenstein** prominently identified with the metal industries for many years, died Dec. 28 in his 77th year. His son, **George Birkenstein,** president of the George Birkenstein & Co. and the Anker-Holth Mfg. Co., Chicago, died Jan. 2. He was 44 years old.

• **Edwin D. Coddington,** president of the E. D. Coddington Co., Milwaukee, and former vice-president and production manager of the Wisconsin Bridge & Iron Co., died in Douglaston, N. Y., recently, at the age of 78 years.

• **Carl Wheeler,** production control manager of Vickers, Inc., Detroit, died recently. Before joining Vickers in 1936, Mr. Wheeler was with Graham-Paige Co. for 19 years. Also **Charles G. Lloyd,** a sales engineer for Vickers recently passed away. He was born in Ebensburg, Pa., 50 years ago.

Renegotiation Figures Accepted

Cincinnati

• • • **Renegotiation of machine tool** contracts so far as the government's end of the job is concerned has been completed in the Cincinnati area. Most manufacturers have already had their final conferences with renegotiators and are now in possession of figures. While there has been no definite announcement, it is fairly well known that several of the manufacturers have closed books and have agreed to the figures and several have sent checks to Washington. In some instances some companies are writing letters of protest so that they may be in reasonable position to gain advantage of any subsequent relief that may be forthcoming. Most manufacturers are dissatisfied with the situation since the margin of profit permitted is reported to be very low.

On the new business side of the picture, manufacturers indicate a fair volume of lend-lease business during the month of December, with continuing fair business during the current month. Most plants are still going along with present forces in a few cases some men have been laid off.

A.S.A. Revises Standards On Machine Tool Elements

• • • **The American Standards Association** has announced the revision of two in the series of 20 machine tool standards, B5.7-1943, circular and dovetailed forming tool blanks, and B5.10-1943, machine tapers (self-holding and steep taper series).

The revised standard covering circular and dovetail tool blanks and their holders, first approved in 1936, includes besides the sizes and types of circular and dovetailed forming tool blanks, the associated mounting portions of their respective holders for use on automatic screw machines. To reduce the number of blanks now in use, the machines have been classified into six different groups of comparable stock capacities.

The American Standard for Machine Tapers (B5.10-1943), which was first approved in 1937, now sets a uniform practice for the slope of self-holding and steep machine tapers, the detailed dimensions for this type of taper tool shank and the corresponding dimensions for the taper socket in the spindle of the machine, including the dimensions of the keyways.

Both of these standards have been formulated by the A.S.A. committee B5 on small tools and machine tool elements, organized under the A.S.A. procedure and under the joint sponsorship of the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the National Machine Tool Builders' Association.

The American Standard for Machine Tapers is available at 60c. a copy and the American Standard for Circular and Dovetail Forming Tool Blanks, at 50c. a copy, from the American Standards Association, 29 West 39th Street, New York 18, New York.

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Tool Steel Identification System

[CONTINUED FROM PAGE 67]

substantial advantages in experience tabulations and in salvage work. Relative performance of various analyses may be checked, worn out tools can be easily sorted by analyses for maximum efficiency and value in the handling as scrap, and tools being salvaged by annealing and re-hardening can be given proper heat treatment.

Only commonly encountered domestic brands are included in the first standards lists being put out by the automotive companies. Others may be added later. The system follows one laid out several years ago and improved upon since by Gorham Tool Co., Detroit. The tool markings are for identification only and should not be confused, in any way, whatsoever, with specifications.

Identification first breaks down all high speed steels by the major alloy element in the composition, tungsten or molybdenum. Where tungsten predominates, the letter "T" starts off the code definition, and for molybdenum tools the letter "M" is used. The next phase of the symbol is a numeral indicating the chemical composition. The third part of the symbol is a letter which denotes the company producing the raw steel.

The symbols are keyed in this manner as regards formulas:

Tungsten High Speed Steels—"T"
Chemical Composition in Percentage

Tungsten	Chromium	Vanadium	Cobalt	Analysis Symbol
18.00	4.00	1.00		T-1
18.00	4.00	2.00		T-2
18.00	4.00	3.25		T-3
18.00	4.00	1.00	4.00	T-4
18.00	4.00	2.00	8.00	T-5
22.00	5.00	1.50	12.00	T-6
14.00	4.00	2.00		T-7
14.00	4.00	2.00	5.00	T-8

Symbol	Company
A	Vanadium-Alloys Steel Co.
B	Firth-Sterling Steel Co.
C	Henry Disston & Sons, Inc.
D	Universal-Cyclops Steel Co.
E	Bethlehem Steel Co.
F	Latrobe Electric Steel Co.
G	Allegheny Ludlum Steel Corp.
H	Columbia Tool Steel Co.
I	Braeburn Alloy Steel Corp.
J	Halcomb Works, Crucible Steel Co.
K	Carpenter Steel Co.
L	Midvale Co.
N	Simonds Saw & Steel
P	Vulcan Crucible Steel Co.
W	Jessop Steel Co.
X	Crucible Steel Co.

Thus if it was desired to specify a steel containing 18 per cent tungsten, 4 chromium, and 2 vanadium, made by the Allegeny Ludlum Steel Corp., the key would be "T" (for tungsten), "2" (denoting the formula), and "G" (denoting the maker), or T-2-G.

Assume a molybdenum steel containing 5 per cent molybdenum, 4 chromium, 1½ vanadium and 6 tungsten was desired. The analysis symbol would be M-2. Purchase orders from companies might read simply M-2, indicating no preference in the choice of maker. Later, the delivery of this order might be marked M-2-X, indicating that the particular specification involved came from Crucible Steel Co. of America. Typical trade names correlated within the framework of this coding system are shown in the accompanying illustration.

Molybdenum High Speed Steels—"M"
Chemical Composition in Percentage

Molybdenum	Chromium	Vanadium	Tungsten	Cobalt	Boron	Analysis Symbol
8.00	4.00	1.00	1.50			M-1
5.00	4.00	1.50	6.00			M-2
8.00	4.00	2.00				M-10
8.00	4.00	1.00		2.50	added	M-20
8.00	4.00	1.00	1.50	4.00		M-30
8.00	4.00	1.50		8.00	added	M-40

MACHINE TOOLS

. . . News and Market Activities

Onsrud Prices Approved, Yet OPA Sues

• • • **Sales of** wood and metal working machinery at prices later substantially approved by the OPA have resulted in an OPA suit for $60,000 against Onsrud Machine Works, Inc., Chicago. The sum asked represents three times the difference between prices assertedly charged for the machinery and established ceiling prices during the period when damage rights under the price control act commenced and the dates on which the company filed applications for upward revision of its prices.

The OPA's suit fails to take into consideration that the claimed above-ceiling prices later substantially were approved for subsequent sales.

Maximum Price Regulation No. 67, covering metal working tools, and No. 136, covering other machinery, set up Oct. 1, 1941, list prices as ceiling. Onsrud had increased its list prices between that date and Jan. 30, 1942, effective date of the price control act, because of rising production costs. The company manufactures high speed routing and milling equipment for non-ferrous metals used principally in the aircraft industry, and wood-working machinery for such special purpose work as fashioning the stock of the Garand rifle. During the period immediately before the price control act, Onsrud found that new special purpose machinery for the aircraft industry had been priced too low, and that this machinery rapidly was becoming the major part of its production. About 88 per cent of the company's sales go to the aircraft industry, representing metal working machinery; the balance, wood working machinery, is sold to government arsenals. The company's business mushroomed because of the war, net sales rising from $230,000 in 1938 to $2,050,000 in 1942 and about $3,000,000 in 1943. Profits after taxes amounted to about $30,000 in 1942 and approximately the same in 1943, so that judgment against the firm in the OPA suit would wipe out profits of two years.

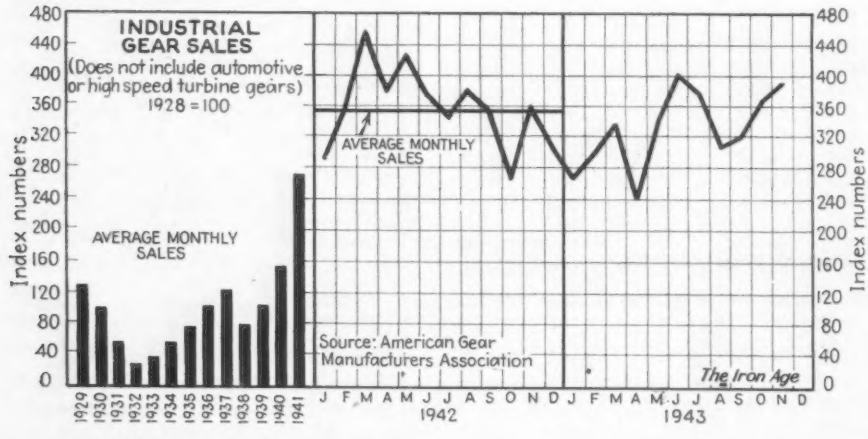
The company maintains that because of the kaleidoscopic change in the character of its business it did not have readily available the necessary information to file for validation of its prices prior to the six month deadline on damages after the effective date of the price control act. Lack of accurate cost records, and devotion of the entire energies of its small executive staff to production, delayed the filing, it is claimed. Application was filed under Maximum Price Regulation No. 67 for revision of prices on the metal-working machinery, on Sept. 7, 1942, and on the wood-working machinery, under Maximum Price Regulation No. 136, on Dec. 3, 1942. Thus most of the damages claimed by the OPA reflect over-ceiling sales of wood working machinery because of the longer time period involved between July 31, 1942, when damage suits became permissible, and the date of eventual filing.

The price increases granted were substantially those requested in each case, and were retroactive to the date of filing the petition. They also were substantially those in effect at the time the price control act was passed, the company states, so that increases made between the Oct. 1, 1941, ceiling price base date, and the cutback caused by the price control act were, in effect, validated.

The OPA contends that the company filed for price increases after an investigation had been started of the alleged overcharges, and that prior to Aug. 1, 1942, it called the defendant's attention to asserted violations of Maximum Price Regulation No. 67.

November Gear Sales Up 5 Per Cent

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows an increase of 5 per cent in the business booked in November, as compared with October. The November index figure was 387 as compared with 368 for October.



WPB Relaxes Restrictions On Rotary Files and Vises

Washington

• • • **WPB by two** amendments to L-216 has eased restrictions upon the manufacture of two tool items—vises and rotary files and burrs. Since last summer manufacturers of rotary files and burrs were permitted to make only up to 10 per cent of their previous month's total production in the form of special sizes and shapes; under the revision the quantity is increased to 25 per cent of the previous month's total production. Chip-breakers, previously prohibited, are now permitted.

Another amendment issued simultaneously removes restrictions upon the manufacture of bench vises, except in the case of the four machinists' bench types which remain on the schedule. The limitation on types of metal that may be used continues in effect.

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NON-FERROUS METALS

. . . News and Market Activities

Primary Aluminum Output Up 75%

• • • **Production of primary aluminum** increased more than 75 per cent from 521,106 net tons in 1942 to about 920,000 tons in 1943, according to the year end report on domestic mineral production submitted by the Bureau of Mines to Secretary Harold L. Ickes.

Construction difficulties and manpower shortages delayed the completion of the aluminum expansion program but by the last quarter of the year metal was being produced at an annual rate of 1,128,000 tons.

Because of the existing over-supply, operations of three newly completed potlines was delayed and indications were that six to 10 additional potlines would be closed.

Domestic production of bauxite increased from 2,768,343 net tons in 1942 to 7,166,000 net tons in 1943. One and a half million tons of bauxite were imported from South America. The bauxite stockpile totals more than four million tons.

Magnesium: Production in 1943 amounted to 185,000 tons valued at $76,000,000 compared with 47,420 tons worth $21,216,414 the year before.

Copper, Lead and Zinc: Despite the incentive of bonus prices, mine production of lead and zinc decreased in 1943 and copper production was only slightly increased. Smelter production of copper from domestic ores increased slight from 1,087,991 tons valued at $256,766,000 in 1942 to about 1,090,000 tons valued at $257,000,000 in 1943. Refined lead production declined from 467,367 tons in 1942 to about 425,000 tons. Slab zinc similarly declined from 629,957 tons to about 585 tons in 1943.

•

Copper Contract Cancelled

Toronto

• • • **Metals Reserve Co.** has cancelled its contract with the Granby Consolidated Mining, Smelting & Power Co., Ltd., Granby, B. C., for supply of copper, as of Dec. 31. The original contract, which became effective on all shipments of copper by the company after Nov. 1, 1942, expired at the end of 1943 and will not be renewed. It is stated, however, that Metals Reserve Co., has given Granby an order for a small additional tonnage of copper which will provide an outlet for its production for several weeks.

While no further cancellations have been announced between Metals Reserve Co., and Canadian base metals producers, contracts are being reviewed and some are likely to end this year.

Production costs at Granby have advanced sharply in recent months, largely because of the failure of the government authorities to provide the company with an adequate supply of labor. This had the two-fold effect of restricting production, while at the same time development had to be reduced and the grade of ore treated had to be lowered. The contract under which Granby operated called for payment by Metals Reserve Co., of all expenses plus a royalty to compensate for loss of ore reserves. This royalty was on a sliding scale, declining as costs increased above the base figure of 11c. a lb. operating costs.

•

CMP Changes

• • • **Aluminum slugs** have been designated as controlled materials to permit allotment of this form of aluminum for the manufacture of collapsible tubes, which may be made under the terms of Aluminum Order M-1-i, as amended Dec. 4, 1943.

Powders made from copper or copper-base alloys are no longer controlled materials as a result of Direction No. 42 to CMP Regulation No. 1. During the first quarter of 1944, producers of copper or copper-base alloy powders may make deliveries either on authorized controlled materials orders or on orders placed by customers who have been authorized on Form WPB-2959 to receive such powders. However, beginning with the second quarter of 1944, producers of such powders may make deliveries on orders placed pursuant to this authorization form only.

•

Beryllium Order Amended

• • • **WPB on Jan. 4** added the name of Beryllium Corp. of Pennsylvania to the list of approved smelters, thereby permitting it to buy beryllium-copper scrap without approval by WPB, in an amendment to Supplementary Order M-160-a. Beryllium is a copper alloying material and this order controls the purchase of this scrap by producers and smelters.

Copper production in terms of recoverable metal based on smelter receipts, except the Central and Eastern States which are mill outputs, in net tons

Region and State	January-June	July	August	September	October	November (preliminary)
Eastern States	6,490	1,317	1,265	1,204	1,313	1,312
Central States	25,789	3,778	3,655	3,603	4,010	3,894
Western States:						
Arizona	203,277	31,291	33,542	32,860	34,490	32,650
California	1,971	718	1,099	1,153	1,260	1,350
Colorado	466	73	84	80	91	88
Idaho	1,301	191	202	207	177	185
Montana	69,439	10,820	9,775	10,562	11,338	11,325
Nevada	34,688	5,782	5,625	5,541	5,917	6,150
New Mexico	39,421	6,770	4,875	6,927	6,641	6,445
Oregon	2		3			
Texas	56	4	3	5	2	3
Utah	158,597	26,739	26,491	27,520	28,752	27,000
Washington	3,857	618	641	480	557	500
	513,075	83,006	82,340	85,335	89,225	85,696
Alaska	15	1	2		4	1
	545,369	88,102	87,262	90,142	94,552	90,903

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper: 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.: ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Scrap Price Controls Eliminated On Sales by Government Agencies

Washington

• • • **Sales and** deliveries of scrap metals by the War Department, Navy Department and the Procurement Division of the Treasury Department to dealers purchasing for resale will be exempt from the specific price control when the dealer certifies that he is purchasing for resale and that in reselling he will not exceed the applicable maximum prices, the Office of Price Administration announced. At the same time, when the dealer executes another certificate, these agencies and their employees will be exempt from the civil or criminal liabilities set forth in price regulations covering these items.

All sales by these agencies of used, waste, and scrap materials subject to price regulation have been exempt from price control for some time. These exemptions represent a further step by OPA to relieve the procurement agencies of burdens placed upon them in disposing of salvage materials and commodities. Where no certificates are executed by the dealer, the exemptions do not apply.

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Auto Wreckers Meet in Cleveland

Cleveland

• • • **Wartime problems** and post war planning were the topics of discussion at the first annual meeting of the National Auto Wreckers Association in Cleveland on Jan. 10 and 11. The program was devoted to the problems of the auto wrecking industry and the relationship that industry plays to the war.

Members of the various governmental control agencies, the armed services and the industry took part in the meeting. OPA and WPB representatives discussed the "Used Parts Problem and Its Relationship to Wartime Transportation," while a representative of the Rubber Director of the WPB discussed the nation's rubber supply and how it affects the auto wrecking industry.

"Auto Salvage" and "Post-War Planning" were discussed by the group, and the representatives from the Army, Selective Service and the War Manpower Commission told members of the association what to look out for in the immediate future as far as manpower supplies were concerned.

On a national radio hook-up, a roundtable group composed of members of various scrap consuming industries, the auto wreckers association, and several government agencies discussed "Automotive Parts Replacement for War."

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Scrap Yards Charge WMC With Aiding Labor Turnover

Boston

• • • **Relations between** the War Manpower Commission and scrap yards are not amicable. The latter claim that WMC makes no effort to aid yards hold what little labor they have. Instead, WMC makes it easy for the yard laborer to switch to another job, it is claimed. Appeals from yards are to sustain refusals to release men are usually answered by giving men a higher rating. A man capable of pushing a wheelbarrow around a foundry has a higher rating than he would working in a scrap yard.

Labor is so tight in some yards that it is frequently necessary to use truck drivers to help load cars and for other yard work. Extra compensation must often be made in such cases. Were it not for the fact that a sizable tonnage of scrap handled by yards is prepared, such as turnings and borings, yard labor problems would be even more acute than at present.

CINCINNATI — While shipments are being accepted on previous commitments, activity for additional amounts of material is all but absent in this area. Most melters are reported to have fair inventories running from perhaps 60 to 90 days. The tendency on the part of consumers is indicated to be one of careful retrenchment so as not to be caught in the event of cancellations with too large an inventory on hand.

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PITTSBURGH — Supply and demand well balanced here. There appears to be no chance of a severe scrap shortage materializing this winter. With pig iron supplies easier, some tension has been taken off scrap. Alloy scrap is still a drug on the market.

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BUFFALO—Scrap dealers reported this week that consumers were buying again after last month's near-embargo. All items with the exception of the troublesome alloys were moving in fair volume.

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BOSTON—Metal working plant prepared scrap production is decreasing, little automobile scrap comes into the market, the supply of breakable, machinery, and textile cast is negligible, and heavy steel scrap supplies are off. Labor, the average yard's bottleneck, is further hindered by cold weather and snows. Government agencies are corraling some scrap but there is much less than a year ago. These agencies see to it that yards get little shipyard scrap.

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BIRMINGHAM—Mills in this area are currently limiting scrap purchases to material available in the immediate district to avoid payment of higher freight rates. Foundries are out of the market for all grades.

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ST. LOUIS — Scrap shipments here have fallen off since the turn of the year because of the scarcity of material, labor shortages, and cold weather. Industrial and railroad scrap provide virtually all receipts, and mills have been working into their reserves.

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CHICAGO — Supply and demand for carbon grades appears to be pretty well balanced with no noticeable trend in either direction. Three local mills that were out of the market at WPB request are buying again. Cast iron is still not available in any measurable quantities, but alloy scrap continues far in excess of demand.

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NEW YORK — Scrap demands have picked up in this area during the past week, with several mills calling for additional receipts and none are restricting quantity. The Army Salvage Center in Brooklyn is using war prisoners from Governor's Island for sorting and other operations, but yards continue to face a bad manpower shortage.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Bik. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.00	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
hicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.86	15.36	22.85	20.36	19.35	19.85	20.36	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.86	13.86	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.; at Memphis, 50c.; Great Lakes ports, $1; New England, $1.25. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$3 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.00	24.00	24.25	24.50
Chicago, Philadelphia Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21 00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED	Solids, Lb. Cont. W	Turnings, Lb. Cont. W	BASE PRICE UNSEGREGATED SOLIDS	BASE PRICE UNSEGREGATED TURNINGS
Type 1	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2	1.60	1.40		
Type 3	1.25	1.25	$1.15 per lb. contained W if over 1% and less than 5%.	$1.00 per lb. contained W if 1% and less than 5%.
Type 4*	0.125	0.105		
Type 5*	0.135	0.115	$0.80 per lb. contained Mo if 1½% or more.	$0.70 per lb. contained Mo if 1½% or more.

*Per lb. of scrap material.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Jan. 11, 1944	Jan. 4, 1944	Dec. 7, 1943	Jan. 12, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Jan. 11, 1944	Jan. 4, 1944	Dec. 7, 1943	Jan. 12, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 142-155.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 11, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. **(1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base.** (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00	→					$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)		(Weirton = 2.80¢)			2.99¢		2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢a	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢g	2.10¢		(Bethlehem = 2.10¢)			2.45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[8]	$5.018a	$3.922	$4.772	$3.605	$3.668	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.885	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.857	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.96	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.60[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.96[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.78[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.... $54.80
6-in. and larger, del'd New York... 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

Per Gross Ton

Old range, bessemer, 51.50 ..... $4.75
Old range, non-bessemer, 51.50..... 4.60
Mesaba, bessemer, 51.50 ..... 4.60
Mesaba, non-bessemer, 51.50 ..... 4.45
High phosphorus, 51.50 ..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

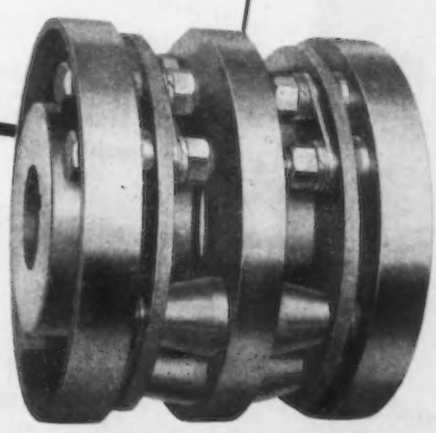
*Includes annealing and pickling.

THOMAS FLEXIBLE COUPLINGS

Since 1914 "THOMAS" has produced the most dependable couplings made. They are specified by engineers and designers because no other type or make of coupling has these features:

NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT

Backlash shocks and vibrations are the destructive forces that take annually in maintenance, millions of dollars from the industries. This terrific drain, however, is greatly lessened by the adoption of Thomas Flexible Couplings.



For specifications on couplings for all standard purposes write for the new Thomas Catalog with complete engineering data.

"BUILT TO LAST A LIFETIME"

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA

T-4

HOW TO STREAMLINE HEAT-TREATING PRODUCTION

Constructed for the heat-treatment of steel castings, this battery of gas-fired furnaces illustrates the degree of engineering perfection to be expected when R-S Engineers are called into consultation.

Three of the R-S Car Hearth Furnaces are direct fired for high temperatures while the fourth (second from the left) is convection heated for low temperature heat treating. Furnace doors, cars and transfer car are electrically operated from central stations.

All those who have seen this installation say that it is a fine example of modern streamlined heat-treating production as well as an efficient method of obtaining the most from available manpower.

Inquiries are invited.

FURNACE DIVISION
R-S PRODUCTS CORPORATION
4524 Germantown Avenue, Philadelphia 44, Penna.

R-S QUALITY PRODUCTS SINCE 1908

R-S Furnaces of Distinction

ANNEALING CONVECTION ROTARY HEARTH SALT BATH FORGING
CONTINUOUS CONVEYOR PLATE AND ANGLE HEATING METAL MELTING CAR HEARTH

★ ★ BUY WAR BONDS ★ ★

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	13.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $38.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

PACKS AUTHORITY

The removal of drawing and fabricating compounds, machining oils, carbon smut — is often a *stubborn* operation. It bows only to *cleaning with authority.*

Wyandotte Metal Cleaners go at a job that way — with authority! However mean the job of metal cleaning or degreasing that's put up to Wyandotte—the job gets *done,* and in jig-time! For Wyandotte Cleaners are *specialized* to fit the demands of any job.

War production can't lag for a second because of metal cleaning difficulties. And wherever used, Wyandotte has seen to it that such "hitch-hikers" *never even get a start.*

Your best friend in helping you meet any cleaning problem that may arise is the Wyandotte Service Engineer. Thousands have learned that he, and the Wyandotte compound he specifies, have what it takes. Find out for yourself—today.

Wyandotte
Reg. U. S. Pat. Off.

SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION, J. B. FORD DIVISION, WYANDOTTE, MICHIGAN

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos-phorus	Charcoal
Boston (3)	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (5)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass (3)	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (4)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Manafield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $2 per gross ton above maximum prices.

(4) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(5) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

5800 LB. CARBON BASKET ASSEMBLY (34' x 7' 1¼" x 5' 1") built of ⅛" cold rolled copper, reinforced with ⅝" copper angles . . . completely fabricated by Brandt for a chemical plant.

Forming, Welding, Fabricating—

Call BRANDT of Baltimore

for Precision in Heavy Plate and Sheet Steel Work

Here, at your command, is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	$3.15

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham: spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

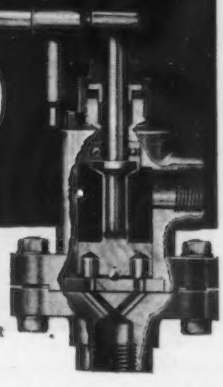
ROOFING TERNE PLATE

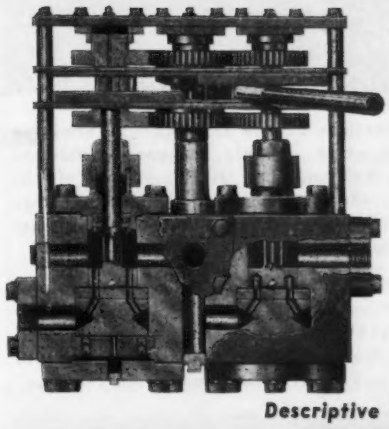
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
30-lb. coating I.C.	7.50	15.00

Easy to Operate

HYDRA
VENTURI-VACUUM
VALVES





3- and 4-way straight operating or neutral point operating valve

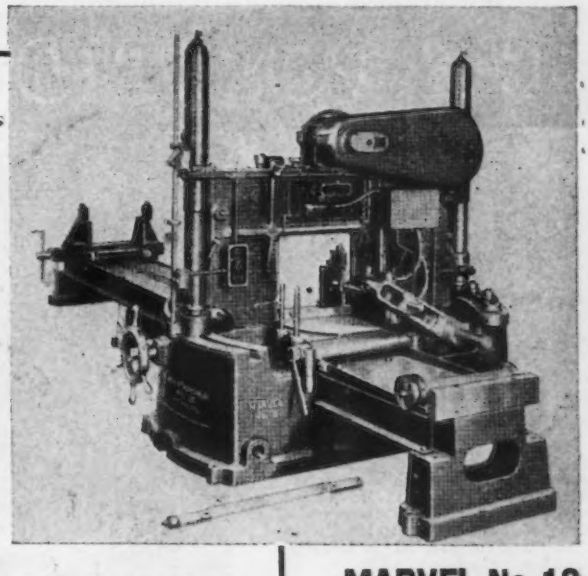
2-way angle and straight through shut-off valve

Hydra Venturi-Vacuum Valves are *unlike* any other valves you have ever used. They operate quickly and easily, have no springs or cups to bother with, cause no shock on the line when closing and require only a fraction of the usual maintenance cost. Many installations in steel mills, rubber packing, car building plants and foundries substantiate these claims.

Descriptive folder upon request.

ALBRIGHT EQUIPMENT CO.
FERNDALE, JOHNSTOWN, PA.

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .

● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

Builders Of Conco Torpedo Electric Hoist

C-F POSITIONERS

Safety, Economy, Speed, *PLUS* Better Welding!

A weldment can be no stronger than its weakest weld—and "down-hand" welding is your best assurance of stronger flawless welds. That's why "positioned welded" is so frequently specified today!

C-F Positioners eliminate crews with slings and chains, clear your floor space, reduce accidents and ***make every weld a faster, better weld!*** The 135° ***beyond horizontal*** tilting feature of C-F Positioners combined with 360° table turn ***assures*** the proper welding position in even the most inaccessible corners!

Adaptable too! Heat treating, cutting, large pipe and boiler-handling problems and jobs where a continuous turn is necessary, are easily answered with a C-F Positioner. ***You'll*** find new uses! Many sizes and true-rated capacities. Hand or power operated. Write for catalog showing sizes, installations and many uses.

Write for Bulletin WP 22

Cullen-Friestedt Co.

1303 S. KILBOURN AVE. CHICAGO 23, U. S. A.

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

*F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(*Per gross ton, delivered, carloads, bulk*)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(*65-72% Cr, 2% max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. producer's plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. or more $1.90

Ferrovanadium, 30-35%, contract basis, f.o.b. producer's plant, usual freight allowances, any quantity, per lb. contained vanadium.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy..... $1.20
Ton lots $1.25

Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy ..... 23c.

Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy ..... 40c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb..... 45c.

Bortam, f.o.b. Niagara Falls
Ton lots, per lb. ..... 45c.
Less ton lots, per lb..... 50c.

Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron..... $6.25

Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium ... $2.25
Less ton lots $2.30

Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium $1.23
Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton....$142.50
3%-5% carbon $157.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26% carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum ..... 95c.

Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum.. 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb contained Mo..... 80c.

Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy ..... 15c.
Less ton lots ..... 16c.

Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton.....$102.50
Packed $107.50
Less ton lots $112.50

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. ... 7.50c.
Ton lots ..... 8c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.
- Less ton lots ..... 9.75c.

AIR CONTROL VALVES FOR LONG SERVICE

Hannifin "Packless" Air Control Valves give you the positive, accurate control of air operated equipment that is essential in modern machine applications, plus a simple, effective design that assures long service with minimum attention. Hannifin disc-type design has no packing, and no leakage or packing maintenance troubles. The bronze disc controlling air flow is ground and lapped to form a perfect seal with the seat. Wear is negligible, yet, if necessary after long service, a simple re-lapping restores the original efficient seal.

Hannifin Valves give you a complete range of choice, in hand or foot operated models, duplex valve, spring return, manifold, and electric types, and pressure regulating valves. Write for Bulletin 57-A.

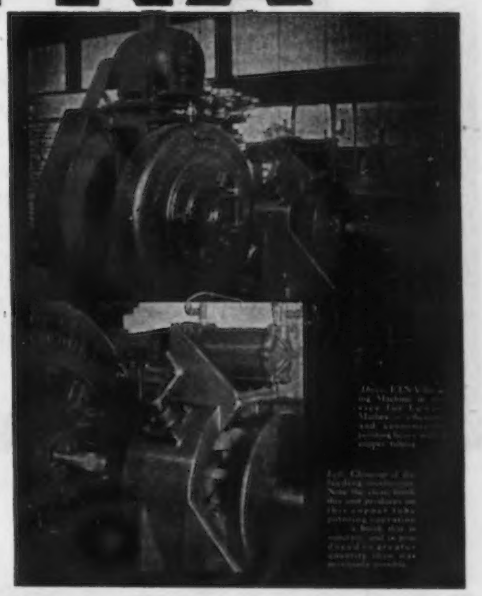
HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago 24, Illinois

HANNIFIN Air Control VALVES

LEWIN-MATHES Got the right answer at

ETNA

They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.



The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

We're offering *Better Lubricant*

YOU'LL GET INCREASED PRODUCTION, SMOOTHER FINISH, LONGER TOOL LIFE FROM SAFCO ENGINEERED CUTTING FLUIDS...OR YOUR MONEY BACK

We've helped others increase their production without increasing manpower or adding to their equipment—*simply by selection of the right lubricant for a given job*. In some cases the results have been truly remarkable. Here are four typical examples:

Chrome-Moly Steel Machined 30% Faster

In a tapping operation on heat treated chrome-moly steel forgings for aircraft parts, SAFCO No. 560 Cutting Oil was tried at the recommendation of the Swan-Finch technical man.

Results:

A 30% increase in production
Tap life increased 6 times
Threads brighter and smoother
Rejects eliminated

In addition, machine operators like SAFCO No. 560 because it is clean to use and keeps machines cleaner.

There may be an operation in *your* plant where SAFCO No. 560 Cutting Oil or another of our "engineered" lubricants for the metal working field can increase your production efficiency. Why not find out by calling in a Swan-Finch technical man?

Eliminates Staining; Speeds Cleaning in Drawing Nickel Silver

In drawing nickel silver to form shells for milking machines, the use of SAFCO Drawing Compound No. 32 was prescribed by a Swan-Finch technical representative. In comparative tests, the SAFCO Drawing Compound consistently produced better results:

Black stains that appeared on pieces drawn with the oils formerly used were eliminated.
Easier cleaning of drawn pieces was obtained.

The SAFCO line of Cutting and Drawing Oils and Compounds includes a product developed to meet virtually every operating condition. The Swan-Finch technical man may have the right solution to your problem.

Swan-Finch Oil Corporation

The IRON AGE

ESTABLISHED 1855

o o o

Jan. 20, 1944

o o o

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You Can't Do That to Me!

POLITICS make strange bedfellows, war is hell and truth is stranger than fiction. If you don't believe this, read the following hypothetical correspondence dated a few months hence, between the largest machinery buyer in America and a machinery manufacturer.

March 1, 1944

Mr. O. U. Sapp, President,
Centerpeed Machine Co.,
Kattsburg, Ioho.

Dear Sir:

Your quotations to me on orders 15,675 to 15,700, for various items of equipment have been received and referred to my fourth assistant for consideration. He reports that in his estimation your prices are 25 per cent too high on each of these orders.

I have implicit confidence in my fourth assistant's capability in pricing machinery since he is a graduate of the Yarvard School of Business Administration and before joining my staff was a junior legal assistant for the Sunrise Peanut Butter Co.

Therefore, these orders have been repriced and are herewith enclosed with mandatory instructions to you to accept them at the reduced prices specified. If you don't like this you can sue us, but separate suit must be brought on each individual order.

Failure to comply will subject you to fine and imprisonment and the seizure of your plant in accordance with Section 9 of the Selective Service Act of 1940.

Yours very truly,

Iam Itt,
2nd Lt., Office of Secretary of War,
Washington, D. C.

Telegram, via Western Union.

2nd Lt. Iam Itt, March 2, 1944
Office, Secretary of War,
Washington, D. C.

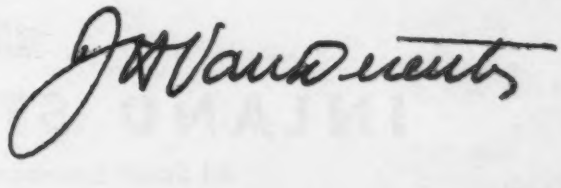
Reference your letter March 1, you can't do this to me.
O. U. Sapp, Kattsburg, Ioho.

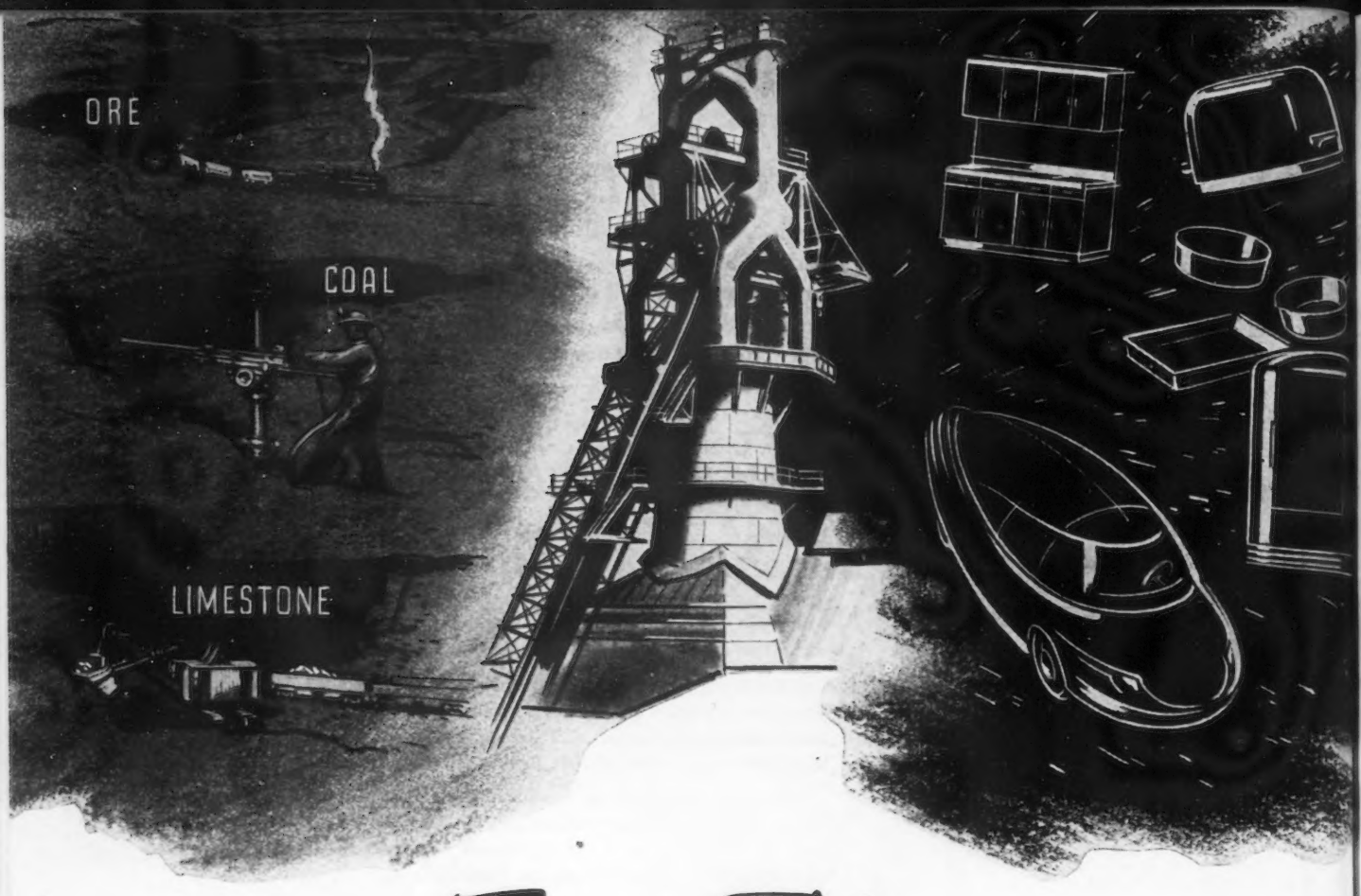
Telegram, via Western Union. March 3, 1944.
O. U. Sapp, President,
Centerpeed Machine Co.,
Kattsburg, Ioho.

Retel yours March 2, Oh, can't I? Read joker in Revenue Act of 1943, Section 801, entitled "Repricing of War Contracts."*
Iam Itt, 2nd Lt., Office, Secretary of War.

Yes, dear reader, it's not fiction but fact. And this is exactly what not only may but will happen to our machinery manufacturers if this act passes in present form. Fortunately it hasn't yet. So if you are interested, and you should be, I advise you to send for a copy of it (H.R. 3687), and then write to your congressmen about it.

* See page 99, this issue.





Finer Things
Are Coming Out of the Ground

From the ore ranges, the coal fields, and the limestone beds are coming vast quantities of blended iron ore, coking coal, and purest limestone—the principal ingredients for making steel, the "master metal" in both peace and war.

Today this steel must all go into the production of the materiel of war, but tomorrow, when Victory is ours, finer things will come to us from out of the ground because of improvements now being made in steel.

Inland metallurgists are constantly testing and re-testing, melting and re-melting, adding one element and taking away another—always seeking for something better. Already they have contributed many new methods and new steels to production for war.

These, and the newer methods and Inland steels that are sure to come from continued intensive research, will help you meet the needs of America at peace.

INLAND STEEL COMPANY

38 South Dearborn Street, Chicago 3, Illinois

Milwaukee • Detroit • St. Paul • St. Louis • Kansas City • Cincinnati • New York

The IRON AGE

JAN. 20, 1944

NEWS FRONT

▶ Machine tool builders with depressing immediate prospects say they have been approached by Ford Motor Co. representatives armed with automobile parts blueprints. Pick out what you want to do, prepare to get started right away, and we'll get the material and permission from WPB, is said to be Ford's offer.

▶ Independent West Coast rolling mills, operating at reduced pace in limited capacity, are hoping for the lifting of production restrictions of reinforcing bars and shapes.

West Coast steel men are pressing for a representative on the Industry Advisory Committee on Steel to the WPB. Although the Kaiser management is in sympathy with this recommendation, others think that the Kaiser organization is sufficiently represented in high councils in Washington.

▶ While little has been heard of leaded steels since the start of the war, interest has not declined. English mills particularly are enthusiastic about the technique, and in the U. S. the steels will undoubtedly be prominent in the post-war period.

Highly machinable steels will likely contain sulphur topped off with some 0.01 (not 0.25, as has often been the case) per cent lead.

Boron alloyed steels, currently employed almost exclusively in armor plate, will be used in the post-war period primarily in steels having about 1 per cent Mn for use in sections $\frac{3}{4}$-in. or more in size.

▶ Apparently there is some propaganda motive in the elaborate publicity regarding the rocket plane developed by the Americans and British. Certainly the development will require many years yet to mature.

Rocket assisted take-offs for bombers has long been employed by Germans and Russians, and will shortly be used by Allies. Aircraft so far developed to operate exclusively by rocket power or jet propulsion have a short range and little weight-carrying capacity, as most of the space is taken up by propulsion equipment.

Operation of planes so far developed leaves much to be desired as regards flexibility. Speeds are high for short periods, operation in the air is comparatively quiet, and acceleration and deceleration are smooth.

There's not much fireworks out the back end while in operation in the air, but on take-off there is a blaze of sparks streaming out behind for hundreds of feet. This would seem to rule against carrier take-offs, despite Navy statements to that effect, until operation is greatly improved.

▶ Some important manufacturers of aircraft components in the East are already beginning to streamline their organizations in the face of leaner post-war years. Drastic changes in top manufacturing personnel recently have been made, much like a field general weeding out the less efficient as a result of battle experience.

▶ Upwards of 30,000 boys and girls 16 to 18 years of age have been putting more than a million hours a week in Pacific Coast aircraft plants. Some groups alternate four-week periods of school with work; others work 4 hr. a day. While the rate of turnover and absenteeism is high the kids do a good job because of their interest in airplanes.

▶ Price Adjustment Boards have allowed profits before taxes of 1.5 to 22 per cent. Greatest bulk falls between 7 and 13 per cent. Where contractors made outstanding contributions having a revolutionary effect on the war, highest profits were allowed.

Of the $5,300,000,000 savings through renegotiation, $2.5 billion was returned to the Treasury and $2.8 billion came from price reductions. Of this over $1 billion would not have been captured through the excess profits tax.

▶ Tin and black plate production is expected to reach 627,000 tons in the first quarter of 1944 and climb to 750,000 tons in the second quarter.

▶ Post-war machine tool surpluses are estimated at $2,500,000,000, hearings of the House Small Business Committee brought out. The new bill being considered there provides for the setting up by RFC of advisory committees for each class of available surplus.

Electrolytic Polishing

SINCE Jacquet and Rocquet first described a practical method for the electrolytic polishing of metallographic specimens of iron and steel in 1939,[6] the method has been tried rather extensively in this country.[7-18] Previous to Jacquet's and Rocquet's work, electrolytic polishing had been confined to the non-ferrous metals.[1-5] The use of this principle of anodic attack in a fluid electrolyte has proved to be an extremely useful tool to the metallographer. The process yields a specimen with a smooth surface, free from scratches and devoid of the disturbed and flowed metal which may be produced in the conventional polishing methods. It is rapid and economical, and may be used successfully by operators lacking the technique and skill required for good results with mechanical methods.

However, many laboratories have been deprived of the use of the polishing method because of a lack of detailed information on the apparatus required and the procedures to be followed. A general impression has been created that electrolytic polishing is rather difficult to apply, and is much less practical than is actually the case. Some laboratories have been deterred from adopting this polishing method through fear of explosion of perchloric reagents.

It is the purpose of this article to present detailed information relative to apparatus and procedures which have been used successfully by laboratories of the Crucible Steel Co. of America for nearly two years, and to explain the precautions taken to prevent explosion of the perchloric reagents involved. It is hoped that this information will permit any laboratory to make a rapid adaptation of proved apparatus and procedures without the necessity of considerable experimental work.

Apparatus

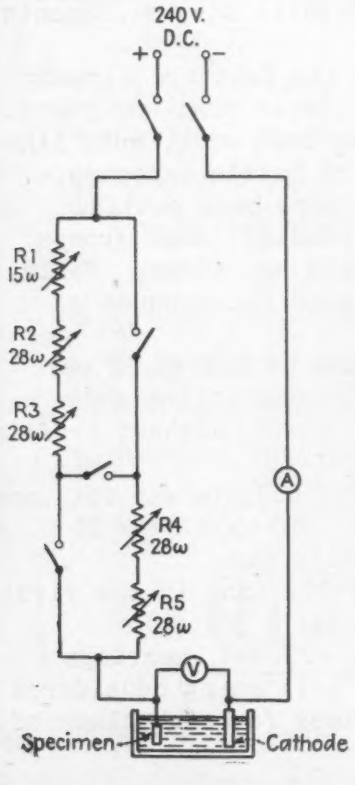
Electrolytic polishing is achieved by causing the specimen to be the anode in a suitable electrolyte and applying the proper factors of voltage and current. A schematic circuit diagram for an electrolytic polishing unit is shown in Fig. 1.

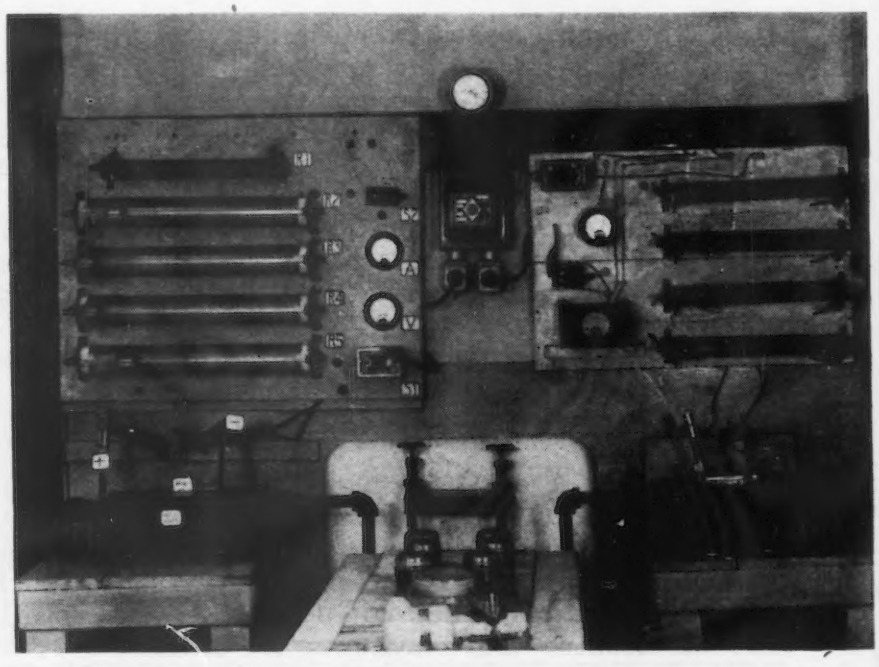
Two separate units, as set up in the Eastern Research Laboratory at Harrison, N. J., are illustrated in Fig. 2. As both units are essentially the same, the unit shown on the left will be described in detail.

The resistors, voltmeter, ammeter and switches are mounted on ½-in. transite board, 25 x 32 in. A photograph, the wiring diagram and the pertinent data concerning the electrical apparatus are shown in Fig. 3. With this arrangement, the resistors may be connected either in series for low currents, or in parallel when currents greater than 6.5 amp. are required.

The electrolyte is contained in a glass dish approximately 5½ x 3½ x 2 in. (an inexpensive butter dish serves admirably), which should be kept covered when not in use. As shown in Fig. 4, the vessel is supported in a wood-lined, welded steel water jacket.

During the polishing operation the specimen clamp itself is attacked, and unless made of a corrosion resistant steel, such as Type 302, has a very short life. The construction of a satisfactory clamp is shown in the photograph and drawings of Fig. 5. The jaws, which are the only part of the clamp which dip into the electrolyte, are easily replaced after they have corroded too thin for further use.





Above: Fig 2—Shown here is the double installation of electrolytic polishing units at the Eastern Research Laboratory of the Crucible Steel Co. of America.

Left: Fig. 1—Circuit diagram for an electrolytic polishing unit.

# of Metallographic Specimens

By L. A. HAUSER
Crucible Steel Co. of America, New York

. . . As a supplement to mechanical polishing, electrolytic polishing of metallographic specimens offers many advantages. With this method, smooth, scratch-free surfaces are produced with no disturbed metal. To encourage use of this rapid and economical polishing method, detailed data on the apparatus used and the procedures to be followed are presented herein by the Crucible Steel Co. of America, successful users of electrolytic polishing for two years.

The clamp is fixed vertically to one end of a horizontal wooden arm, which is pivoted through an oversize hole about a vertical pin at the other end.

The cathode is a 2 x 6 x ⅛-in. strip of corrosion resistant steel (Type 302) and is attached to a similar pivoted wooden arm. These arms are pivoted to facilitate adjustment of the distance between cathode and anode and can be lifted from the electrolyte when not in use.

Electrolytes

Three different electrolytes have been used successfully. Their compositions are as follows:

No. 1. Perchloric acid—acetic anhydride	
*Perchloric acid, 68 to 72 per cent	185 cc.
Acetic anhydride	765 cc.
Water	50 cc.
No. 2. Perchloric acid—ethyl alcohol	
Perchloric acid, 68 to 72 per cent	1 volume
*Ethyl alcohol denatured with 3 per cent ether	4 volumes
No. 3. Perchloric acid — acetic acid	
Perchloric acid, 68 to 72 per cent	1 volume
Acetic acid, glacial	10 volumes

** It has been found that satisfactory polishing can be done if 60 per cent perchloric acid is used, and with No. 2, if ethyl alcohol without ether is used.*

Extreme care must be taken in the preparation of Solution No. 1. The acetic anhydride is placed in a beaker immersed in a cold water jacket, and the perchloric acid added slowly, drop by drop, from a burette. The water is added last in the same manner as the perchloric acid. A rise in temperature due to the reaction occurs near the surface and the temperature there should be closely watched and not permitted to rise above 90 deg. F. In cool weather, about 5 or 6 hr. are required for the preparation of one liter of this solution. In the summer, one or two days may be required for its preparation. Evidently the temperature of the perchloric acid in the burette influences the heat of reaction. After the solution has been prepared, it must then be permitted to stand for 24 hr. before using. Once aged, however, it is not necessary to keep the solution cool. This electrolyte has been used at a temperature as high as 120 deg. F. without any danger whatsoever. Samples mounted in bakelite, lucite or other organic materials cannot be polished in any of these solutions because of the danger of an explosive reaction.

Solution No. 2 is not explosive during its preparation. However, it should be carefully prepared in the same manner as Solution No. 1, but at a more rapid rate. Approximately ½ hr. is consumed in preparing this electrolyte, which may be used immediately.

Solution No. 3 may be quickly prepared by slowly pouring the perchloric acid into a beaker containing the acetic acid without danger of explosion. A liter of solution may be prepared in 4 or 5 min. and may be used at once.

Solution No. 2 is recommended for

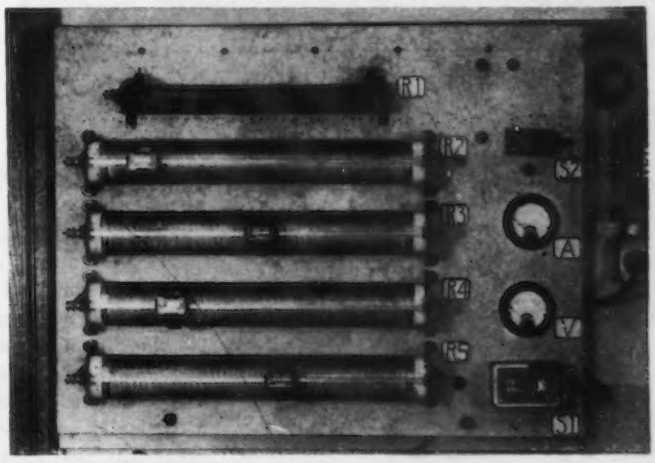
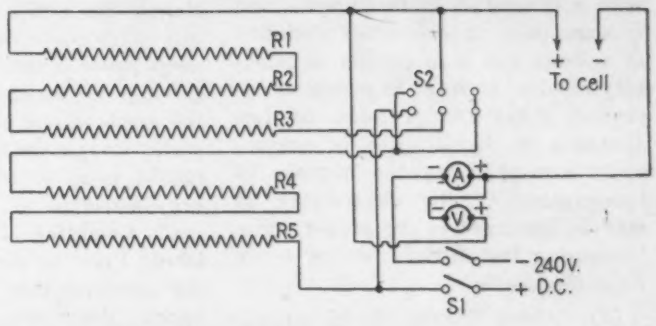


FIG. 3—On a half inch transite board are mounted resistors, voltmeter, ammeter and switches. Below is the wiring diagram of the control board.



R1 = 14.7 ohms, 6.5 amperes
R2 = R3 = R4 = R5 = 28 ohms, 6.5 amperes resistors
S1 = 2-pole, 5 ampere-250 volt toggle switch
S2 = Double pole, double throw switch
V = 0-150 volt d.c. voltmeter
A = 0-150 ampere d.c. ammeter

only those steels containing complex high alloy carbides. Solution Nos. 1 and 3 have proved to be equally effective on a variety of steels: Plain carbon, low alloy, high speed and the corrosion resistant grades. These solutions are probably the best all-purpose electrolytes, and Solution No. 3 is particularly recommended because of its ease in preparation.

Variables in Operation

There are seven variables in the electrolytic polishing operation. They will be discussed individually, and may be listed as follows:

(1) E.m.f. across cell
(2) Current density
(3) Distance between anode and cathode
(4) Dimensions and shape of specimen
(5) Condition of surface to be polished
(6) Time of polishing
(7) Condition of electrolyte

(1) E.m.f. across cell: This variable is quite important. With a constant source of direct current, it is affected by the external resistance; the distance between the anode and cathode; the size of the anode and cathode, and the composition, temperature and volume of electrolyte. Usually a given steel may be polished with a leeway of 10 to 20 volts, and in some cases, a still wider variation of voltage will give equally satisfactory results. During the polishing operation, if the e.m.f. becomes too low (because of the increase in conductivity accompanying the increase in temperature of the electrolyte), it may be increased to the proper value by moving the cathode farther away from the anode.

(2) Current density: It is impracticable to determine quantitatively the current density with this unit, for two reasons: (1) The clamp itself contributes an undeterminable amount of area normal to the current. (2) Portions of the surface of the specimen other than the face being polished, contribute an undeterminable amount of area normal to the current.

However, the current density is an important factor. If it is low, the polished surface will contain highlights, and some complex carbides will be pitted, whereas, if it is too high, general pitting occurs. In many cases, a wide latitude of current density is permissible, but in others, it is not. Actually, however, total current is measured rather than current density, and pieces of widely different sizes can be polished without difficulty.

(3) Distance between anode and cathode: The distance between the anode and cathode is varied to provide the proper combination of e.m.f. and total current. As far as was determinable, the distance between anode and cathode, by itself, has no effect on the polishing.

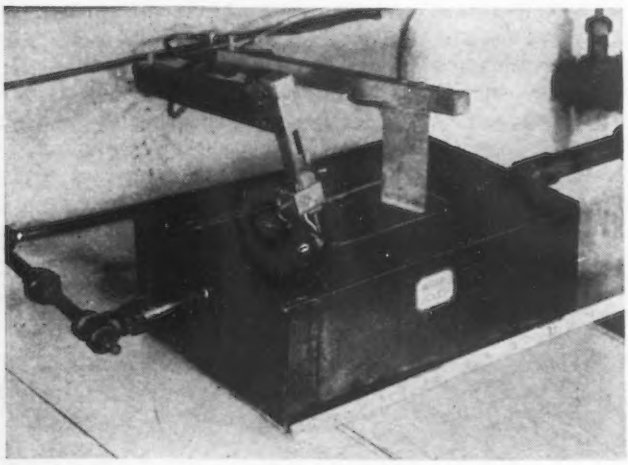


FIG. 4 — Cell and welded steel cooling jacket used for electrolytic polishing.

(4) Dimensions and shape of specimen: Specimens of any shape may be polished, so long as they can be held in the anode clamp. As mentioned previously, samples mounted in bakelite or lucite cannot be polished electrolytically. However, when specimens are held in a metallic polishing clamp, the entire assembly may be put in the anode clamp, and the specimens polished satisfactorily. The surfaces of the specimen in contact with the anode clamp should be free from scale. Copper or brass spacers should not be used, as copper contaminates the electrolyte.

(5) Condition of surface to be polished: Prior to electrolytic polishing, the specimen may be finished on 000 paper, American Optical Abrasive Nos. 303 or 303½ lead lap grit, 600 mesh Carborundum, levigated alumina or may have been previously polished and etched. In general, it may be stated that the finer the prior polish, the shorter will be the time required for the electrolytic polishing operation.

(6) Time of polishing: Suggested times for various conditions are given later in this paper.

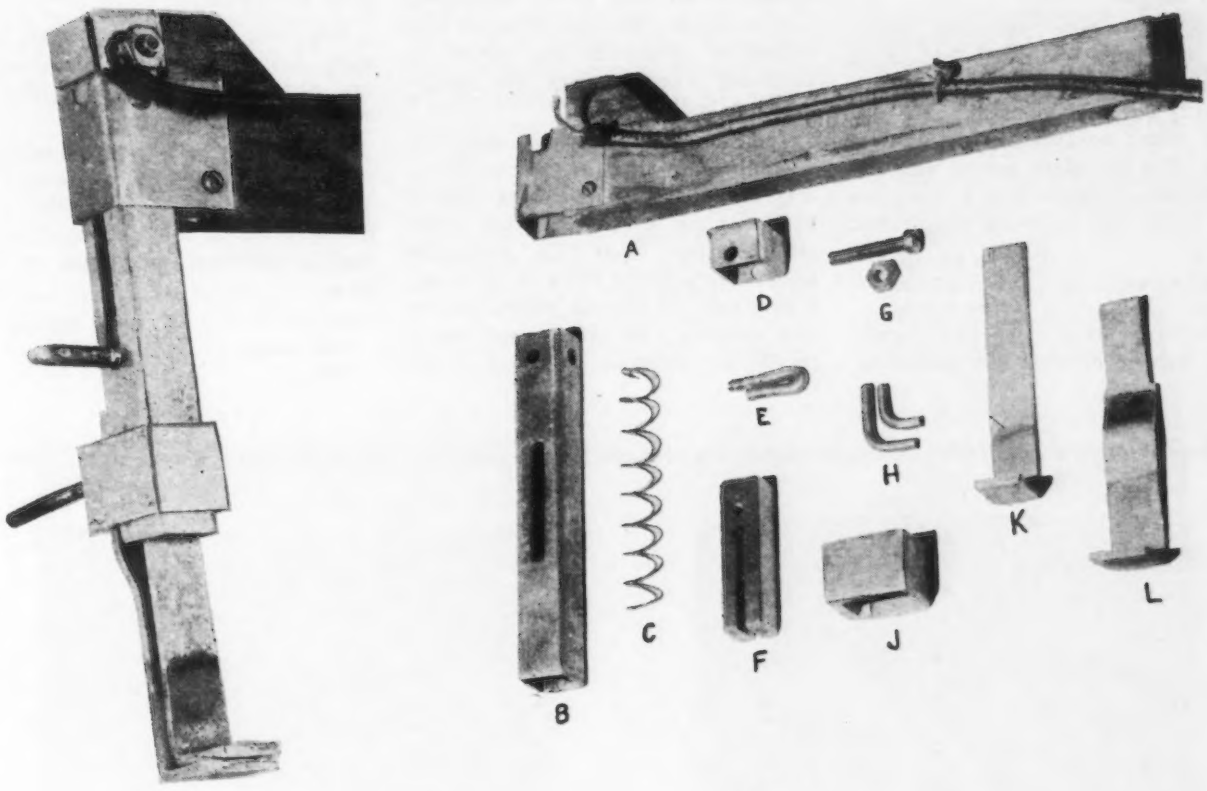
(7) Condition of electrolyte: As stated previously, Solution No. 1 has been used satisfactorily at temperatures as high as 120 deg. F. However, the increase in temperature causes an increase in conductivity of the solution, and in some cases, this limits the maximum allowable temperature. For this reason it is advisable to use the electrolytic cell in a water jacket, insuring more constant operating temperatures and more consistent results.

About 300 cc. of electrolyte are usually used, although considerable deviation from this amount does not seem to affect the polishing. The conductivity of the solution increases with an increase in amount of electrolyte.

The electrolytic polishing solutions are used over and over again. A small amount of electrolyte is lost in "drag-out," and fresh solution is added to make up the loss. The life of the electrolyte is dependent upon the number of samples polished, the average operating temperature (solutions must be replaced more often in summer) and the change in composition due to evaporation losses. The addition of water contaminates the solution and results in poor polishing. Care should be taken that both specimen and electrodes are dry before placing in the cell.

Recommended Practices

After this specimen has been given the desired prior finish, it should be dried (washed in alcohol if greasy) and placed in the specimen clamp with the face to be polished parallel to the cathode. Immediately after the clamp has been placed in the electrolyte, the e.m.f. should be applied. Slight adjustments of the variable resistors and the positions of the anode and cathode may be necessary during the polishing operation to attain the proper values of e.m.f. and current. The solution need not be stirred during the polishing. After the proper time, the switch is opened, and the specimen clamp immediately removed from the electrolyte. The specimen should be picked from the clamp with a pair of tongs and quickly washed under running tap water to remove the electrolyte and sludge which may stain the sample. During the polishing operation, a certain amount of etching occurs (except with the corrosion-resistant grades). Frequently no further etching is required, but if nec-



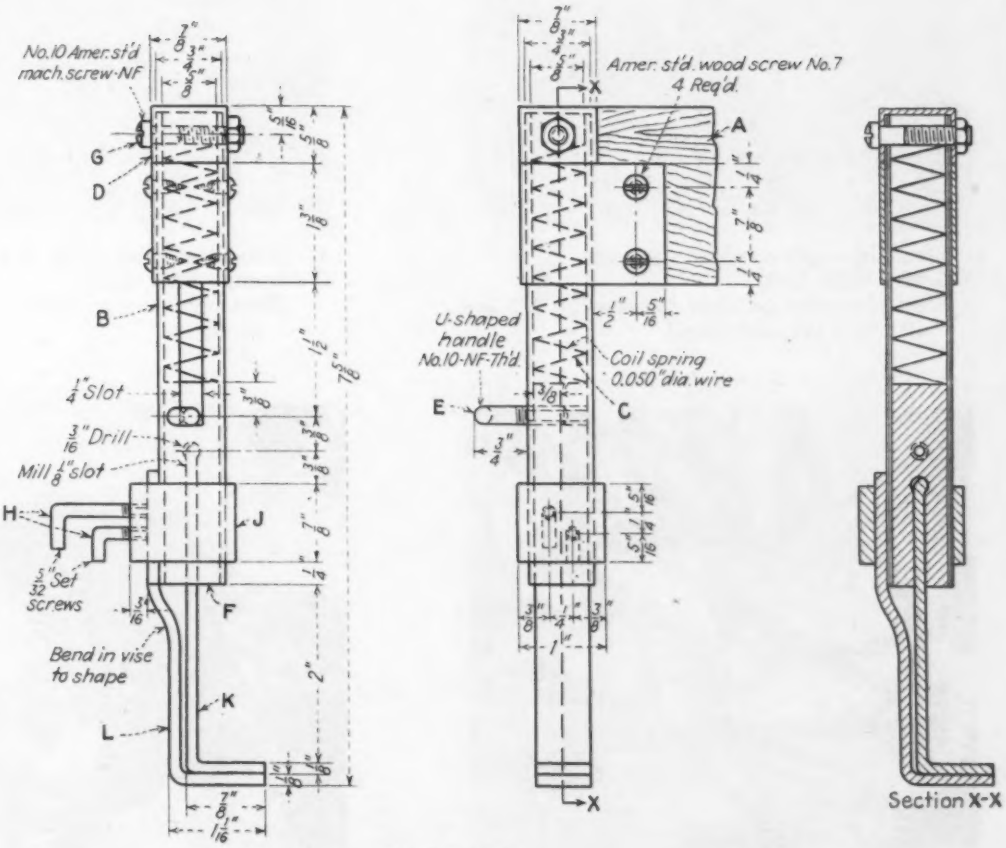


FIG. 5—Illustrated above is the steel specimen clamp. For long life the clamp should be made of corrosion resistant steel. Clamp assembly is shown (above right) and clamp details indicated (right).

NOTES

All metal pieces, except spring C and bearing post G made of KA_2S

A - Wooden arm and sleeve
B - Square barrel
C - Coil spring
D - Cap
E - U-shaped handle
F - Slotted piston for holding upper clamp jaw K
G - Binding post
H - Set screws which fit into collar J
J - Collar for holding lower clamp jaw L in place
K - Replaceable upper clamp jaw (movable)
L - Replaceable lower clamp jaw (stationary)

essary, the specimen is etched in the usual fashion.

For electrolytic polishing, steels may be roughly divided into three groups: (1) Plain carbon and low alloy; (2) corrosion-resisting; and (3) those which contain high alloy carbides. For the plain carbon and low alloy steels, Solution Nos. 1 and 3 are used under the following conditions:

E.m.f.	50 to 60 volts
Total current	1.5 to 2.5 amp.
Time	0.5 to 2 min.

Micro-examination may show insufficient etching or improper polishing. If re-polishing is necessary, the sample is returned to the electrolyte and re-polished directly. It is not necessary to return to the papers or polishing wheels unless the sample becomes badly pitted.

The corrosion-resisting grades—austenitic, ferritic or martensitic—may be polished in the same fashion as the plain carbon and low alloy steels, except that the austenitic grades are polished for a longer time, 3 to 6 min., to remove effects due to cold working. In some cases better results are obtained by finishing the polishing at 70 to 90 volts and 2 to 6 amp. for 10 sec.

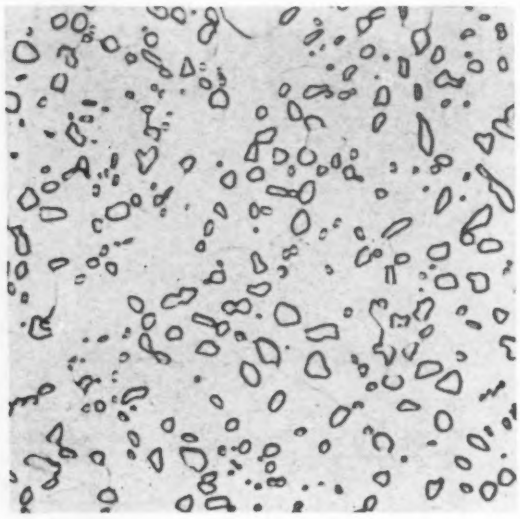
For those steels which contain high alloy carbides, Solutions Nos. 1 and 3 may also be used, under the following conditions:

E.m.f.	120 to 150 volts
Total current	3 to 6 amp.
Time	3 to 5 sec.

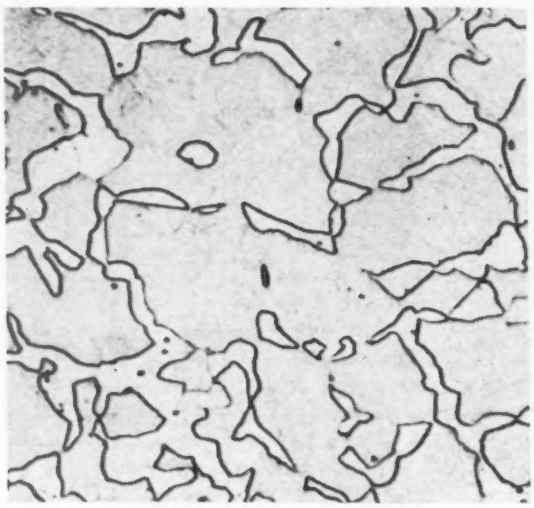
Solution No. 2 may be used under slightly different conditions, as follows:

E.m.f.	80 to 100 volts
Total current	7 to 10 amp.
Time	3 to 5 sec.

Fig. 6—Photomicrographs showing results obtainable with electrolytic polishing. All magnifications are 1200 diameters.

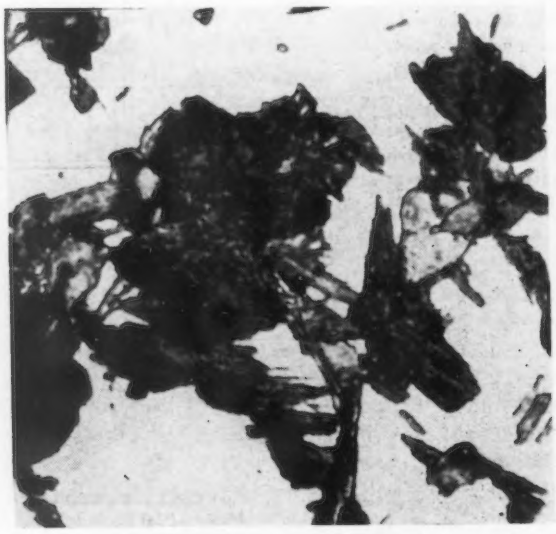


A **Structure**—spheroidized cementite
Grade—SAE 9260
Electrolytically polished followed by a 5 sec. etch in 4 per cent picral



B **Structure**—martensite and ferrite
Grade—SAE 4640
Electrolytically polished as etched in polishing

C **Structure**—martensite and bainite
Grade—SAE 9260
Electrolytically polished as etched in polishing



D **Structure**—intermediate transformation product and martensite
Grade—SAE 9260
Electrolytically polished as etched in polishing

The specimen is then etched, if necessary, and examined. It is sometimes necessary to re-polish several times to remove all the scratches. In this event, the specimen should be washed and dried between each polishing period. A longer polishing time will over-etch the specimen and over-heat the solution.

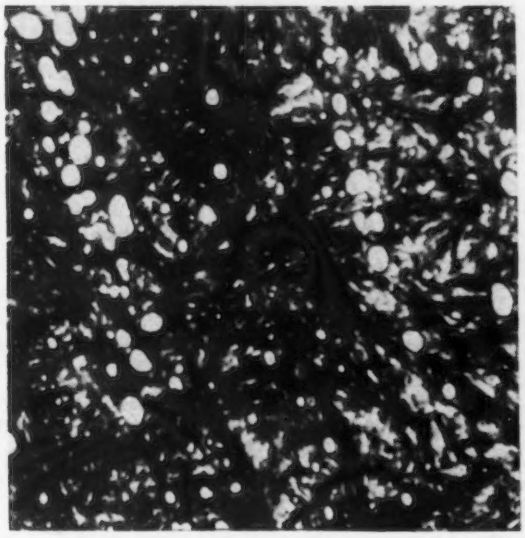
Solution Nos. 1 and 3 may be used to identify Cb-rich carbides. These carbides etch a dark pink color when polished under the following condition—80 to 100 volts, 3 to 4 amp. and 3 sec.

The procedures recommended in the ASTM standard method are quite similar to those outlined in this paper. However, in discussing the use of the acetic anhydride-perchloric acid electrolyte (Solution No. 1) the ASTM suggests the best current density to be used. As previously pointed out, the exact current density is difficult to evaluate; thus values of total current have been recommended here.

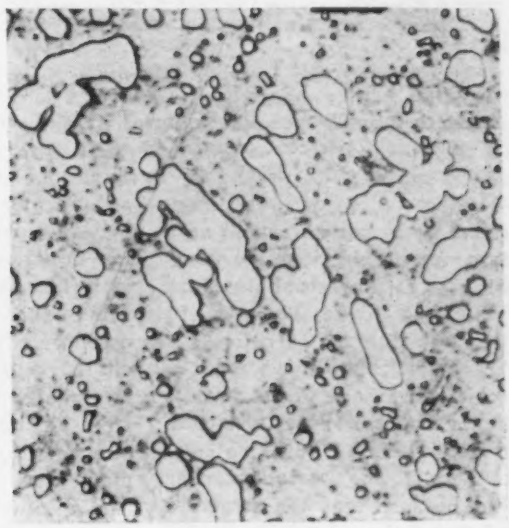
In the preparation of this electrolyte, the ASTM method states that the acetic anhydride should be added to the perchloric acid. This paper has recommended the addition of the much smaller volume of perchloric acid to the acetic anhydride. Considerable heat is evolved regardless, but it is felt that the latter method requires the lesser time.

The ASTM discussion on the use of the acetic acid-perchloric acid electrolyte (Solution No. 3) suggests values of voltage and current which are in close agreement with those shown in this paper.

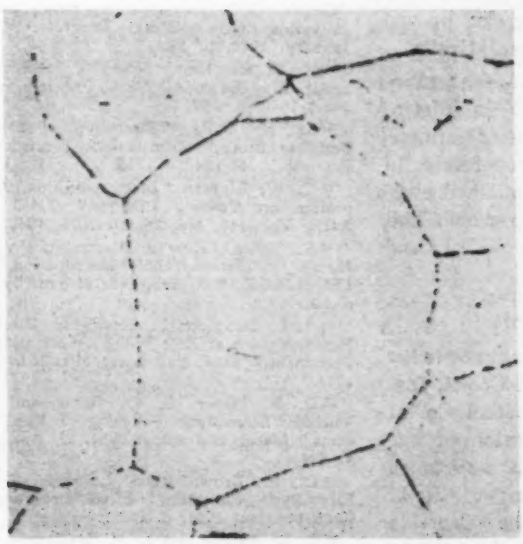
The proper use of the electrolytic polishing method depends upon a full understanding of its advantages and



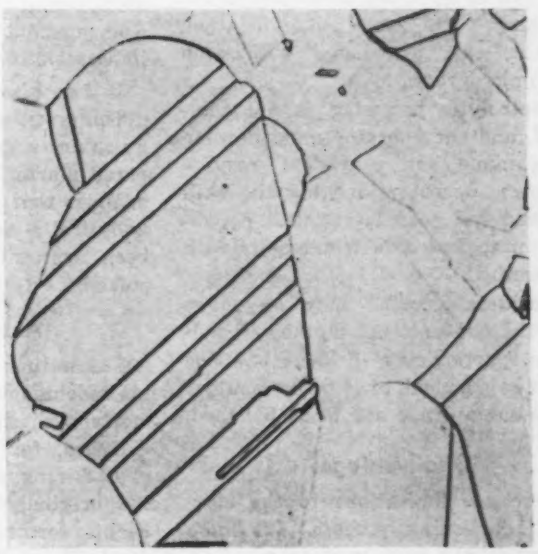
E **Structure**—tempered martensite and carbides
Grade—5-4-4-1 high speed steel
Electrolytically polished as etched in polishing



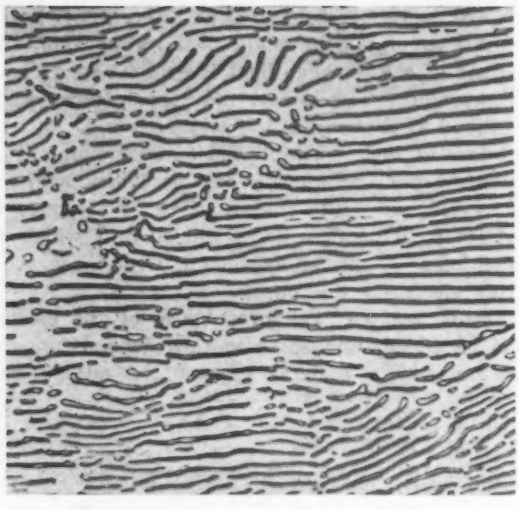
F **Structure**—martensite and carbides
Grade—1.5 per cent C, 12.0 per cent Cr die steel
Electrolytically polished as etched in polishing



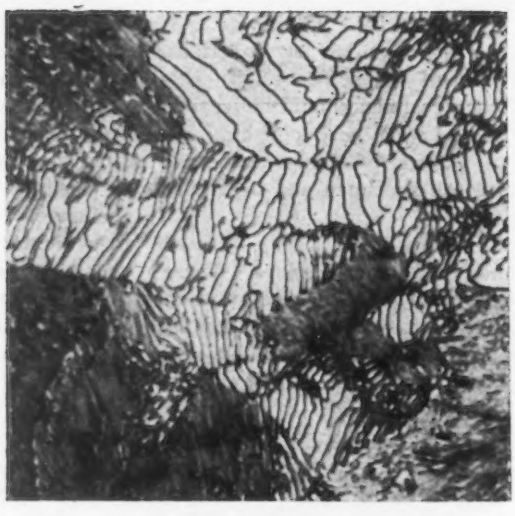
G **Structure**—austenite showing carbide precipitation at grain boundaries
Grade—stainless Type 302
Electrolytically polished followed by a 10 sec. electrolytic etch in 10 per cent chromic acid



H **Structure**—austenite
Grade—stainless Type 302
Electrolytically polished followed by a 10 sec. etch in Marble's Reagent



I **Structure**—coarse lamellar pearlite
Grade—0.8 per cent C tool steel
Electrolytically polished followed by a 5 sec. etch in 4 per cent picral



J **Structure**—fine and coarse pearlite
Grade—0.80 per cent C tool steel
Electrolytically polished as etched in polishing

limitations. It is not advocated as a substitute for mechanical polishing, but rather as an important auxiliary to it.

Advantages

The chief advantage of electrolytic polishing is that it produces a smooth, scratch-free surface, with no disturbed metal. The metallographer may thus be sure that the structure observed under the microscope is the true structure, not one which may have been smeared or flowed, which is possible by even the most careful mechanical polishing.

The photomicrographs presented in this paper are examples of the results that can be obtained with electrolytic polishing. The grade, magnification, etchant, etc., are listed with each photomicrograph.

Electrolytic polishing is not foolproof, and the operator must develop a technique for consistent results. However, operators lacking the skill required for good mechanical polishing can achieve excellent results with this method.

Considerable time may be saved over the conventional method of polishing, particularly if large samples are to be polished, or if many samples of the same grade are to be polished.

Disadvantages

There are limitations to the electrolytic polishing process. On some specimens, the surface appears wavy at low magnifications, and in general, structures are best revealed at magnifications of 500 diameters or higher.

In the electrolytic polishing process, some inclusions are held intact and appear in their true shape. They are not ground flat. However, many inclusions fall out, or cause localized attack and pitting. This condition is accentuated in light etching martensitic structures, but usually at a relatively high magnification areas free from pitting may be found for study or photography. This pitted condition may give the steel an extremely "dirty" appearance at low magnifications. In its present stage, electrolytic polishing is not recommended for the study of non-metallic inclusions.

Electrolytic polishing has been used successfully on a wide variety of steels, but one grade, a fast finishing steel containing 1.25 per cent C and 3.50 per cent W has thus far proved impossible to polish electrolytically.

It has also been found that more difficulty is encountered in distinguishing small amounts of untempered martensite from free ferrite in samples that have been polished electrolytically than in those which had been conventionally polished and etched.

Acknowledgments

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Bibliography

[1] P. A. Jacquet, "Electrolytic Polishing of Metals and Its Applications," Tech. Mod. Vol. 31, Aug. 15, 1939, pp. 561-9; Sept. 1, 1939, pp. 596-8.

[2] J. D. Edwards, "Aluminum Reflectors," Transactions Illuminating Eng. Soc., Vol. 34, p. 427, 1939.

[3] E. E. Thum, "Speedy Polishing Without Abrasive," Metal Progress, Vol. 36, December, 1939, p. 756.

[4] R. B. Gordon and M. Cohen, "Age Hardening of a Copper-Cobalt and a Copper-Iron Alloy," A.S.M. Symposium on Age Hardening, p. 161 (1939).

[5] Schaefer, "Anodic Polishing, of Metals," Metal Industry (London), January, 1940.

[6] P. A. Jacquet and P. Rocquet, "Electrolytic Polishing of Iron and Steel," Metal Progress, Vol. 36, December, 1939, p. 771 (Original in Comptes Rendus, Vol. 208, March, 1939, p. 1012).

[7] H. Pray and C. L. Faust, "Comments on Electrolytic Polishing of Metals," THE IRON AGE, April 11, 1940, pp. 33-37.

[8] G. E. Pellissier, H. Markus and R. F. Mehl, "Electrolytic Preparation of Iron and Steel Micro-Specimens," Metal Progress, Vol. 37, January, 1940, p. 55.

[9] M. E. Merchant, "Warning Perchloric Reagents May Explode," Metal Progress, Vol. 37, May, 1940, p. 559.

[10] H. H. Uhlig, "Electrolytic Polishing of Stainless Steels," Transactions Electrochemical Soc., Vol. 78, 1940, p. 265.

[11] T. W. Lippert, "Electropolishing, A Symposium on Today's Practice," THE IRON AGE, Vol. 146, No. 26, Dec. 26, 1940, p. 23.

[12] F. Keller, "How to Electrolytically Polish Metals for Metallographic Examination," THE IRON AGE, Vol. 147, No. 2, Jan. 19, 1941, p. 23.

[13] A. L. DeSy and H. Haemers, "Electrolytic Rapid Method of Etch-Polishing Metallographic Specimens," Stahl und Eisen, Vol. 61, p. 185, 1941.

[14] G. F. Meyer, G. D. Raker and J. R. Vilella, "Electrolytic Polishing of Steel Specimens," Metals and Alloys, Vol. 13, April, 1941, p. 424.

[15] O. E. Brown, "An Improved Cell for Electrolytic Polishing," Metal Progress, Vol. 40, September, 1941, p. 298.

[16] V. R. Farlow and L. H. McCreery, "Hadfield Manganese Steel," Metals and Alloys, Vol. 14, November, 1941, p. 692.

[17] R. W. Parcel, "Simplified Electropolishing of Steel Specimens," Metal Progress, August, 1942, pp. 209-212.

[18] A.S.T.M. Standards, "Methods of Preparing Metallographic Specimens (E3-42T)," 1942, p. 1491.

Swedish Sponge Iron

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. . . For years there has been a great deal of interest shown by steel men in this country in the Wiberg process of low temperature reduction of iron ore by CO gas regenerated from carbonaceous material in an electric furnace. After many struggles the Söderfors Works has perfected a furnace of 11,000 net tons annual capacity which has been in continuous operation since 1941. Behind the scenes much controversy has raged here as to whether this process had application in this country, considering the quality of local ore resources, labor and power costs. This comprehensive article "lays it on the line" and enables a complete analysis of all factors to be made. Detailed cost data are supplied in the concluding part.

PRODUCING pig iron from iron ore in order to use this pig iron for the purpose of steel making can rightly be considered as a roundabout process. It is therefore evident that the problem of producing steel direct from the ore has been subjected to a great deal of interest. As a matter of fact innumerable schemes have been advanced for the solving of this problem and much energy as well as large sums of money have been spent in order to try out in practice different methods, but the results so far have been rather indifferent.

In 1918 Martin Wiberg, professor of metallurgy, Royal Technical University, Stockholm, proposed a new and theoretically clever method for the production of sponge iron by means of gaseous reduction. The essentials of the process are the following:

The Wiberg Process

Sintered or lumpy ore, high in iron, is charged into a shaft furnace (Fig. 1) or other type of furnace operating on the counterflow principle. In the lower part of the shaft carbon monoxide is introduced at a temperature of 1650 to 1830 deg. F. While passing up through the shaft the gas reduces the ore to iron and in the process the carbon dioxide in the gas rises to 25-30 per cent corresponding approximately to the equilibrium existing at 1650-1830 deg. F. C between FeO, CO_2 and CO. About 75 per cent of the gas thus formed is evacuated from the shaft by means of a fan and is forced through a carburetor where the carbon dioxide in passing through an incandescent layer of carbonaceous material is converted into carbon monoxide which is again introduced into the lower part of the shaft. Since the reaction $CO_2 + C = 2\ CO$ is endothermic, heat must be supplied to the carburetor. This is done electricallly.

That portion of the gas (about 25 per cent) not circulating through the carburetor continues through the shaft, causing a pre-reduction of the ore, whereby the CO_2 contents of the gas is further increased. The carbon monoxide still remaining in the gas is finally burnt in the upper part of the shaft where air is introduced, thereby preheating the ore to 900-1000 deg. C (1650 to 1830 deg. F.). As an excess of air is used in the preheating zone the ore is partly oxidized. Simultaneously a partial elimination of sulphur takes place.

The lower part of the shaft is designed to form a cooling chamber in which the sponge iron is cooled and finally discharged.

A schematical diagram used to explain the Wiberg process is given in Fig. 2. This diagram is not quite accurate in as much as no consideration has been given to the fact that part of the gas must be burnt in order to preheat the ore.

A more detailed diagram in which the matter of preheating has been taken into account is given in Fig. 3. In working out this diagram the following is further assumed:

1. The sintered ore charged consists of pure Fe_2O_3.

2. As the ore received from the sintering plant normally is somewhat warm the temperature thereof is assumed to be 100 deg. C. (212 deg F.)

3. The carbonaceous material charged into the carburetor consists of pure carbon.

4. There are no heat losses due to radiation from the shaft or the carburetor taken into account.

5. The gas entering the shaft as well as the gas entering the carburetor has a temperature of 1000 deg. C. (1830 deg. F.).

6. The gas escaping from the furnace has a temperature of 100 deg. C.

With the assumptions as stated the theoretical consumption of power and fuel will be as follows:

	Per Metric Ton of Metallic Iron	Per Net Ton
Consumption of power...	675 kw-hr.	612 kw-hr.
Consumption of coal....	165 kg.	330 lb.

The low power and fuel consumption thus theoretically attainable in the Wiberg process evidently evoked great interest therein, although many were doubtful as to the practical application thereof, since the coordination of the different steps in the process were considered particularly difficult.

Early Experiments

In 1920 a small experimental furnace, producing about 500 kg. of sponge iron in 24 hr., was built at Woxna, Sweden. Under the auspices of the Swedish Iron Masters' Association (Jernkontoret) a slightly larger furnace, having a daily production of

*Represented in the United States by Stora Kopparbergs Corp., 230 Park Avenue, New York.

about 2 metric tons, was later erected at Sandviken, Sweden. Finally in 1930 the Stora Kopparbergs Bergslags Ab. erected at its Domnarvet works a furnace with a daily capacity of about 2 tons.

Due to the encouraging results obtained at Domnarvet, Emil Lundqvist, managing director of the Stora Kopparbergs Bergslags Ab., decided in 1932 to have erected at the company's Söderfors plant a furnace of commercial size. This furnace was to have a yearly capacity of about 10,000 metric tons (11,000 net tons).

The late Mr. Lundqvist (deceased 1942) took an active part not only in the designing of the furnace but also in the work connected with all the alterations and experiments subsequently carried out. He personally superintended the design and made sketches for all important parts of the furnace. Thanks to his extreme interest and energy, allowing no interference with his plans, he carried the matter to a happy solution.

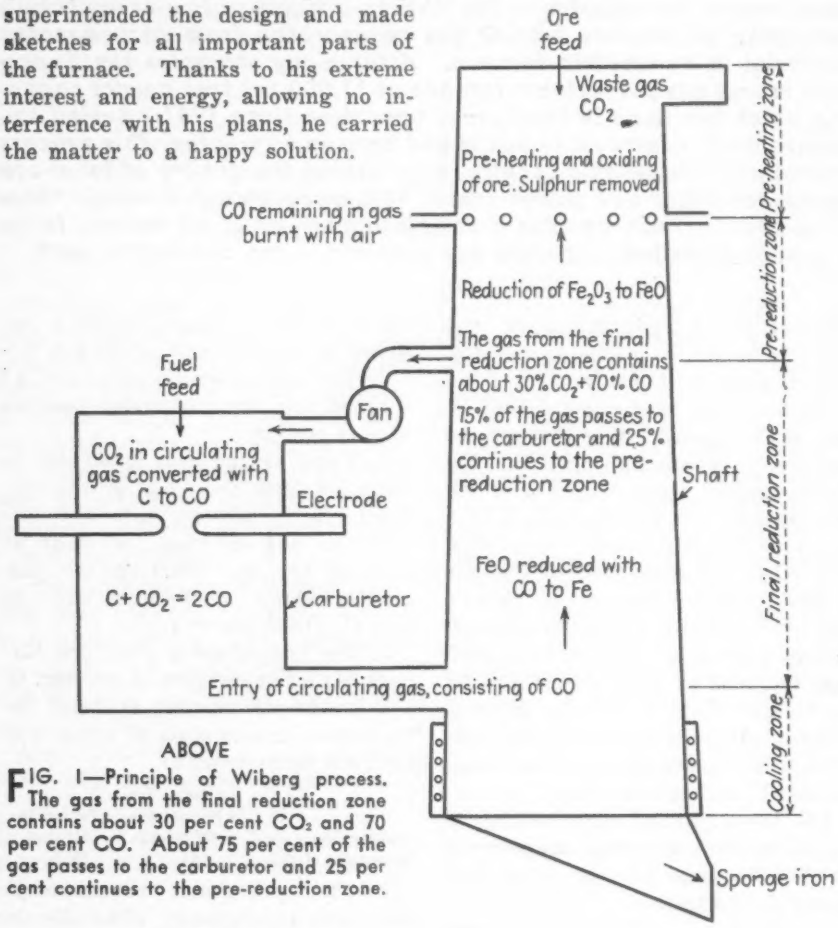

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FIG. 1—Principle of Wiberg process. The gas from the final reduction zone contains about 30 per cent CO_2 and 70 per cent CO. About 75 per cent of the gas passes to the carburetor and 25 per cent continues to the pre-reduction zone.

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As the nearest assistant to Mr. Lundqvist in the sponge iron experiments, Helge Kihlander, works manager of the Söderfors plant, put in a lot of hard work in solving all the various problems that appeared from time to time and zealously superintended the operation of the furnace.

Due to local conditions at Söderfors it was decided to erect the sponge iron furnace on the site of an old blast-furnace. The existing equipment, such as ore and charcoal hoists were to be retained as far as practically possible and for this reason the height of the shaft and certain other matters were therefor predetermined.

The carburetor was designed on the direct-flow principle; in other words the fuel and the gas were to move in the same direction. The carburetor was equipped with six top electrodes, connected in 3-phase. Fig. 4 shows a cross-sectional view of the plant. The furnace was started in the end of 1933 and was kept in operation until June 1934. The results obtained during this period demonstrated among other things the impossibility of a continuous operation, the reason being that the lower part of the carburetor became clogged by an accumulation of charcoal breeze. It was therefore necessary to empty the carburetor from time to time.

During this trial period, comprising 100 days of operation, the following results were obtained:

Production about 6 metric tons (6.6 net tons) of sponge iron in 24 hrs. with a degree of reduction of 75-95 per cent.

	Per Metric Ton	Per Net Ton
Power consumption about...	1550 kw-hr.	1400 kw-hr.
Charcoal consumption about.	14.5 hl.	37 bu.
Electrode consumption about	6 kg.	12 lb.

From June to December 1934 the furnace was at a standstill almost the whole time. A new fan was installed to replace the temporary fan previously used. Several other changes, such as providing the carburetor with an arrangement for discharging the charcoal breeze, were also made. In January 1935 the furnace was restarted and kept in operation a couple of months when it was again shut down, the reason therefor being a breakdown of the fan. On inspection it was found that, due to carbide precipitation, cracks had developed near the center of the runner. The vanes of the runner were cast from a heat resisting steel, analyzing about 0.08 per cent C, 18 per cent Cr and 20 per cent Ni. A new runner was manufactured from the same type of steel but with an addition of titanium to prevent carbide precipitation. The new runner was forged instead of cast.

Single-Phase Carburetor Tried

As the results with the six-electrode carburetor had proven far from satisfactory, the carburetor problem was given renewed and careful study. A number of different types were de-

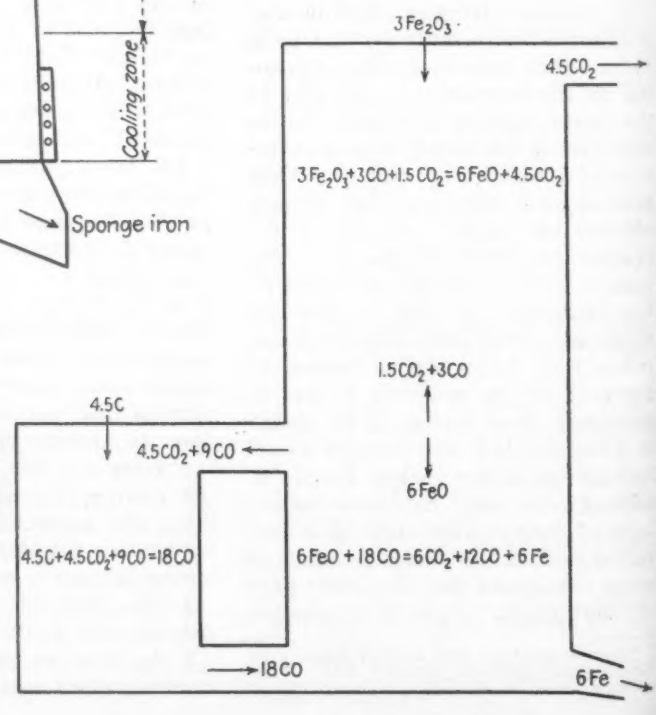

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FIG. 2 — Simplified schematical diagram of the Wiberg process. Preheating is not considered in the chemistry of the process.

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signed and models made. Finally it was decided to employ a system of three parallelly connected, single-phase carburetors, working on the counterflow principle. For the time being only one single phase carburetor was to be erected. The old 3-phase carburetor was therefore torn down and a new single-phase carburetor, Fig. 5, was erected in its place. The carburetor was provided with a 600 mm. (23.6 in.) top electrode and with a rammed-in bottom contact, composed of Söderberg mixture. The alterations completed, the furnace was again put in operation in the beginning of 1937 but after having been in use a short time only difficulties were again experienced with the carburetor, necessitating some changes. By the end of 1937, however, the furnace could be put in regular use and was kept in continuous operation from November 1937 until December 1940.

Certain interruptions occurred, however, caused in particular by the top electrode in the carburetor. It developed that this electrode was gradually eaten away underneath the roof arches, causing pieces of the electrode to drop down into the carburetor. In order to remove these pieces the carburetor had to be shut down, with rather lengthy interruptions as a consequence. These interruptions took place at intervals of about two months and the risk of electrode breakages could not be eliminated in spite of numerous attempts to protect the electrode. Trouble was also experienced by hangings in the shaft, resulting further in lowered production.

During the periods of undisturbed operation the following results were obtained:

Production about 10 metric tons (11 net tons) of sponge iron in 24 hr. with a degree of reduction of about 90 per cent.

	Per Metric Ton	Per Net Ton
Power consumption about...	1200 kw-hr.	1090 kw-hr.
Charcoal consumption about.	13.5 hl.	34.8 bu.
Electrode consumption about	1 kg.	2 lb.

Due to the difficulties with the carburetor, mentioned above, it was decided to repeat the test with a 3-phase carburetor, constructed on the direct-flow principle and accordingly a new carburetor of an improved type was designed. The furnace was shut down in December 1940 and was out of commission until August 1941. In the meantime the new carburetor was installed, the shaft was repaired and partly relined and certain other adjustments and improvements were made. The furnace was started in August 1941 and after various adjustments was in full operation in November 1941. From that time on one is justified in stating that the furnace had left the experimental stage. The following report will therefore cover the results obtained from November 1941 and onwards.

Operating Data Summarized

The data in this article was originally presented in the form of a paper read at the spring meeting of the Swedish Iron Masters' Association (Jernkontoret), May 29, 1943. For convenience, all metric units have been converted into English measure on the following basis:

1 kg. = 1 metric ton = 2205 lb.
= 1.103 net tons
1 cu. meter = 35.3 cu. ft.
1 hectoliter = 2.84 bu.
25.4 mm. = 1 in.

The krona has been figured at 25c.

Results obtained in the first six months of 1943 in producing electrically a sponge iron with about 65 per cent metallic iron, 77 per cent total iron and with a degree of reduction of 85 per cent have been as follows:

Production, 24 hr.	21.5	net tons
Power consumed, kw-hr.	730	per net ton
Charcoal consumed, bu.	28	per net ton
lb.	375	per net ton
Electrode consumption, lb.	5.4	per net ton

Annual output is around 7700 net tons and by extending the data it is expected that the power consumption can be brought down to 640 kw-hr. per net ton by increasing output of the furnace to 11,000 net tons annually, or approximately 30 tons a day. With a projected furnace double this size, it should be possible, the author states, to lower the power consumption to 550 kw-hr. per net ton for the same degree of reduction.

Electric furnace smelting of both pig iron and sponge iron has been brought to a high state of perfection in Sweden where three factors have contributed to its success: high grade ore, cheap power from hydroelectric stations and abundant timber from which charcoal can be obtained. Actually, however, the production of pulp and paper is such a prime industry there that it has first call on the wood supply so that there is a real advantage in favoring processes where electric power replaces solid fuels to a large extent. —Ed.

Present Installation Described

Due to the patent situation the present furnace installation cannot be described in detail. Roughly it corresponds, however, to the original installation, as shown in Fig. 4, which illustration therefore will serve as a basis for the following general description.

The sintered ore is charged into the furnace from an ore bin placed above the shaft (1). The shell of the shaft is made of welded steel plate, lined with fire brick, 900 mm. (35.5 in.) in thickness. For heat insulating purposes the space between the shell and the fire brick is filled with Sil-O-Cel powder. The principal dimensions of the shaft are as follows:

Inner diameter at top	800 mm.	31.8 in.
Inner diameter at bottom	2,000 mm.	78.8 in.
Outer diameter at top	3,700 mm.	146 0 in.
Outer diameter at bottom	5,500 mm.	217.0 in.
Height of furnace from working floor to top of ore bin	24,000 mm.	948.0 in.
Cubic contents of ore bin	7.8 cu. m.	279 cu. ft.
Cubic contents of shaft, including ore bin	42.0 cu. m.	1480 cu. ft.

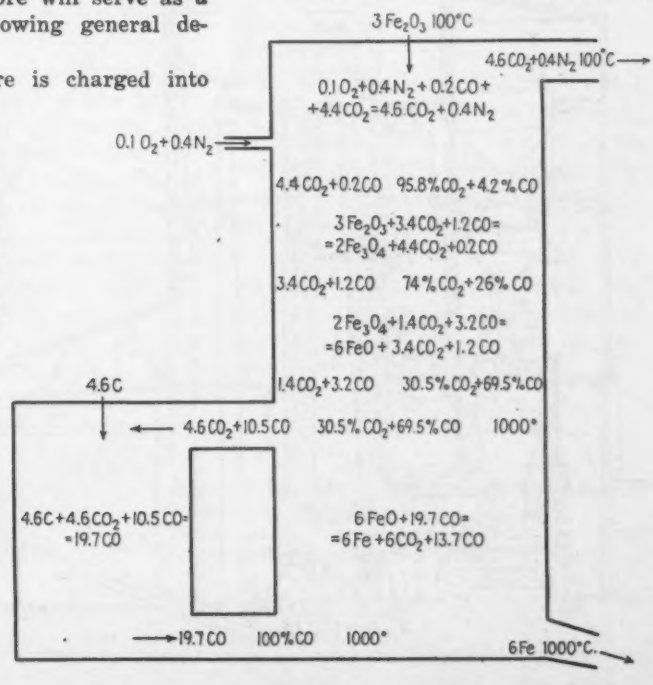

FIG. 3—Schematical diagram of the Wiberg process, with consideration given to the preheating of the ore.

The gas enters the lower part of the shaft through a circular flue (2) from which it is distributed by means of a number of openings (3). The circulating gas is drawn from the furnace through four openings (4). The air for combustion is admitted through 12 openings (5) evenly spaced round the shaft. The waste gas leaves the shaft through a chimney (6) which is provided with an automatic regulator whereby a certain pressure can be maintained in the shaft. The lower part of the shaft is designed to form a cooling chamber (7), cooled by water. The machinery for discharging the sponge iron is placed underneath the cooling chamber and consists of a rotating table (8) that discharges the material into a container (9). The speed of rotation of this table can be adjusted from 0.15 to 0.90 r.p.m.

In level with the discharging table the shell is provided with inspection windows to enable the furnace operators to inspect the appearance and condition of the sponge iron, while being discharged. The discharging chute is equipped with a device by means of which samples of the sponge iron can be withdrawn.

The circulating gas passes to the fan (10) through heat resistant steel piping, provided with dust collectors. The fan is of the single runner type, designed for a maximum capacity of 110 cu. m. (3900 cu. ft.) per min. and a pressure of 360 mm. (14.2 in.) at 800 deg. C. (1470 deg. F.) and 2950 r.p.m. The runner is self-cleaning and is made of forged heat resistant steel. The whole fan is carefully insulated with Sil-O-Cel powder. On the exhaust side the fan is provided with a regulating valve. By means of this valve and by regulating the speed of the fan the volume of gas in circulation can be adjusted.

The carburetor consists of a shaft lined with fire brick. The shell is made of non-magnetic (austenitic) steel of the 18/8 type. For insulating purposes there is a layer of Sil-O-Cel powder between the fire brick and the shell. The carburetor has three pairs of electrodes (11) entering through the roof. Each pair of electrodes is connected to a single phase transformer. The electrodes are of the Söderberg self-baking type, 300 mm. (11.8 in.) in diam.

The transformers each have a capacity of 400 kw. The secondary voltage can be adjusted in five steps to give 55-90 volts. The fuel is fed into the carburetor by means of a centrally located charging pipe (12). Above the carburetor there is a fuel bin (13) from which it is possible to charge the carburetor without permitting any entrance of air. The fuel bin has a capacity of 14 cu. m. (500 cu. ft.). The ashes and breeze formed in the carburetor are removed from the lower part thereof by means of discharging rakes.

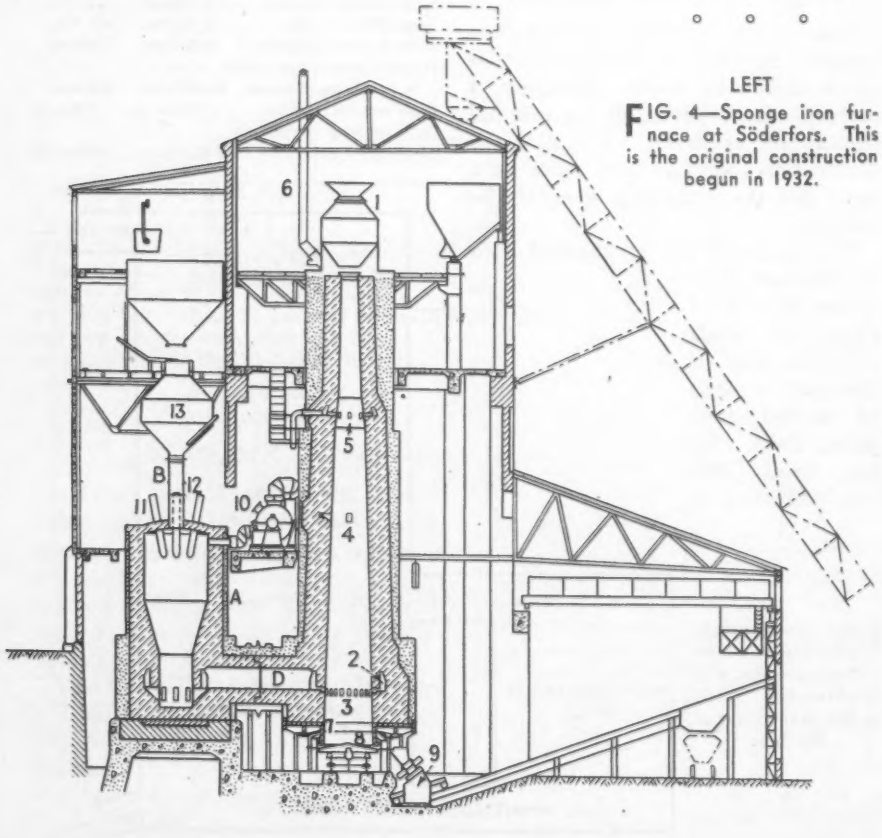

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FIG. 4—Sponge iron furnace at Söderfors. This is the original construction begun in 1932.

The Practical Operation of Furnace

When the sponge iron furnace is to be put into operation a fire is started in the carburetor and in the flue leading to the shaft and kept up for about two weeks, thereby carefully and slowly drying out and preheating the brick work. When the drying is completed, the shaft is cautiously filled with first class, porous sintered

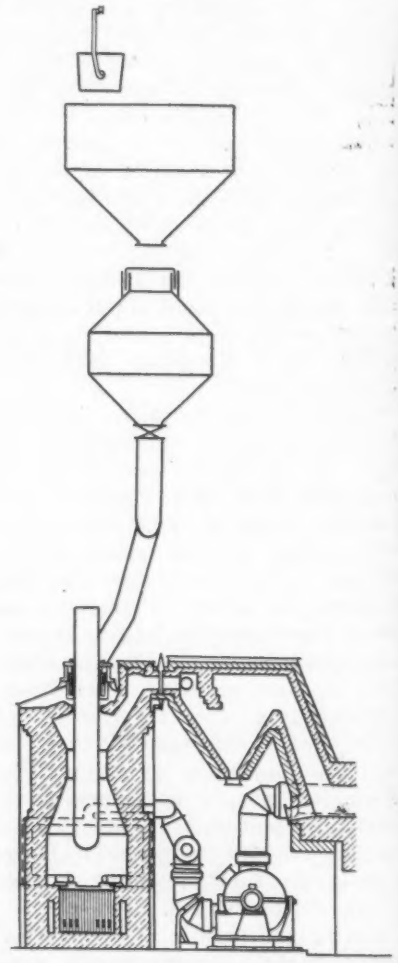

FIG. 5—Single phase carburetor which was in continuous operation from November, 1939 until December, 1940.

ore. Crushing of the sinters is avoided.

The carburetor is filled with charcoal, on the top of which and in between the electrodes is put a layer of coke and some scrap iron so as to provide satisfactory contact. To heat the carburetor the power is put on and after operating for a few hours with a load of 200-300 kw. the fan is started. By circulating the warm gas generated in the carburetor the shaft is gradually heated until the temperature reaches that required for the reduction. When reduction begins excess gas is generated and passes up through the shaft. When the percentage of carbon monoxide in the excess gas is sufficiently high, air is in-

troduced in the preheating zone and the gas is ignited. During the whole period of preheating, in order to prevent hangings in the shaft, the furnace is operated at a rate that will discharge about 400 kg. (880 lb.) of product per hr. Following the practice just described, the furnace will be in full operation about eight days after the completion of the preheating period.

In normal operation of the furnace the following matters have to be attended to: The bin above the shaft has to be filled with sintered ore. This has to be attended to every 10 hr. as the bin holds sufficient material for this period. The fuel bin above the carburetor is filled every 11 hrs. At certain intervals, about twice in 24 hrs., sufficient charcoal breeze is discharged from the carburetor so as to keep constant the loss of pressure therein. The charcoal breeze bucket, having a capacity of about 1.5 cu. m. (53 cu. ft.) is emptied four times weekly. On an average about 0.4 hl. (1 bu.) of ashes and breeze have to be discharged for each ton of sponge iron produced.

By regulating the voltage on the transformers and thereby the power input, the temperature of the gas entering the shaft is also regulated. The temperature of the inner surfaces of the carburetor is controlled by means of suitably located thermocouples. Individual regulation of the three pairs of electrodes guards against superheating of the carburetor walls and prevents unbalanced operation. The temperature of the gas leaving the carburetor is kept at 950-1000 deg. C. (1740-1830 deg. F.). It is very important that the temperature does not greatly exceed 1000 deg. C. as this would cause hangings in the shaft. On the other hand the temperature should not be kept below 950 deg. C. as this would considerably lower the rate of production.

In operating the furnace it is desirable to keep constant the degree of reduction, i.e. the ratio between metallic iron and total iron in the sponge, as this will have a great bearing on the subsequent remelting of the sponge iron in the electric steel furnaces. For reasons discussed later, the furnace at Söderfors is operated so as to give a degree of reduction of about 85 per cent.

When the sponge iron discharge bucket is filled, a double valve is closed and the bucket is removed and emptied. The sponge iron, being pyroforic, ignites in contact with air if the temperature exceeds about 200 deg. C. (390 deg. F.). For this reason the sponge iron must be cooled down before being emptied. The bucket, holding 1.5 metric tons, is normally emptied every 1 hr. and 40 min.

In producing normally 20 metric tons of sponge iron in 24 hr. the time spent by the material in passing through the different zones of the shaft is as follows:

Ore bin	16 hr.
Preheating zone	6 hr.
Prereduction zone	13 hr.
Final reduction zone	30 hr.
Cooling zone	11 hr.
Total	76 hr.

During the operation all matters of interest are recorded. Temperatures and gas pressures in the different parts of the furnace are measured and registered hourly and the gas is analyzed at regular intervals. The load on the electrodes is registered and the volume of the circulating gas is measured. All temperatures are measured by means of thermocouples except in the combustion zone where it is ocularly estimated. This is done simply by running an iron bar through the shaft and leaving it there for a few minutes. After having rapidly withdrawn the bar the temperature thereof can be estimated. By this means it is possible to check in a simple manner the temperature conditions in the combustion zone, this being of special importance as otherwise local superheating and hangings might take place. All instruments used in the supervision and regulation of the furnace operation are installed in a central control room.

As noted all conditions in operating the Söderfors furnace are very carefully checked, this being of particular interest with this novel type of furnace. Normally, however, it should be possible to limit considerably the number of observations.

In shutting down the furnace the procedure is as follows: The power to the carburetor is disconnected, the circulating fan is stopped, the air supply to the preheating zone is shut off and the sponge iron remaining in the shaft is discharged as quickly as practicable. The fuel in the carburetor is also discharged and the whole system is left to cool.

The furnace crew and the distribution of the work on the furnace is as follows:

Designation	Number of men needed in 24 hr.	Character of the work
Furnace operators	3	Emptying of sponge iron and charcoal breeze buckets; charging the carburetor and taking of samples.
Instrument observators	3	Read and attend to the instruments; lower the electrodes and attend to the carburetor in general; assist in charging the carburetor.
Fuel loaders	2	
Oilers, etc.	1	
Total	9 men = 3 men per shift	

The personnel requires no particular skill. As evidenced, workers with no experience whatsoever in steel plant work can be trained in about two weeks to carry out their duties satisfactorily.

Reliability of the Process

In putting the process to practical use the question of reliability is naturally of the greatest importance and will therefore be discussed in detail on bases of the results obtained at Söderfors. In the development of the process the biggest troubles have been hangings in the shaft, difficulties with the circulating fan and carburetting problems.

As to the hangings in the shaft it needs to be pointed out that these are of two types, viz., hangings in the combustion zone and hangings in the gas intake level. In the early stages the hangings in the combustion zone sometimes became so serious that the sintered ore fused together, forming solid big lumps. By increasing the number of air intakes in this zone and by careful control of air pressure and temperature, these difficulties have been eliminated.

The hangings in the gas intake level are caused by the welding together of the reduced sintered ore, the dominating factor being the temperature. For this reason the temperature of the gas entering the shaft must be kept below 1000 deg. C. (1830 deg. F.). The trouble therefore can be said to be due to the difficulties experienced in keeping the temperature of the gas at a constant level, not easy to attain with the early carburetor designs. The present type of carburetor causes no difficulties in this respect and troubles with hangings in the gas intake level have been eliminated.

In the beginning the difficulties with the circulating fan were caused by breakdowns of the runner. With the changes in the design, already mentioned, the runner has performed satisfactorily. The fan has now been in operation over four years at a temperature of 1200 deg. F. and is still at work. At a careful inspection recently made, no defects were discovered and only a slight wear was no-

(CONTINUED ON PAGE 150)

Application of Stress-Strain Theory in

Fabrication of Aircraft Parts

. . . The problem of springback in formed parts, such as those with flanges, is related to basic stress-strain theory and the plastic behavior of metal. Tests show that per cent elongation values for a given material vary widely, depending upon the distance between gage points in the tensile specimen. Application of this basic theory to bar forming of extrusions is exemplified and a problem in stretch forming of a wing cap channel is solved graphically.

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By F. C. Hoffman

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THE first and foremost problem in aircraft fuselage production is one of proper design and rapid production of sheet metal forming tools. A full understanding of forming properties of various aircraft materials, the limits of each method of forming, and die design and construction are of vital importance to every tool designer and tool planner. In view of the great variety of parts to be produced, the expense and time consuming trial-and-error method of die development should be reduced to a minimum. If the limits to which parts can be formed by the common methods are known and applied, a large percentage of parts can be designed so that they may be formed readily and economically using as few operations as possible. If parts are designed so that they take advantage of new simplified methods, it is important that tools be made with close cooperation between the preplanners, tool planners and tool designers.

Forming metal is accomplished by forcing all or most of the fibers into their plastic range. In simple forming this stress is one of compression and tension. More complex forming, such as drawn parts, makes use of compression, tension or a combination of each.

Fig. 1 diagrammatically shows fundamental stress condition. Simple tension is shown at *a* with its well known maximum shear component along the 45 deg. diagonal plane. Triple tension is shown in the next figure, *b*. This type is of special interest because it represents practically a complete absence of formability. Permanent deformation under conditions would require a permanent increase in volume. If sufficient force were applied, failure would result without any appreciable change in shape. At *c* is shown combined tension and compression in two dimensions. The figure could be modified to show compression on all four vertical planes, thus producing pure shear in any plane inclined 45 deg. to the direction loading. This would represent the most formable condition.

The properties of a material are commonly judged by the yield strength, ultimate strength and elongation in 2 in. While these properties are usually sufficient to judge the structural value of a material, they do not necessarily give enough information to judge the forming characteristics nor to analyze typical forming operations. Of much more value is the stress-strain curve. Such a curve for 24ST alclad aluminum alloy is shown in Fig. 2. Since a detailed discussion forming operations has been published recently,* only a brief discussion will be given here.

In Fig. 2, the vertical axis shows the stress applied to the specimen being tested while the horizontal axis shows the amount of stretching which takes place when these different loads are applied. In the upper right hand corner is plotted the tension curve and in the lower left hand corner is plotted the compression curve. It will be noted that the compression curve is very similar to the tension curve. However, slight variations can be observed, but for all practical purposes the compression characteristics can be considered similar to the tension characteristics. For the present only the tension curve will be discussed.

The most important points of this curve are shown in Figs. 3, 4, 5 and 6. Fig. 3 shows the unit yields at the critical points of the curve. Fig. 4 shows the elastic limit. On the 24ST stress-strain diagram it is located at the intersection of 37,000 lb. per sq. in. stress and 4 per cent strain. Within this area the material being tested stretches in direct proportion to the force applied, but returns to its original length when the force is released. This curve is a straight line and is

* *Elastic Theory in Sheet Metal Forming Problems, by F. R. Shanley, published in the July, 1942, issue of the Journal of Aeronautical Sciences.*

called the proportional elastic limit or modulus of elasticity slope.

The next point is the yield stress, Fig. 5, and is the force required to produce a permanent set or strain of 0.2 per cent. In 24ST this stress is approximately 42,000 lb. per sq. in. and will cause the material to stretch approximately 0.6 per cent. When the force is released the material elastically contracts 0.4 per cent as before and leaves a permanent deformation of 0.2 per cent. The next point is the ultimate strength, Fig. 6, and is the maximum unit force which the material can withstand without failure. This stress, which is approximately 65,000 lb. for 24ST, will produce 18 per cent permanent deformation. It is to be noted that the same elastic recovery is still present and is of somewhat larger magnitude than that which occurs at lower strains. At maximum strain the recovery appears to be approximately 0.006 in. per in., and at the yield point the elastic recovery is 0.004 in. per in. The effect that this difference may have on analyzing springback problems is now being investigated.

The range in between the yield point and the ultimate is termed "plastic range" and it is, therefore, obvious that forming must be done within these limits. It is necessary, though, to bear in mind that elastic recovery does exist throughout this range and causes serious difficulties in springback, even though it is only of a magnitude of 0.4 per cent or 0.004 in. per in.

Fig. 7 shows a comparison from which the following general conclusions may be drawn. At *a* is a stress-strain curve for a low yield stress material such as 24SO, and at *b* is one of a material of high yield stress, such as 24ST. The elastic recovery per unit strain is much less in *a* than in *b* and accounts for the lack of springback in the annealed stock. Curve *c* is for a different type material—one of high modulus of elasticity, the slope being approximately three times that of 24S and typical of a low carbon steel, one having approximately the same yield and total strain as aluminum. The elastic recovery is much less than that for 24ST, and the piece, therefore, would not have as much springback.

The application of this data to a practical problem is evident when the following is considered. Consider two materials, 24SO and 24ST of 0.051 in. gage, to be formed over a ⅛ in. bend radius. The springback angle in 24SO will be much less than that for 24ST due to the fact that although the outer fiber length is the same in both cases, the elastic recovery, inch per inch, or total elastic recovery is one-fifth as much for SO as for ST. This will shorten the outer fiber much less for ST. In the compression side of the radius, the same phenomena are observed. The change in length takes place on both sides of a neutral plane, and causes the springback angle to greatly increase in this latter case.

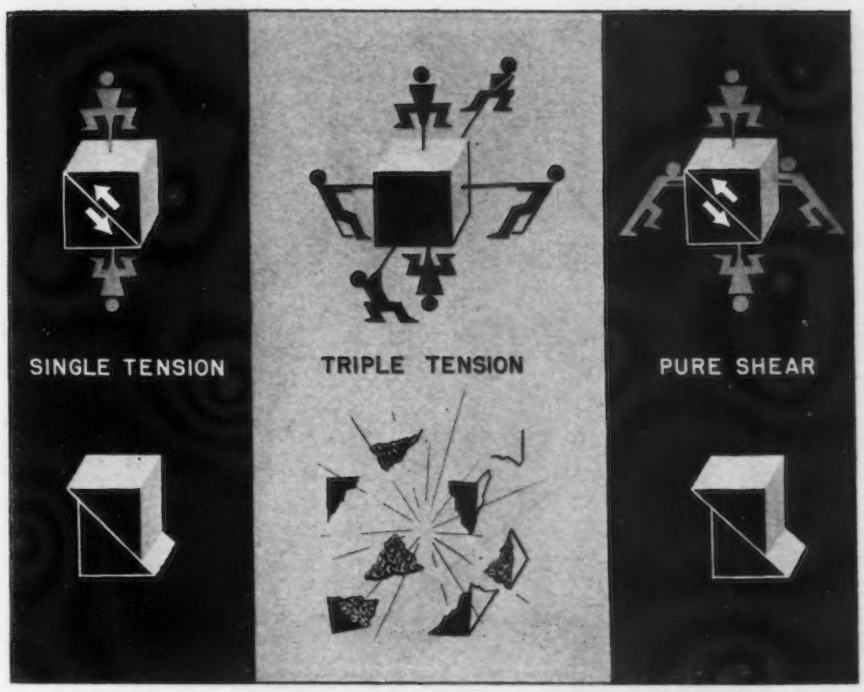


FIG. 1—Animated diagram showing nature of stresses applied to metal. Application of triple tension represents complete absence of formability since permanent deformation under such conditions would require a permanent increase in volume—an obvious impossibility.

This same analysis can be applied to another practical example when the same material is being bent over two different radii, one being large and one small. In the small bend radius, the outer fiber length subject to recovery is less than the outer fibers on the larger radius and although the elastic recovery, inch per inch, is approximately the same, more

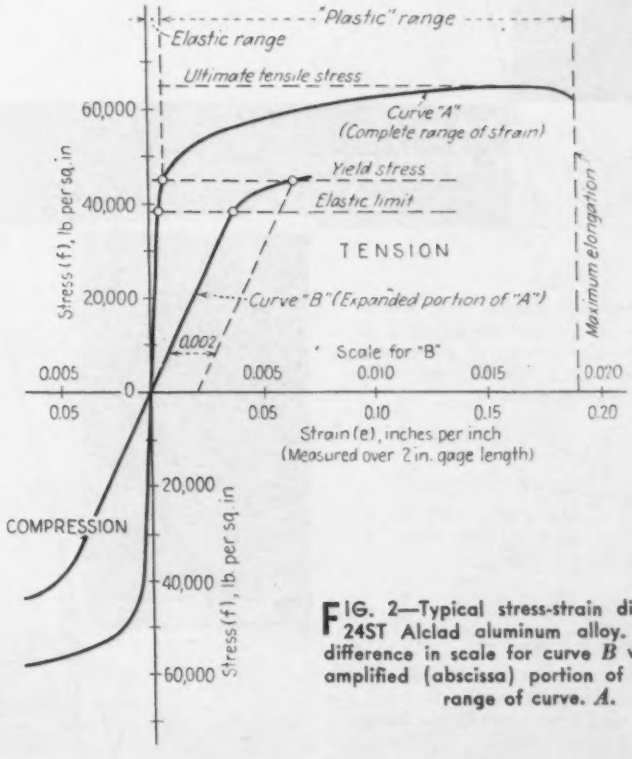
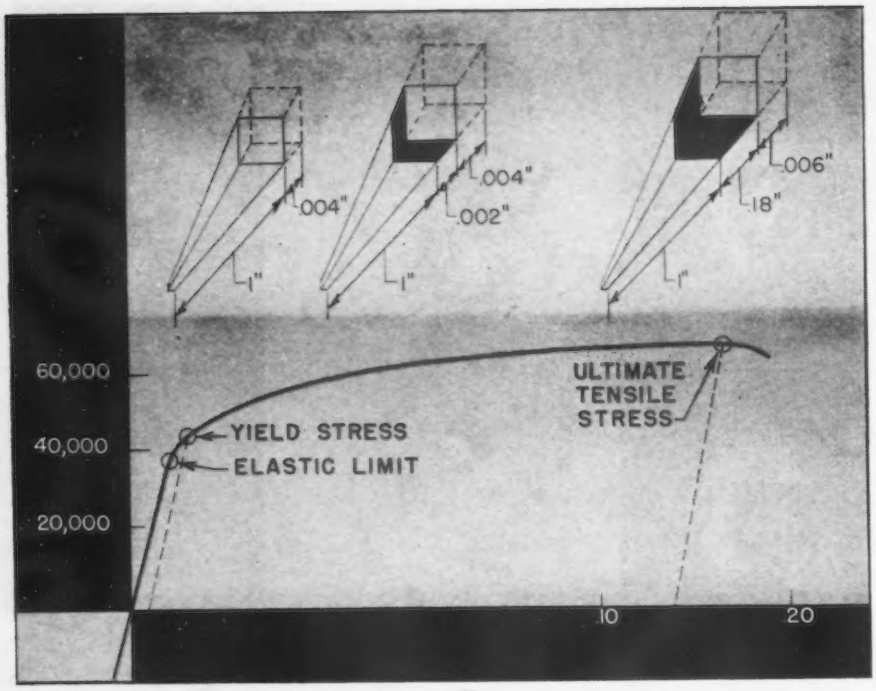
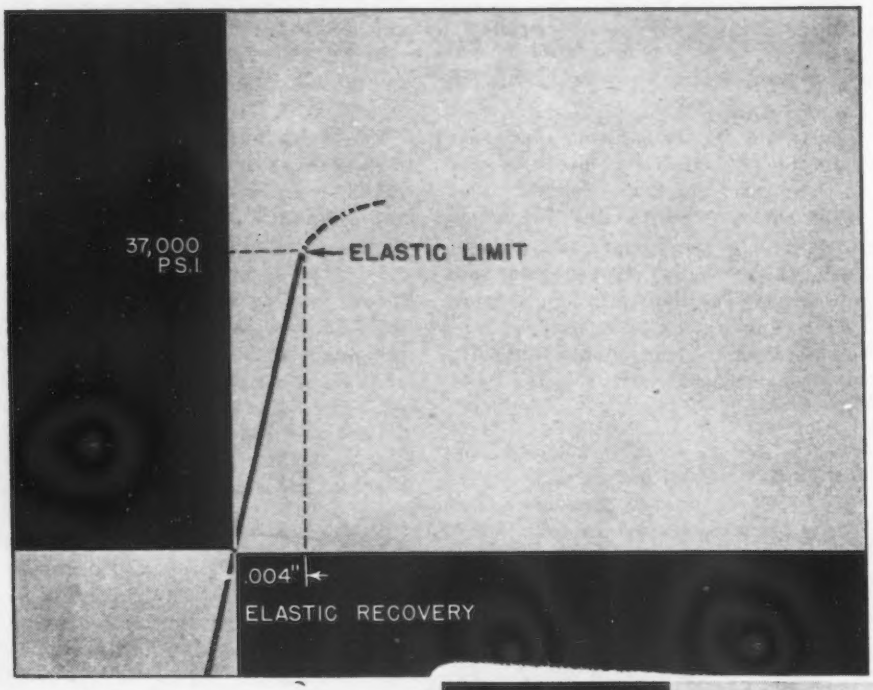


FIG. 2—Typical stress-strain diagram for 24ST Alclad aluminum alloy. Note the difference in scale for curve *B* which is an amplified (abscissa) portion of the elastic range of curve. *A*.





TOP

FIG. 3—Total unit yield of 24ST aluminum alloy at critical stress points is shown graphically in terms of permanent set (black) and elastic recovery (dotted outline).

o o o

ABOVE

FIG. 4—Up to the elastic limit, there is full elastic recovery after stress is relieved (24ST).

o o o

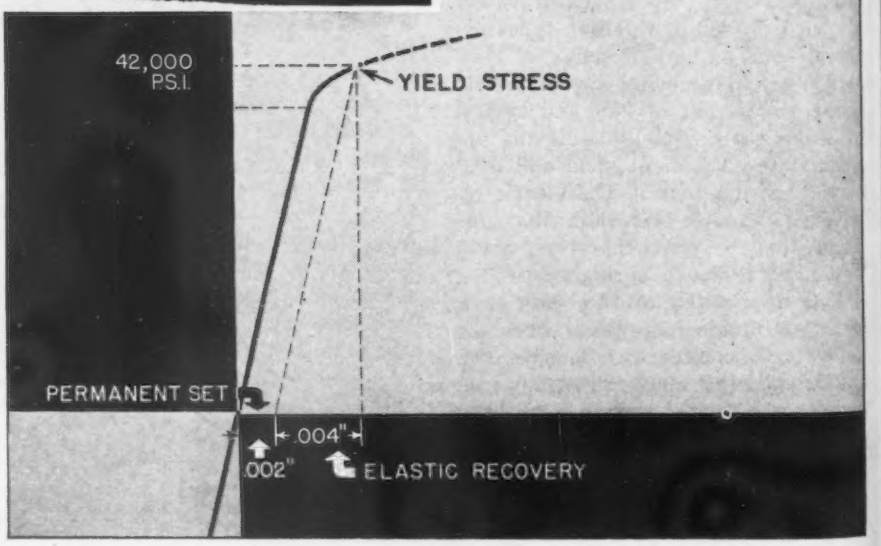
RIGHT

FIG. 5—Once the elastic limit is passed, permanent set takes place but there is always some elastic recovery present (24ST).

inches are acted upon in the larger bend radius, thereby causing a greater springback angle.

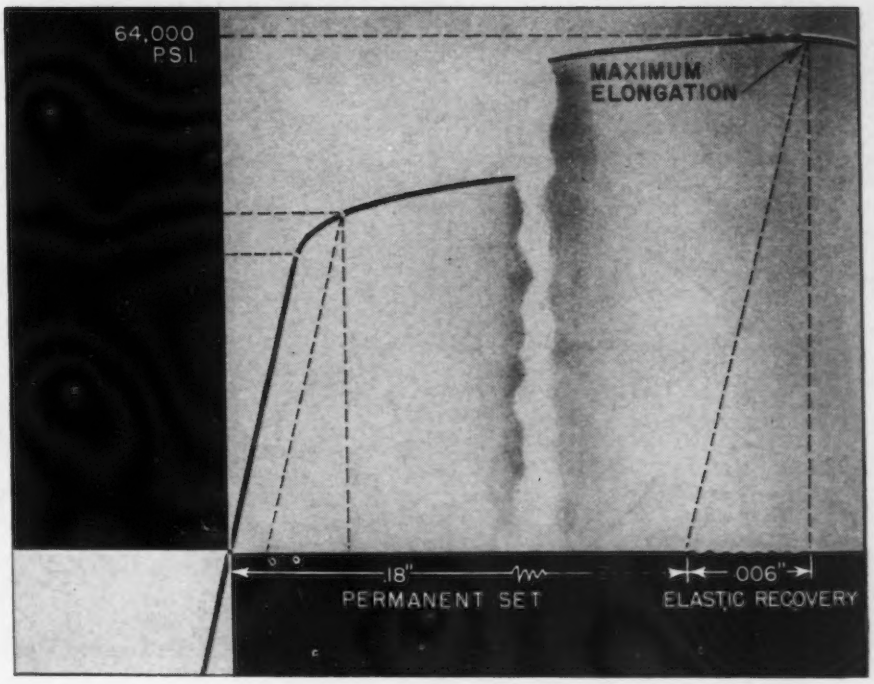
When material is bent over a radius, as in the examples of flanges on bulkheads or wing ribs, Fig. 8, the outer fibers of the material are stretched and the inner ones compressed. Fig. 9 shows the geometry of such a simple bend. Let us consider the material as being 24ST, 0.051 gage, bent over a ⅛ in. radius and the forming done by the rubber hydropress or power brake. As shown, the outer fibers *EC* are stretched distance *ED* and the inner fibers are compressed a corresponding amount. The neutral axis remains the original length and is located approximately in the center of the sheet. When the force bending this material is released, the fibers which are stretched recover elastically, thereby becoming somewhat shorter, and the inner fibers, which are in compression, expand in the same proportion. Although this amount of elastic recovery in the outer and inner fibers is approximately only 0.004 in. per in. as previously explained, it does cause considerable springback trouble.

A test coupon similar to the one shown in Fig. 10 has been used to determine maximum elongation and its distribution in 2 in. It is held between grips which are about 5 in. apart. The specimen is machined down to ½ in. in width by 2 in. in length in the center portion. On this area is photoprinted a fine grid of lines 0.01 in. apart. Elongation studies were made from these specimens after failure occurred and the results plotted as shown in the graph. The



location of the measurements taken along the length of the specimen are shown on the horizontal axis, and the amount of elongation or unit elongation in per cent is shown on the vertical axis.

In the area directly adjacent to the fracture the material stretched approximately 40 per cent, but over the 2 in. length the average is only 18 per cent. This average value is the one usually referred to in handbooks. The high local elongation which occurs near the fracture explains why it is possible to bend 24ST material to a much smaller radius than could ordinarily be expected. The progressive bending around such a small



ABOVE

FIG. 6 — Even at the point of ultimate stress, some elastic recovery takes place (24ST).

o o o

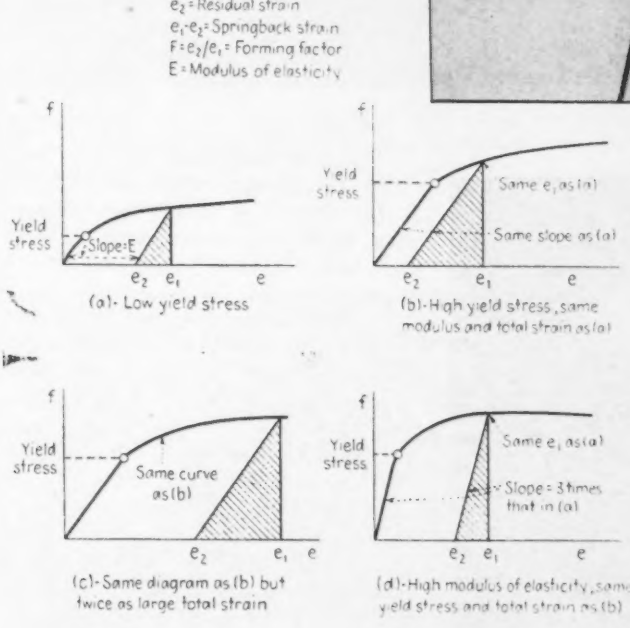
BELOW

FIG. 8—Typical flanged parts, like these wing ribs, are formed in the ST condition

allowable elongation over larger gage lengths; for example, 12, 36 and 48 in., which would be applicable to forming large sheets on the stretch press. It was found that for these larger gage lengths the average elongation dropped down considerably, in some cases to approximately 50 per cent that of the 2 in. gage length value.

For 24ST material, the practical interpretation of these data leads to the conclusions that there can be expected:

(1) Upwards of 40 per cent elongation if only a very small area of the sheet is deformed.



ABOVE

FIG. 7—Effect of shape of stress-strain diagram on springback—At "B" the elastic recovery is much greater than that shown in "A" for a low yield material, the elastic recovery being e_2e_1. If these charts were true stress-strain diagrams of 24SO and 24ST, then in "A," e_2e_1 would be approximately one-fifth that of "B" or elastic recovery for 24SO is approximately 0.001 in. per in., whereas the elastic recovery for 24ST is approximately 0.005 in. per in.

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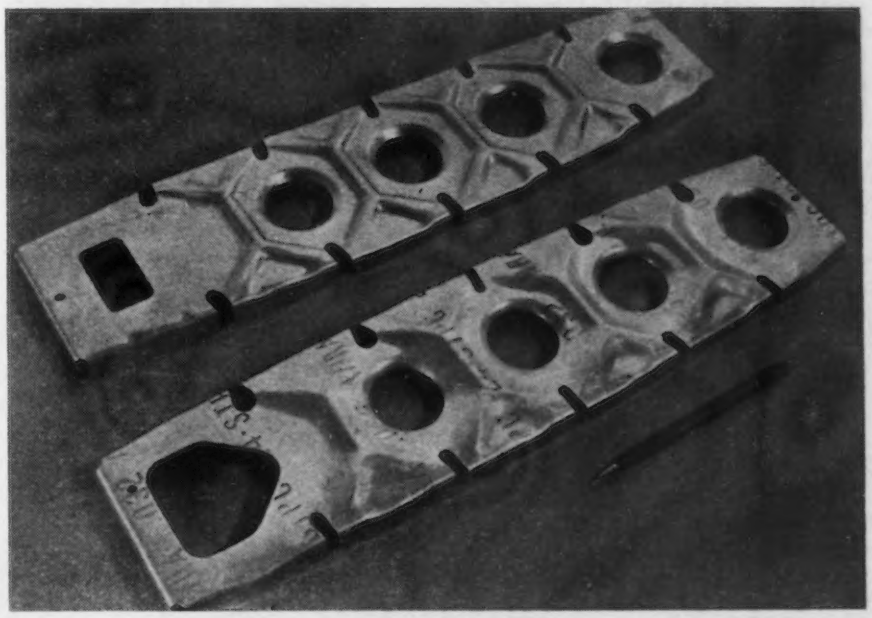
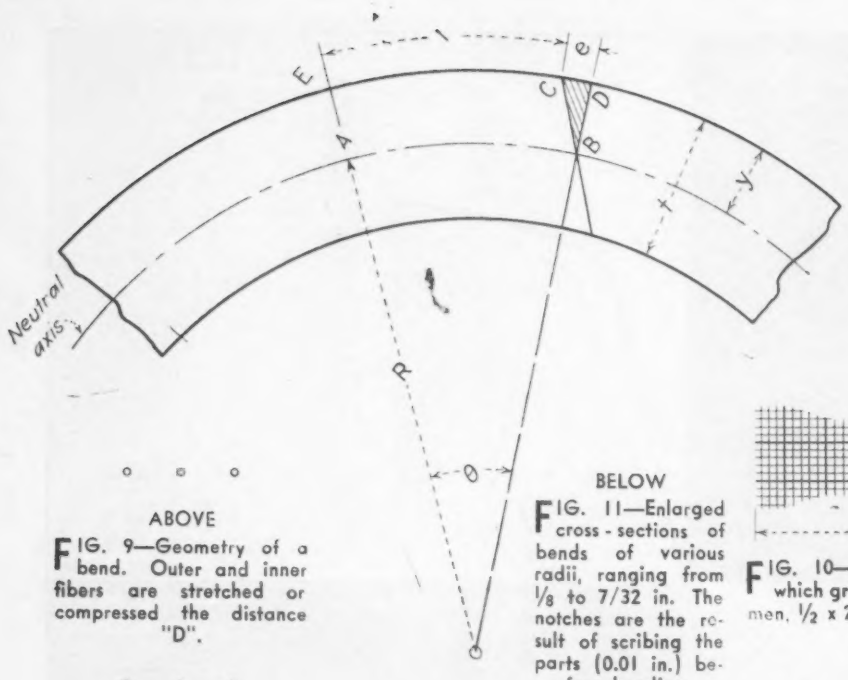
radius takes advantage of these high local characteristics.

A number of elongation charts on various material have recently been compiled and give the elongation in ¼ in. gage lengths and 2 in. gage lengths, as shown in Table I. Further studies were made to determine the





ABOVE

FIG. 9—Geometry of a bend. Outer and inner fibers are stretched or compressed the distance "D".

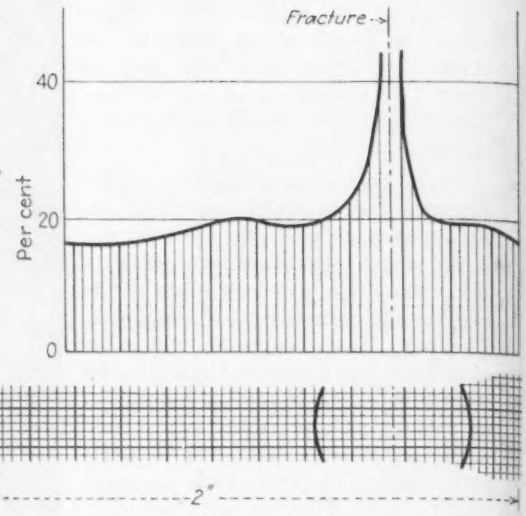


FIG. 10—Local unit elongation plotted on a specimen on which grid marks 0.01 in. apart were photo imprinted. The specimen, ½ x 2 in. in cross-section, was pulled to failure in a tensile testing machine.

BELOW

FIG. 11—Enlarged cross-sections of bends of various radii, ranging from ⅛ to 7/32 in. The notches are the result of scribing the parts (0.01 in.) before bending.

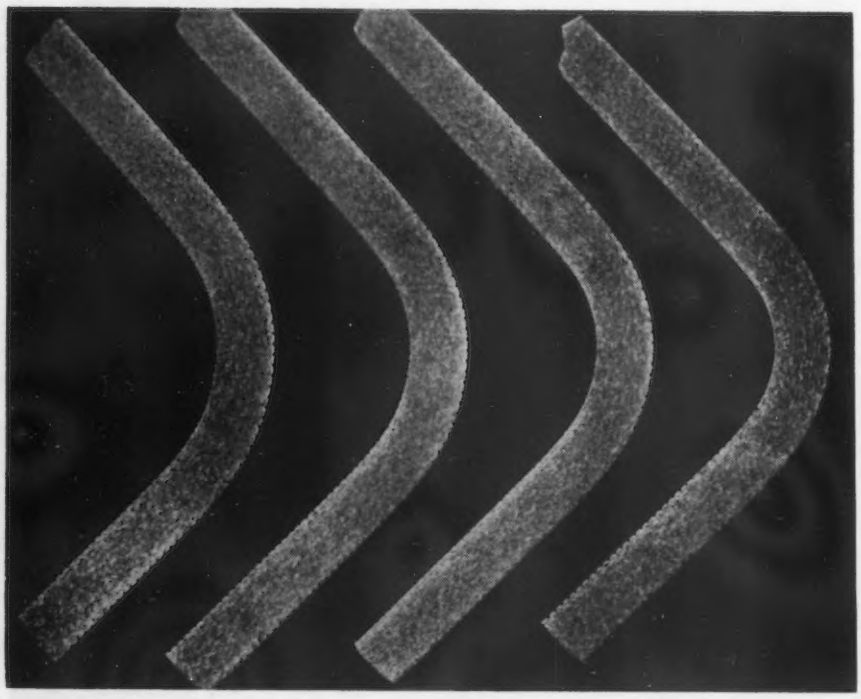


TABLE I

Elongation of Various Alloys for Various Gage Lengths

Material	Gage, In.	¼ In. Elongation, Per Cent	2 In. Elongation, Per Cent	42-48 In. Elongation	
				Smooth Edges, Per Cent	Sheared Edges, Per Cent
52SO	0.032	37	21	16	13
24SO	0.032	30	19	10	9
61SW	0.032	30	19	17	8
53SW	0.032	29	19	16	10
24ST	0.032	23	17	9	4
52S½H	0.032	20	11		3

(2) Approximately 18 per cent when the forming occurs over 2 in.

(3) Only 9 or 10 per cent elongation when large sheets such as fuselage skins or cowl panels are stretch formed.

A few years ago an effort was made to form parts directly from ST material which had previously been formed in the annealed temper (SO) and then heat treated. By so doing, troublesome heat treat distortion could be eliminated. In order to proceed with this program it was desirable to determine the minimum bend radius which could be used for 24ST, thereby not necessitating design changes of SO parts which already had a suitable bend radius. Many bent specimens were made and cross-sections of some are shown in Fig. 11.

In this particular instance, the material was 24ST, 0.064 in. gage. The top specimen was bent on a ⅛, the second on a 5/32, the third on a 3/16 and the bottom on 7/32-in. radius. Before bending these parts, scribe lines 0.01 in. apart were scratched into the alclad surface on both sides of the specimen and may be seen by close observation in these cross-sectional views. At the time of this investigation the photo-grid process had not been developed or at least was not in use at this plant. After forming, these lines were measured and found to agree with the theoretical geometry of bending previously shown in Fig. 9. The outer fibers stretched to limits approaching those shown for ¼ in. gage lengths and the inner fibers compressed a corresponding amount, thereby locating a neutral point approximately midway in the

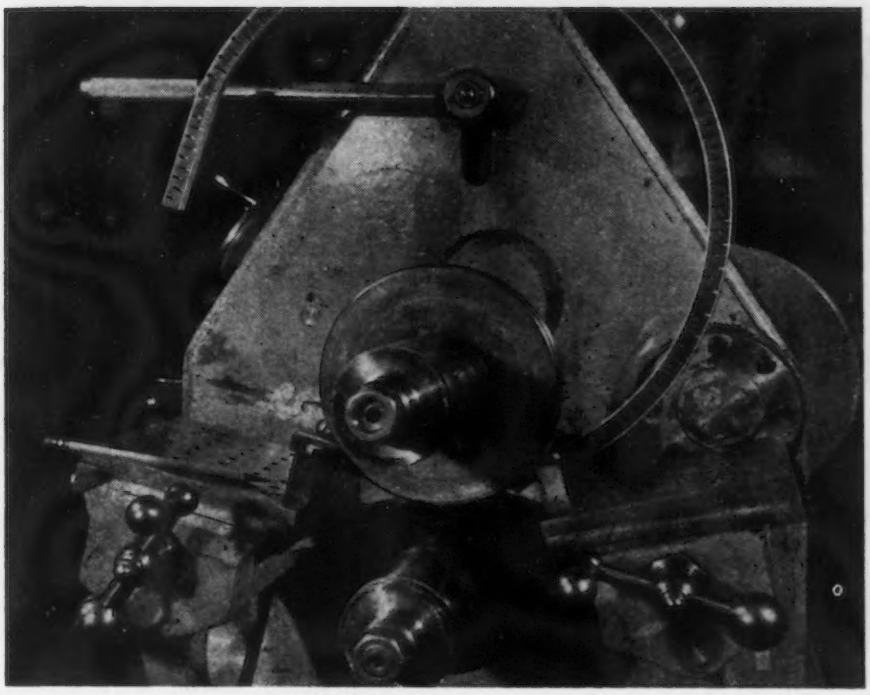


FIG. 13—A 24ST C-channel being formed in a two-roll contour machine. The flanges are prevented from collapsing by use of a notched micarta filler strip.

bend and how it affected the fatigue life of the part.

Many specimens of various gages were formed on their minimum bend radii and subjected to vibration tests. A machine was constructed to hold these bent-up specimens with one leg held stationary while the other oscillated as shown in Fig. 12 until failure occurred. When the results were

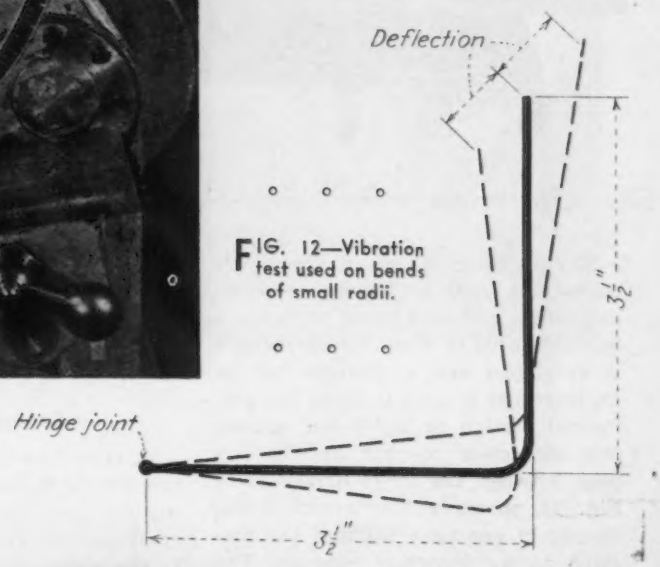


FIG. 12—Vibration test used on bends of small radii.

ABOVE

FIG. 14—Bar forming a T-extrusion. Spring back brings the part back to a 180-deg. bend.

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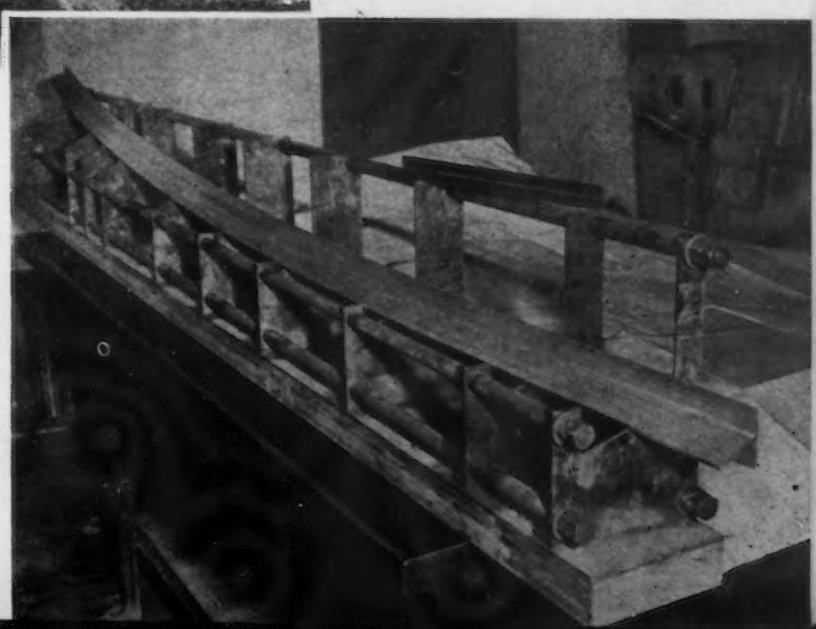
RIGHT

FIG. 15—Check fixture for T-section that has been bar formed in a two-roll contour machine, Fig. 14.



sheet. After determining the minimum bend radius upon which 24ST could be formed without fracture, there was still doubt as to what effect the work hardening had made in the

compared with specimens formed in the SO condition and heat treated, it was found that those formed from the ST stock had the longer fatigue life.

In most hydropress flanging operations, the form blocks must be undercut to allow for springback. To form a 90 deg. flange angle in a 24ST part, for example, a 10 deg. undercut is used.

A two-roll contour machine such as the one shown in Fig. 13 forms by compressing the inner fibers and stretching the outer ones in the same manner that a small bend radius is produced. This view shows a C-channel, 24ST extrusion being contoured in the plane of its web.

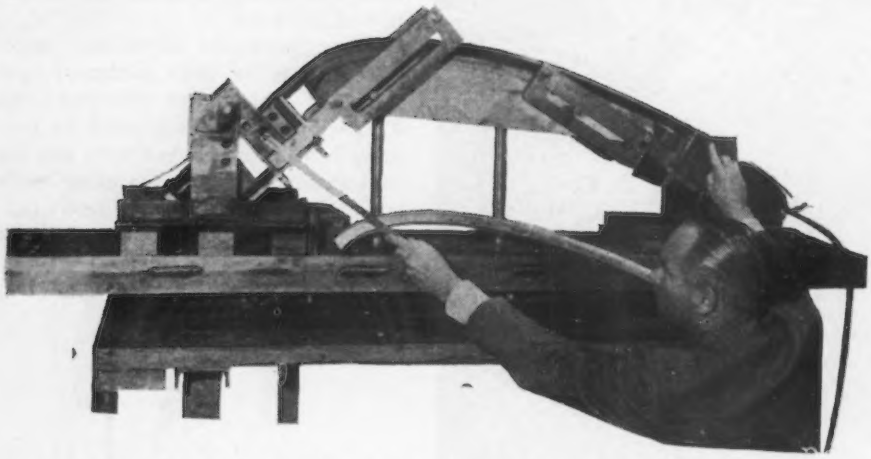


Fig. 16—Table type stretch press used to form the cap strip shown in Fig. 17.

Bar forming is one of the newer techniques used in forming aircraft extrusions and preformed sections. A bar contoured to allow for springback is developed and a straight bar or pressure bar is used to force the preformed section or extrusion against this developed contour as the two pass between the large driven rolls. Fig. 14 shows a T-extrusion being shaped in one pass through the machine to an irregular contour. The amount of springback added to this bar can be judged from the fact that the part opens up to approximately 180 deg. The flange angle is also changed during this forming process.

Fig. 15 illustrates a check fixture needed to check each part individually as it comes through the machine, since springback characteristics vary. These variations may be caused by one or a combination of the following: Hardness of material, cross-sectional tolerances, pressure of rubbing block or amount of lubricant used and in some cases the general technique of the operator.

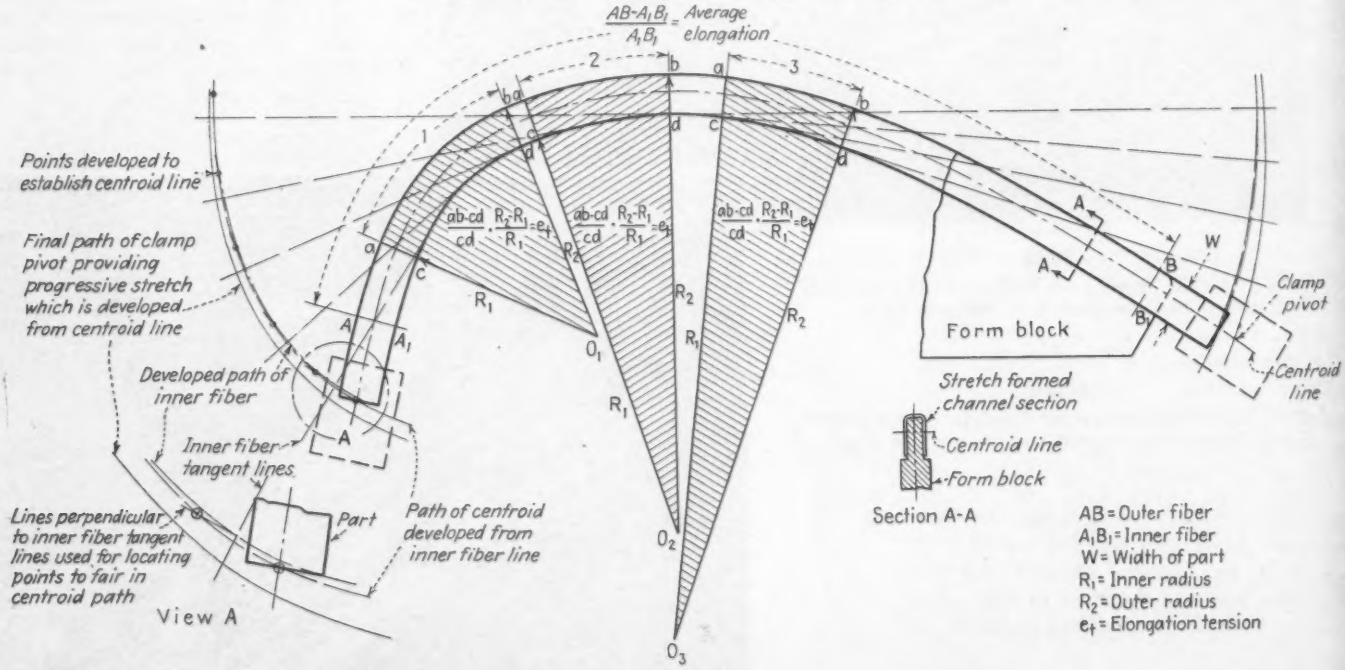
Stretch Forming

Stretch forming is one of the most interesting techniques developed during the past few years to form aircraft parts. The preliminary action is the elongation of elements in the neutral plane, bending and shear stresses being secondary. Fig. 16 shows a table type stretch press forming a cap strip to be used as the leading edge for a wing tip. The limiting factor in a part of this type is the region that has the sharpest radius of curvature, Segment 1 in Fig. 17. Actually, the areas of the triangles shown do not enter into the calculation. The triangles are shaded merely to bring out the fact that the curve consists of radii of different lengths. It is necessary to put a "permanent bend" in this part because it is already assumed that both the inner and outer fibers of the part in this area will be forced into its plastic range by the geometric lay-out of the clamp or jaw path.

This area, Segment 1, requires the outer fibers to elongate near their maximum limits, as the inner fiber *CD* must be held in tension during the forming cycle in order to prevent excessive springback or buckling upon release of the tension of the forming force. The geometry of this area is the projected part width W divided by the inner radius R_1, which gives a difference of 12 per cent from the inner fiber to the outer. The radius in this area is of importance when the part width W is of such magnitude that the outer fibers in this area will be stretched beyond their ultimate limits. Of course, it is assumed that the inner fiber is deformed at least 0.5 per cent. If this were maintained, the outer fiber would be forced to stretch 12½ per cent.

A part with an irregular contour such as this, with some areas sharp and others relatively flat, requires sensitive adjustments in the forming fixtures. During the forming cycle the clamp jaws must follow the developed path established by the geometrical lay-out shown in Fig. 17. In order for the clamp to follow this predetermined path it is necessary to pivot the clamps off-center, as shown in Fig. 16. The movement of the clamp inward is governed by the slot-

FIG. 17—Layout procedure chart for stretch forming a cap strip for a leading edge. The geometry of the clamp path is laid out so as to maintain all fibers in tension during the forming process. The pivot point in this case is operated by the die and pivoted from another point which is attached to the bed of the press. (See Fig. 16.)



ted lever actuated by the form block as it rises.

An effort has been made to present these springback phenomena in a simple manner. Past experience has shown that if the theory of elasticity which occurs during forming were better known by those who design and plan aircraft parts, much time and material could be saved. It is hoped that this presentation will assist in some small way in showing the relationship of theory to practical everyday application.

o o o

FIG. 18—To determine the distribution of elongation, the cap strip was scribed with circles before being formed by first giving the material a coat of template ink. The elongation was then measured with dividers as shown. This is the same setup as shown in Fig. 16 and plotted in Fig. 17.

o o o

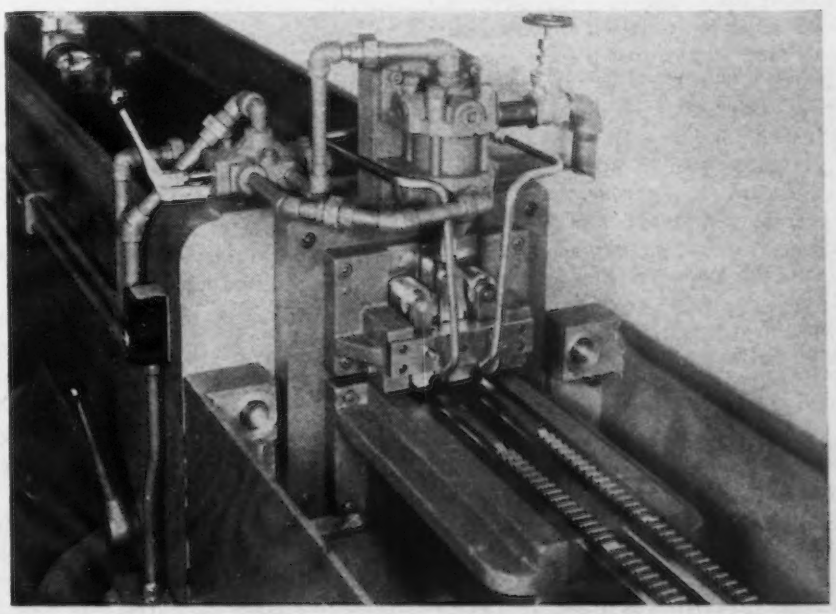
Hydraulic Fixture Aids Broaching Operation

DEEP slots are being successfully broached to close tolerances on small parts with the aid of a special hydraulically actuated clamping fixture, illustrated, designed by the Colonial Broach Co., Detroit. The parts are alloy steel drive spline inserts for hydraulic disk brakes for airplanes, made by the aeronautical division of the National Acme Co., Cleveland.

In a length of a little over 3 in., more than half the 13/16 in. diameter round stock is removed in two passes by a single machine equipped with two broaches. In making the spline inserts, it is necessary to maintain the depth and width of the slot within close limits and locate it directly opposite a narrow slot on the periphery of the piece.

To achieve this positioning, the center portion of the fixture clamp is stationary and is fitted with fingers or lips which engage and position the narrow slots directly above the broach center lines. The other halves of the semi-cylindrical clamps are mounted on movable arms which are actuated by a wedge cam and rollers. Vertical movement of the cam is obtained by a hydraulic ram operating off the hydraulic system of the hydraulic broaching machine. The parts fit freely into the contours of the clamp when the pressure is released. This fixture is mounted against the faceplate of the machine and below it guideways are bolted for holding sectional type broaches.

In production, the pieces are placed on the grooved pilot ends of the broaches so that when the broaches move inward, the parts are drawn into the fixture. The clamp is then closed and broaching proceeds. Return of the broaches pushes the parts out of the clamps. The operator then moves one part into the second station, inserting an unfinished part in the first. In the latter, a flat is produced on the length of the piece, removing approximately ¼ in. of the diameter, at the same time leaving about 1/32 in. of metal to start forming the sides of the slot. In the second pass, the slot is deepened an additional ¼ in. and the sides brought to size within close limits and highly finished. The top edges of the slot are also rounded. One piece is completed at each stroke and production rate is approximately 100 pieces per hr.



Some Malleable Iron

. . . In this discussion, the gating of castings, preservation of chills, and use of synthetic sands are commented upon.

o o o

AT the London annual conference of the Institute of British Foundrymen, held in September, some interesting aspects of the production of malleable iron castings were discussed. With regard to the use of the spherical-shaped feeder, it was remarked that there is a tendency among many patternmakers to avoid its use. They agree that the job could be done with the spherical-shaped feeder; but often when the pattern reaches the foundry, the shape of the feeder is anything but that which was designed to enable the founder to overcome the troubles that are likely to arise. Troubles arise without a feeding head which gives maximum feeding facilities and the minimum of difficulty from local crystallization.

It was remarked by one speaker that while he had no criticism to make of the practice of coating chills with a core oil or similar type of oil, it is a good plan, for some jobs in malleable form, to shellac the chills and to dust them with very fine sand; but care must be exercised to insure that the sand is not dusted onto the chill thickly. The burnt or dead material from annealing pot bating, suitably crushed, may be used.

If chills which have become badly scaled are used, it was said that considerable thickening of the chills and also—a more dangerous occurrence from the point of view of the malleable castings producer—the presence of primary graphite, would probably be found. This might be due to the effect of oxide coating on the chill, on the molten metal; that effect is a type of inoculation which results in the precipitation of primary graphite. When this occurred, the trouble had been cured by replacing the old chills with new ones.

With regard to the use of synthetic sands, attention was drawn to a statement that due to the lower moisture content, there is delayed freezing of the casting and a consequent increase in pulls and tears. It was suggested that a factor which governed to an even greater extent the occurrence of pulls and tears was the density of ramming. This supposition, the speaker said, was confirmed by the observation that, presumably owing to the greater permeability of the synthetic sand, "it was found that synthetic sand could be rammed at least three to four times harder than with natural bonded sands."

Discussing photographs of castings and the runners and risers used, it was remarked that it was an outstanding achievement to have done so much with so little feeder metal. In the case of a tank hub casting it was surprising that such a very heavy flange around the center of the casting could be made completely sound with simple joint feeders, where the heavy section was at a higher level than the feeder. Where there was a light section above the feeder it was satisfactory. Of course, the casting temperature was an important factor in dealing with that casting, and presumably the casting temperature was as low as possible in order to insure that the metal at the top of the mold would freeze rapidly.

It was suggested that atmospheric pressure feeding would not be very applicable to malleable foundries, in view of the long freezing range; while that did not affect gravitational feeding, it might be found very difficult to force the metal up-hill under atmospheric pressure while it was passing through that very pasty condition within the freezing range.

It was also suggested that by using jet type runners on top of the spherical feeding head it might still be possible to cut down the size of the spherical feeder by running through the feeder itself, particularly through the top of the feeder.

Discussing the change from natural to synthetic sands, one speaker mentioned his experience with a 30 per cent chromium cast iron. It had to be cast at a temperature of about 2600 deg. F., as estimated by the Schofield pyrometer. The trouble had been experienced, that although the synthetic sand could be rammed harder than the naturally-bonded sand and the gases would still get away, the result was some cracked and pulled castings. It was not necessary, for making the small castings, to have green strength of 5 to 7 lb. per sq. in.; they could be made with green strengths of about 2½ lb. per sq. in. and the bentonite saved.

Referring to a series of tests carried out with a single vent to within ¼-in. of the face of the test piece, it was said that in a mixture of the Mansfield variety, which had a permeability of 18 to 22, with one vent in the 2 in. circle it went up to 25; in the case of a synthetic sand having an A.F.A. number of about 100 to 120, it went up to 150 with a single vent. The fact that the molds were rammed very much harder in the one case than in the other had had an effect on the strength, but not very much influence on the permeability as shown by the A.F.A. test. It was rather an important point that the effect of the permeability over an area was the same in the synthetic sand unvented and even rammed hard as in a natural sand which had to be vented and rammed fairly soft; there was the same ease of evacuation of gases, or indeed, the evacuation was easier, in the case of the synthetic sand.

Referring to the problem of accuracy of dimensions, it was said by one speaker that he was afraid it was not sufficiently realized generally outside the malleable industry how great were its difficulties as compared with those of other branches of the founding industry. Casting temperature is one factor; founders in general do not seem to appreciate the differences which the initial casting temperature makes when working to extreme accuracy of dimensions. Chills have a definite effect; and, even more important, there is the problem of the location of the feeding heads.

With reference to the remarks on

Castings Problems . . .

formation of primary graphite due to scale or oxide on the chill, it was said that such a chill might be cleaned by sand-blasting. Failing that, it would be better to replace a chill rather than take risks by its extended use.

It was agreed that the density of ramming had as much effect on the occurrence of "pulls" in castings as had the lower moisture content of the synthetic sand, and that a great deal of attention had had to be paid to this aspect. With regard to the increase of permeability shown by the backing sand, after continued use, it was suggested that the strength of the sand had been reduced by the diminution of bond, and also the percentage of coal dust had become less and that these two factors were contributory to this end. With regard to the tank hub casting, previously mentioned, it was remarked that although it was perhaps surprising to find that the top of the flange was sound when joint feeders alone were used, there was merely a run-off on the top of the flange, and, as a matter of fact, thousands of castings had been made in this manner, and they were quite sound. It was necessary to cast at as low a temperature as possible.

Replying to a question concerning the running of metal direct into the top spherical feeders, it was remarked that this was the speaker's practice with joint feeders but not with top feeders because he was concerned only with green-sand molding, and would be afraid that the dropping metal would damage the mold and also affect the actual running of the casting. Nevertheless, it was said to be good practice to fill the top feeder partially, and then make an addition of hot metal to increase the effectiveness of the feeding metal.

It was remarked that it is not an economical proposition to patch a mold produced from a molding machine, and that it is cheaper to knock the mold out and make another. With hand molding, it was remarked that patching-up does present difficulties and is usually effected by wetting the damaged part of the mold and by subsequent sprigging. In order to avoid or reduce the drying out of synthetic sand, it is customary to add a small percentage of oil.

In the main, it was said no dressing was used on any of the cores discussed except in some special cases where it had been found necessary to black them with a mixture of wet blacking and plumbago. For example, the cores used in manufacture of 3-in. bombs were treated in this manner. There was, however, no dressing used on the molds, as they were cast green, the sand incorporating coal dust.

Calibrated Handwheel for Turret Lathes

A CALIBRATED handwheel for turret lathe cross-slide longitudinal travel, used with or without the regular machine stops, has been devised at the Pittsfield works of the General Electric Co. to enable even inexperienced operators to obtain closer and more uniform dimensions than can be obtained with stops alone. The wheel periphery is graduated to represent 0.005 in. travel for each mark and has adjustable pointer clips which slide in a T-slot in the outer edge of the wheel. The outside diameter is turned flat before being graduated and when the handle is removed from the wheel, the slot is machined for the pointer clip bolts to slide in easily.

An opening through which the T-head bolts may enter the groove is provided at the point where the handle bolts to the wheel. When the handle is in place, the bolts are prevented from leaving the slot. Thumb nuts for the T-bolts hold the pointer clips in place. A reference pointer is formed by a bracket which extends from the wheel hub housing.

When the handwheel is used with a stop, the stop is permitted to kick off the feed before the full travel and the cut is completed by turning the proper pointed clips up to the reference pointer. Uniform dimensions to within 0.001—0.0015 in. are permitted by the use of this method.

Mass Production of

By W. W. BROUGHTON
National Lead Co., New York

o o o

LINE production of the usual articles of commerce is commonplace today. In many industries the flow of parts and subassemblies to a main assembly line helps to streamline fabrication, cut handling costs and increase efficiency through specialized labor. Parts are produced at a rate of speed geared to the output of the plant; they flow down the tributary conveyor belts to the main assembly artery and thence out into the reservoir of industry much as drops of rain ultimately find they way to the sea.

The extension of the mass production idea to the making of tools to be used to produce parts for an assembly line is, however, a new concept, one that has most interesting possibilities. The staggering number of planes demanded by our armed forces at the earliest possible moment has presented problems to the aircraft industry even more difficult of solution than those of an aerodynamic nature.

If the tools necessary to produce the thousands of odd shaped blanks of aluminum alloy sheet stock used on today's warplane were to be made by orthodox methods, the time required in both man and machine hours would be enormous.

One solution to the problem of obtaining blanking dies quickly and cheaply was developed by the Consolidated Aircraft Corp. through the use of a new form of a material which had already proven satisfactory for forming dies.

This material, a zinc-base alloy called Kirksite "A" by its producer, the National Lead Co., has been in almost universal use throughout the aircraft industry in ingot form for sandcast dies for several years. At the suggestion of Consolidated, a technique for rolling the alloy was developed and it can now be obtained in a wide range of sizes and gages.

The procedure developed by Consolidated has been modified and mass-production methods added by the Douglas Aircraft Co. for use at both the Santa Monica and Long Beach plants. At the first-named plant alone, more than 10,000 blanking dies have been produced at the rate of nearly 1000 per month. They are called PBT (pierce-blank-template) dies.

A complete description of the various steps in the sequences developed by Douglas follows:

Step 1: Two thin steel templates are received from the mold loft (where the various details of the airplane are developed from the original blueprints

o o o

BELOW

FIG. 1—Master template clamped to the 1/8 in. plow steel sheet ready to have outline of punch and rivet and piercing holes scribed on its surface.

ABOVE

FIG. 2—Checking plow steel punch for trueness of shearing (or broaching) edge.

o o o

Kirksite Blanking Dies

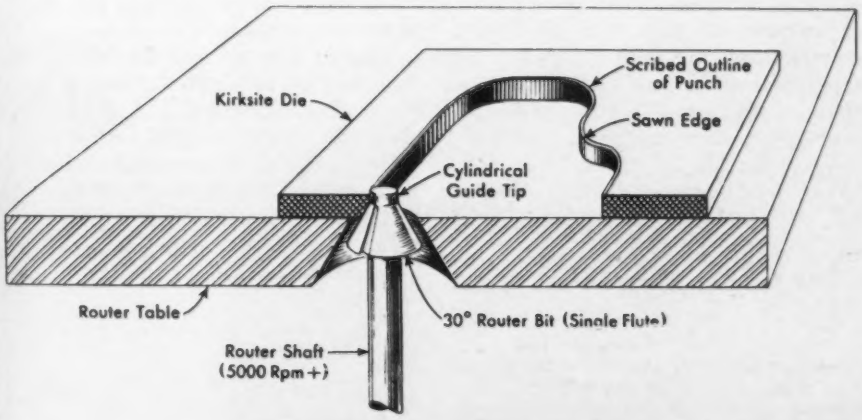
. . . At Douglas Aircraft Co., more than 10,000 blanking dies for aluminum alloy sheet metal parts have been made on a production basis at the rate of nearly 1000 per month. Flat plow steel punches are used in conjunction with rolled Kirksite "A" zinc alloy dies, which are broached to final size by the punch itself. The soft dies are self-sharpening. The practice in making such dies in a number of aircraft plants is reviewed.

and laid out on steel for the shop to use in checking parts for size and shape). One of these templates is cut out to the exact shape of the desired aluminum alloy blank, with all holes drilled and cutouts made. The other is really a blueprint on steel, that is, a layout scratched on steel to serve as an imperishable master gage.

Step 2: The first of these templates is laid upon a piece of ⅛ in. plow steel (an inexpensive, low carbon steel) and its outline scribed on the steel, complete with centerpunch marks for all holes, Fig. 1. This layout also can be done by chemical transfer from films taken off lofting templates.

Step 3: A band saw is used to cut the steel close to the outside of the scribed outline (as well as inside the outline of any large interior holes) and the flat punch completed by hand filing to the scribed line. All straight edges are smoothed on a horizontal spindle disk grinder.

Step 4: The punch is checked against the template, Fig. 2, and then is placed on a piece of rolled Kirksite "A" 5/32 in. thick and of suitable size. This in turn is placed upon two sheets of ¼ in. hot rolled steel that have been previously jig drilled with two positioning holes and with two or more holes to provide means of holding the die backing plate to the upper platen of the press, as well as a means of holding the die set together for storage. This pile of four sheets of material is clamped to the



ABOVE

FIG. 4 — Sectional view of the special router used to bevel the underside of the Kirksite "A" die. This is the start of Step 8 and is a preparatory operation to the broaching operation, Step 12.

o o o

RIGHT

FIG. 3 — Steel punch, Kirksite sheet and punch and die backing plates stack-clamped for drilling in order to assure correct registration of blanking punch and die, as well as individual piercing punches.

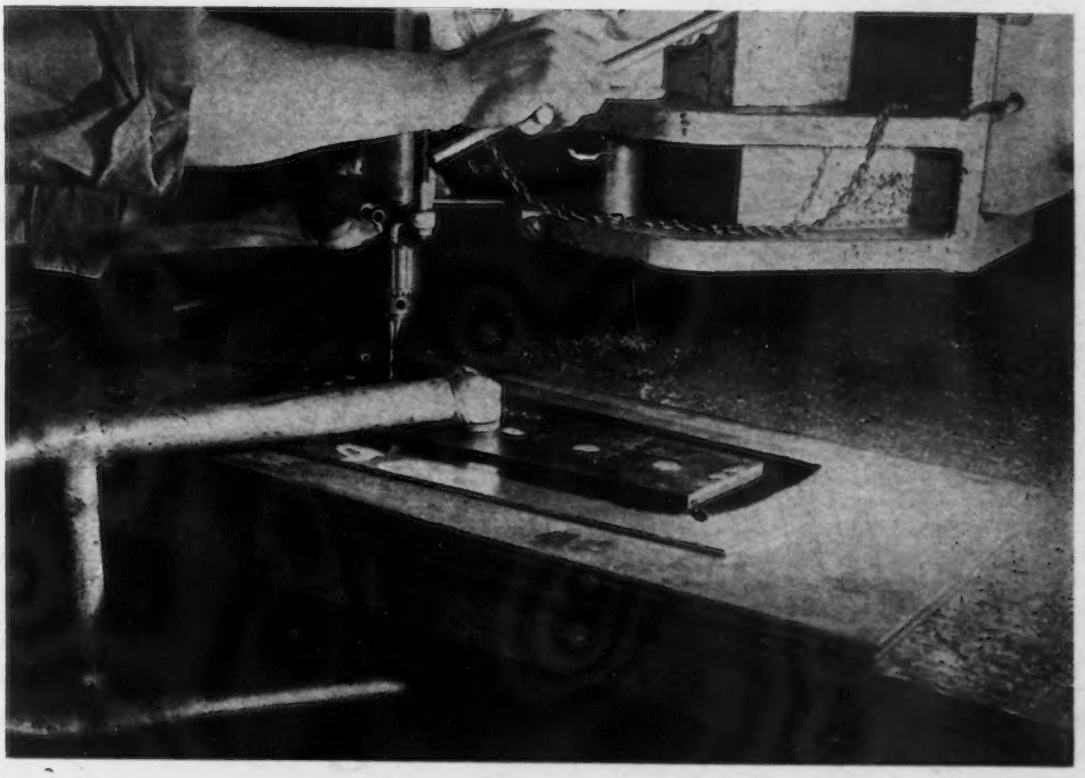


FIG. 5—Cementing strips of rubber inside die (and outside punch) to act as ejectors for blank and scrap. Rubber grommets are used around piercing punches. Cork is sometimes used in place of rubber for "stripping".

bed of a drill table, Fig. 3. A sufficient number of holes are drilled through these sheets to allow for the riveting of punch and die to their respective backing plates, and countersunk. Backing plate sizes run from 5 x 6 in. up to 48 x 90 in. In the larger sizes plate thickness is 5/16 in.

Since the steel punch must also act as the die for any small holes to be pierced in the blank and because it is essential that these holes be accurately coordinated with the positioning dowels, they are drilled through all four plates before disturbing the clamped position. These holes are, of course, the exact size of the holes desired in the blank.

The punch outline is also scribed on the Kirksite sheet before the clamps are removed.

Step 5: The steel backing plates are turned over and countersunk for rivets. The holes in the punch backing plate corresponding to the holes to be pierced in the blank are redrilled to a standard size (5/16 in.) to allow clearance for piercings. In the die backing plate, these same holes (registering with the holes to be pierced in the blank) are redrilled to provide a press fit hole (3/16 in.) for the standard knurled end of stock piercing punches (hardened and ground).

Step 6: By means of a pair of dividers, a second line is now scribed on the Kirksite sheet 1/16 in. outside the outline of any large holes to be cut in the blank. A hole is drilled through the Kirksite inside this newly scribed line to allow for the entry of a jig-saw blade.

Step 7: The Kirksite die then goes to the jig-saw operator who quickly saws around the inner scribed line of the die as well as the outer scribed line of any "islands" of Kirksite which are to act as punches for large holes in the blank.

Step 8: The die and the islands, if any, now go to a special routing machine, Fig. 4, which has a 30 deg. single fluted bit equipped with a plain cylindrical tip. This cylindrical portion acts to limit the depth of the cut and must be positioned at such a height above the router table as to allow about 1/32 in. of the sawn edge

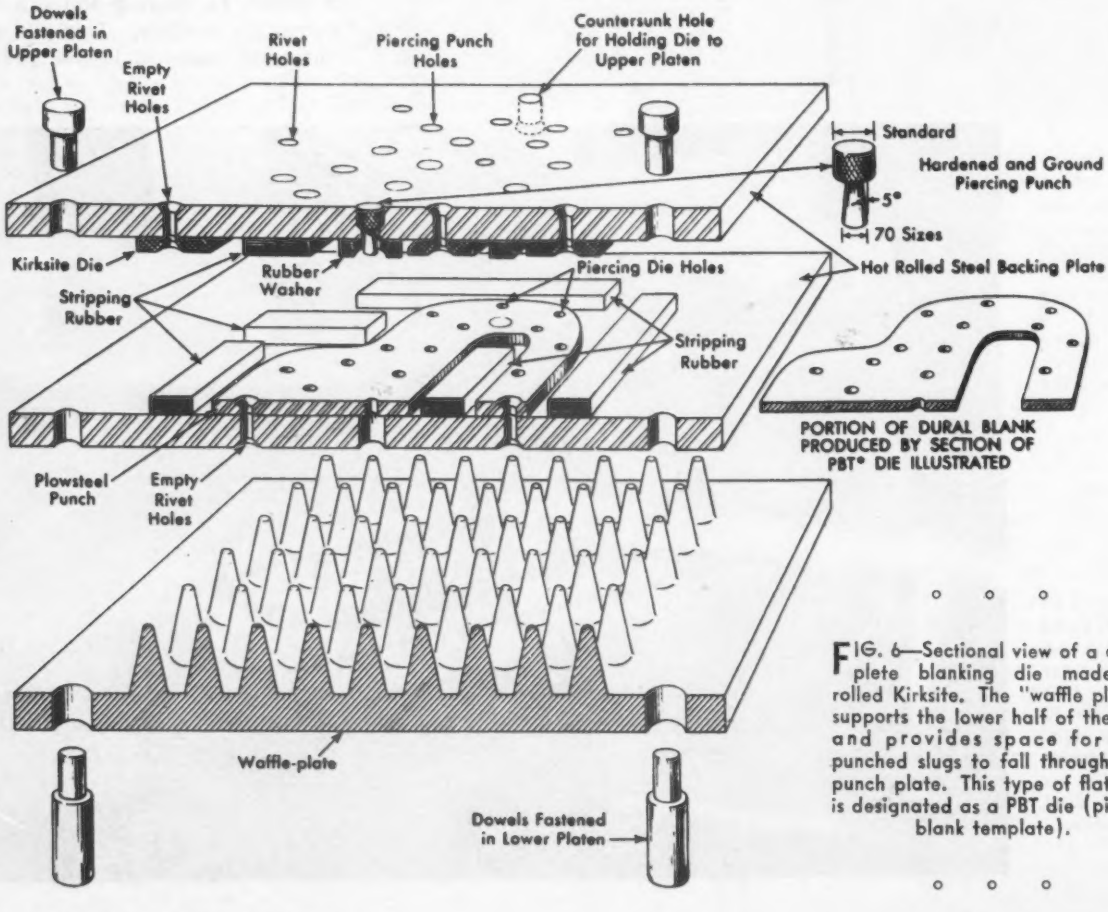


FIG. 6—Sectional view of a complete blanking die made of rolled Kirksite. The "waffle plate" supports the lower half of the die and provides space for the punched slugs to fall through the punch plate. This type of flat die is designated as a PBT die (pierce blank template).

of Kirksite die to remain untouched by the router bit. The operator places the die over the router bit and feeds the sheet against the cylindrical guide tip until it will go no further. He then follows the sawn edge all the way around the inside of the die as well as the outside of any islands, if present. This results in a 30-deg. bevel under the desired cutting edge of the die.

Step 9: The hardened steel piercing punch (of which a stock of 70 different sizes is kept on hand) are provided with a knurled shank of a diameter to provide a press fit in a 3/16 in. hole. Punches of the correct sizes for this particular blank are then pressed into their respective holes in the die backing plate and staked in place. These punches are made on automatic screw machines and are heat treated to a hardness of 55 Rockwell C.

Step 10: The Kirksite punch and die, with any islands, are now flush riveted to their respective backing plates in a pneumatic squeeze riveter. Heads are ground flush with plates by means of portable disk sanders.

Step 11: Strips of rubber about ½ in. wide and ⅛ in. thick are cemented (Goodrich E70 cement) to the backing plates, Fig. 5, inside the die to eject the blank and outside the punch to strip the scrap. Small rubber washers (also ⅛ in. thick) are cemented to the die backing plate around each of the steel piercing punches to aid in ejecting the blank.

Step 12: The die set is now ready to be broached. This is done with the plow steel punch itself in a press in which the test blank is to be made. The die set is provided with a "waffle plate," Fig. 6, and with positioning dowels to fit the backing plates. The die is secured to the upper platen of the press by means of three or more flat head screws. The punch, also positioned by dowels, is simply laid on the waffle plate. The press is operated, causing the punch to shear through the bevelled undercut of the Kirksite die, the scrap falling free in the die, from which it can be easily removed. A few blanks made from scrap material are not run through. It will be found that whatever small burrs occur on the edges of the first blank soon disappear.

Step 13: The test blank is now checked against the master template, Fig. 7, and if found to be accurate, the die set is removed from the press, the two parts fastened together by means of screws and wing nuts and sent to the tool room to await call for production.

The arrangement of the equipment in the Douglas die room is in the form of a U and line production methods are employed. By using the principle of the division of labor into simplified steps it is possible to have each man perform just one step or machining operation, at which even a relatively green worker soon becomes proficient. One worker does drilling, another band or jig sawing, a third, disk grinding, etc. Although a fairly large number of workers are employed, the manhours of labor per die is much lower than if the job were performed by a few toolmakers and the monthly output is correspondingly large, around 1000 die sets a month. To produce the same number of conventional steel blanking dies would truly be an enormous and costly undertaking.

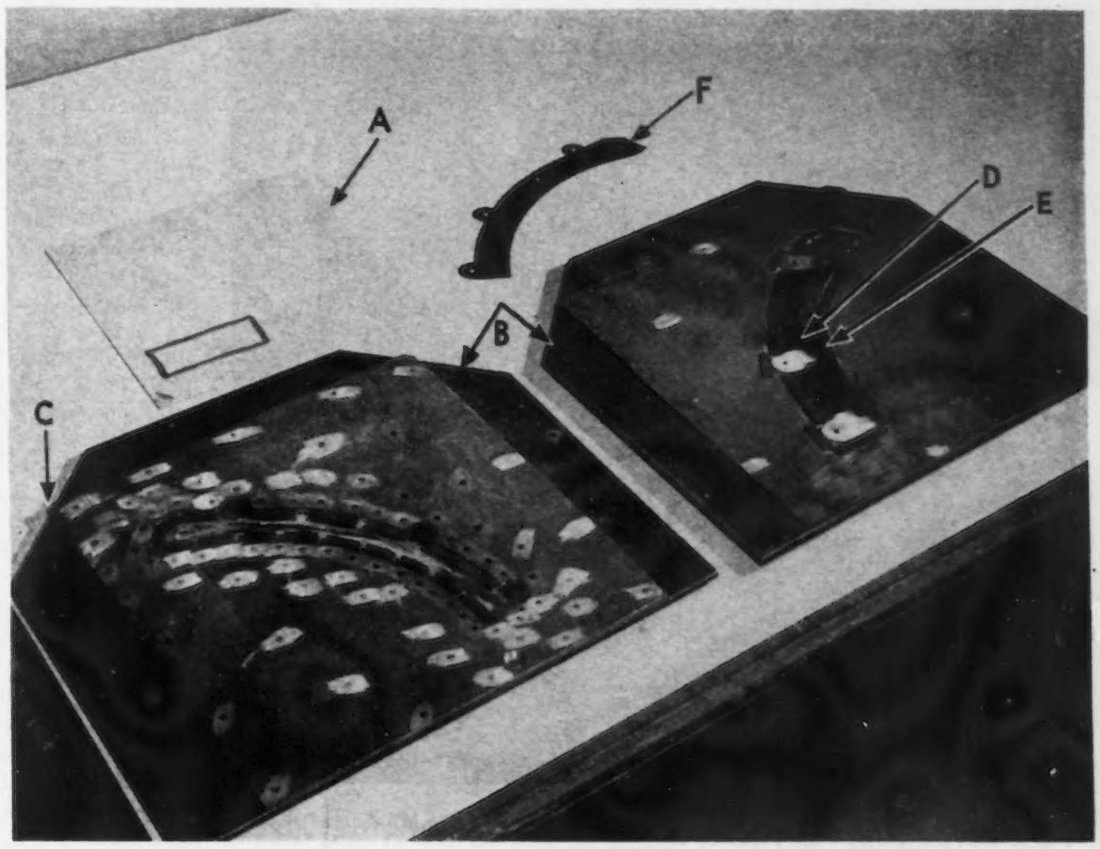


FIG. 7 — Finished PBT die showing A—master template; B—backing plates; C—Kirksite die; D—steel punch; E—rubber ejector strips and F — finished blank. The white blotches are the result of grinding rivet heads flush on the Kirksite die.

Variations in Method

The foregoing is a description of the methods and equipment used by Douglas. Since few of the potential users of this type of die have a sufficient volume of die work to warrant an assembly line setup, it may be well to point out variations of the methods just described as applied in other plants.

Steps 1 and 2 will vary, but have no real bearing on the final result. Whatever the method used, layout and alinement must be accurate.

In Step 3, an engraving machine or any other two dimensional pantograph can be used in place of the bandsaw and file. The original template can then be used as a guide or pattern to produce the punch.

In Steps 7 and 8, a number of variations are in everyday use with success. Consolidated Aircraft uses a special routing machine which utilizes the punch as a guide template in routing the Kirksite. This requires a rapid and readily accessible adjustment for the vertical position of the router. Vega also uses a template shaped like the die rather than the punch and scribes the line for the saw cut with a special scriber which marks the saw guide line 1/32 in. inside the template. Murray Corp. of America has developed a free-hand method of routing in which the operator stays within the proper distance of the outline of the punch by eye. Curtiss-Wright saws close to the line with a band saw, broaches the punch through without beveling the edge to provide scrap clearance and simply breaks the resultant bead of crushed Kirksite away from the bottom edge of the die. This must, of course, be done **before** the die is mounted on its backing plate.

Northrop Aircraft has a router which has its bit above the table, cutting downwards. A pin in the table top, slightly back from the cutter, provides a guide against which the punch bolted to the Kirksite sheet is pressed. The cutter is lowered to an established position, cutting its way down into the Kirksite and the correct position of the cut relative to the punch is maintained by holding the punch in contact with the guide pin as the outline is being cut.

In Step 9, Boeing Aircraft Co. and others use flathead steel rivets hardened and ground to size for the piercing punch and press them into the die backing plate but do not stake them fast. This necessitates an additional backing plate to retain the piercing punches in place, but provides a quick way of replacing broken punches. The two plates are spaced by washers having the same thickness as the punch heads and are fastened together by countersunk flat head screws. At Willow Run the Ford Motor Co. uses punches which are cold headed with a countersunk head and swaged to size in an upsetting machine, thus eliminating the necessity for spacers between the two backing plates.

In Step 11, some plants have had trouble with the stripping rubber flowing between the Kirksite and its backing plate. Curtiss Wright now leaves the first blank in the die and cements the rubber to it instead of to the backing plate. Consolidated sometimes uses a steel stripper plate on top of the rubber strips.

FIG. 8—A larger size PBT die ready for the press. Some of these dies are longer than the longest press platen and to complete the operation must be shifted after half the blank is formed.

Waffle Plate Modifications

It will be noticed that the waffle plate shown in Fig. 6 is a solid casting. If interference occurs with the piercing punches, the interfering tit must be broken off. More recent practice is to make these tits removable. By numbering them in one coordinate direction and lettering them in the other, it is possible to designate on the worksheet for each die the tits that must be removed. A waffle plate made in this manner is a permanent fixture.

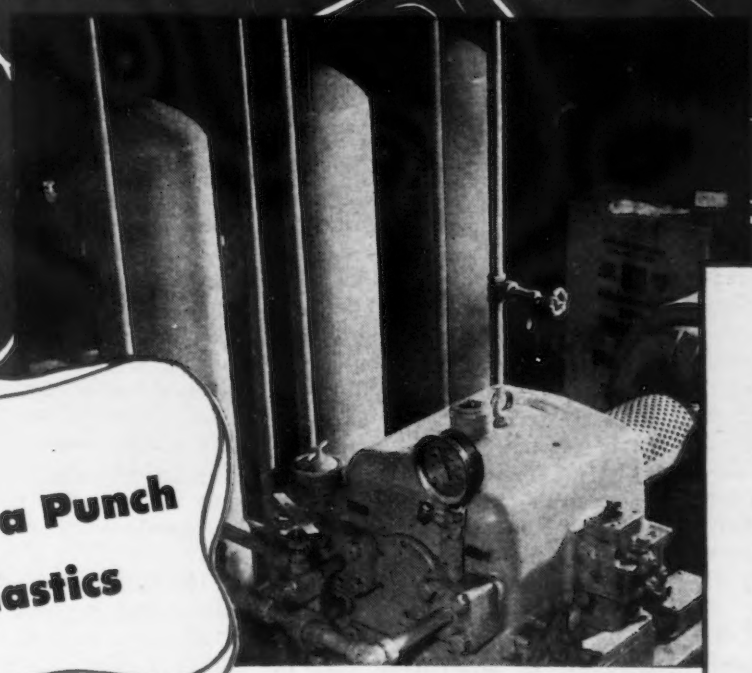
Consolidated Aircraft uses a simple ribbed construction which provides troughs about ¾ in. deep and ½ in. wide across the press under the die set. When there are no piercing holes that interfere with these ribs a standard ribbed plate is used, but if holes are in such a position that the ribs interfere with the removal of piercings, the rib is milled away at that point and hence becomes a part of that particular die set. Boeing uses adjustable ribs held in place by countersunk screws and rectangular nuts sliding in T-slots in a bed plate at right angles to the ribs. These ribs can be altered in spacing or set at an angle to obtain clearance for all pierced holes. In both designs the piercings are removed by a blast of air through between the ribs under the punch backing plate.

While most plants do the actual blanking in a mechanical press or a hydropress, Douglas has used the pneumatic hammer (Cecostamp) for the purpose with success. A very short stroke is used (about ¾ in.) and rapid production obtained.

Dies Self-Sharpening

Kirksite dies of this kind have proved to be self-sharpening, that is, material flows toward the punch sufficiently to keep the cutting edge honed. Tests have proved that 30,000 dural blanks of a thickness of 0.037 in. can be produced without destroying the smoothness of the edges of the blank. Ford is successfully blanking ¼ in. dural. Some firms are blanking stainless steel up to 0.025 in. thick when only a couple of hundred parts are needed.

In any case, the use of Kirksite "A" requires zero clearance between punch and die and this obviously calls for extreme care in securing perfect alinement.



Oilgear generator or pump powering three accelerators that actuate molding presses. Many processes have used this successful Oilgear technique for years and with entire satisfaction.

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This is just another highlight in the story of Oilgear versatility which with Oilgear engineering experience is solving problems up and down the land—machine design puzzles solved by means of the tremendous force in small space . . . the force without motion . . . the steplessly variable speeds . . . the combination of linear and rotary motion . . . or any of the other functions Oilgear provides. Oilgear may be a "natural" for you. Why don't you find out? Now is the time. . . . THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

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5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
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11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
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STANLEY H. BRAMS

• Automotive Engineers annual meeting promises future cooperative work . . . Light metals again subjects of controversy . . . Postwar aircraft market is analyzed.

DETROIT—The war program of the Society of Automotive Engineers was distinctively recognized last week at the annual meeting, with award from the Army Ordnance Department of a distinguished service citation, first of its kind ever granted. Beyond that, the annual meeting was keynoted by reports of advance on subjects of wartime development and incisive projections for the future. There was quite definitely a post-war tinge to the many papers presented and to the discussions in the corridors.

However, the new president, W. S. James of Studebaker, made it clear that war work continues to be the number one job of the engineers. In a press conference he predicted that the exchanges of information which have been brought to a high level through the activities of the SAE War Engineering Board would likely continue, although probably in modified form, after the war.

"The competitive spirit has never been so strong among the engineers as it has been between other automotive executives," he said. "I cannot help but believe that the close bonds of relationship and friendship developed among engineers of many companies during the war will be bound to have effect in continued close relationships afterward."

L. W. Kempf, of Aluminum Co. of America, predicted wide use of aluminum parts for post-war automobiles, anticipating that secondary aluminum, usable for engine parts, would be available in large supply at about 5c. per lb., making costs of aluminum and iron castings about equal. The discussions in the corridor later produced a diametrically opposite viewpoint—that automobile engine weight reductions would come by reason of more precise ferrous castings and by smaller engines, rather than by widespread use of aluminum.

E. C. DeSmet, executive engineer of Willys-Overland Motors, Inc., declared that regardless of costs or weight saving advantages, aluminum requires high welding skills to fabricate, and poses intensified servicing problems due to inelasticity under shock, causing cracking or tearing rather than denting, as in steel, thus discouraging the use of aluminum for body parts. Going further into his subject, Mr. DeSmet discussed proposed plywood bodies and declared that skill and time factors in manufacture would increase costs tremendously. His basic thesis was that costs are likely to be the final determinant in postwar automobiles; and inasmuch as this was a prime factor in pre-war cars as well, no revolutionary changes should be anticipated.

E. J. Willis of Alcoa bespoke support of continued use of the L-head engine in automobiles, despite anticipated gradual increases in compression ratios. L-head engines, he said, protect a piston dome from the flame better than overhead valve motors, because of the proximity of the head. The chamber design will improve roughness, he anticipated. He declared that aluminum pistons and heads allow greater spark advance with less detonation, resulting in greater fuel economy and more torque. Future engines, he predicted, will provide approximately 8 to 1 compression ratio, with aluminum pistons and heads contributing toward better economy.

A TRUCK session produced some rather stimulating viewpoints presented by G. W. Laurie of Atlantic Refining Co. on the post-war truck desires of fleet operators. As regards cooling systems, greater accessibility was urged, along with consideration of surge and expansion control, better water pumps, better thermostats, more easily cleaned systems, and underhood temperature controls for quicker warm-up. Medium and heavy duty truck operators, particularly want power plants which are removable as a unit from the chassis, to aid problems of maintenance. Light truck operators did not deem this necessary.

Fleet operators urged better vision, standardization of hand brake type and location, more comfort for drivers, sturdier hardware, and other improvements. More rust-proofing on bodies, even at higher cost, was declared justified, but rust-proofing of chassis parts did not seem warranted.

A STIMULATING session on postwar private flying served to debunk many commonly held ideas on the size of the market. J. H. Geisse of the Civil Aeronautics Administration offered a table of rather convincing statistics indicating that demand for private planes in 1945, even counting the wants of demobilized Air Force pilots, would be around only 39,000 units, and that because of carryover the 1946 demand would diminish to 16,000. He admitted that the heightened interest of the public in aviation because of the war might upset these anticipations, but his inference was that past experience promised comparatively little variation from the statistics. Broader ownership of private planes is not contingent on income, however—he cited the fact that the average annual earnings of approximately 100 airplane owners in one section of the country recently disclosed average income of $2200 per year.

Limited market or no, William D. Hall, chief engineer of Aeronca Aircraft Corp., painted a glowing picture of the quality of aircraft that would be available after the war. He anticipates a mass market two-place "strip model" plane which will sell at approximately $1000. The medium-priced model of this type aircraft would be about $1500 in two-place version, and about $3000 in four or five-place models. High performance planes selling at $2000 would have non-spinning characteristics, controls coordinating rudder and aileron for easy operation, and cruising speeds of 100 to 120 miles in lower priced models, perhaps as much as 140 miles an hour in higher priced models.

W. P. Eddy, Jr., who lately left GMC Truck Coach Div. to join Pratt & Whitney, discussed the effects of wartime developments on future steel. He anticipated such developments as improved fatigue resistance developable by improved surface finish, design which would reduce stress concentrators in highly stressed parts, reduced alloy content in steels for heat treated parts in which deep hardening is unnecessary, and a

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A familiar scene in the Pratt & Whitney Small Tool Division — one P&W small tool milling another one. Here a P&W Milling Cutter is making the secondary fluting cut on a P&W Spiral Fluted Taper Reamer. This provides necessary chip clearance yet leaves ample support behind the cutting edge.

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great increase in shot blasting and other applications which impart compressive stress to surfaces. He looked ahead to a period of lowered manufacturing costs, better and more uniform products, and ability to use cheaper steels in the future by means of more precise and more highly developed heat treatment cycles. Steel casting improvements, he anticipated, would make possible more diversified applications; X-ray and gamma-ray will be more highly utilized. Welding, he said, has progressed from an art to a technique during the war and there will be more of it, replacing more extensive assembly methods; welded road and rail transportation equipment, as well as machinery and structures of countless types, were envisioned, but he cautioned that bringing this about would require more attention to welding design.

On the subject of alloys, Mr. Eddy forecast use of less alloys, more intelligent specification of materials by engineers, better selection of steels by metallurgists. He anticipated that there would develop a wider use of needle steels because of "actually startling" savings made in alloying elements in experimental needle steel heats. As for NE steels, he declared their reception after the war would depend on such factors as technical superiority (which his paper implied was not a factor, inasmuch as low alloy structural steels are interchangeable for most applications); sales efforts; length of the war with consequent greater familiarity with NE steels; regimentation after the war which would tend to continue use of the NE's; national preparedness and its effect on stockpiling; and price structures.

S.A.E. CONVENTION FIGURES: *Maj.-Gen. G. M. Barnes, technical chief of Ordnance, talks with the new president of the Society of Automotive Engineers, W. S. James of Studebaker Corp. At the annual dinner Gen. Barnes presented the S.A.E. with a citation of distinguished service.*

Straws in the industry wind: Curtailment of operations at the Vigo Ordnance Plant, Terre Haute, Ind., has made possible the lease of four buildings to Delco Radio Div. of General Motors, Kokomo, Ind. Production of radio and electronic equipment for the Signal Corps and Navy will require about 500 people in the Terre Haute operations.

Two months from the time officials announced production of more than 1000 Flyaway B-17's, Ford Motor Co. revealed last week-end that a second thousand has been produced. With production at the rate of several hundred a month, Flyaways are ahead of planning and close to projected peak. Considerable additional numbers have been shipped in knock-down form for final assembly elsewhere.

Inland's Growth and Achievements Termed Typical of the American Way

Chicago

• • • Commemorating its recently celebrated 50th anniversary, Inland Steel Co., Chicago, has published an elaborate historical book entitled "The Story of Inland Steel."

The story of how 40 carloads of antiquated machinery were parlayed into the largest "independent" steel company in the United States is told against a backdrop of contemporary history covering the past 50 years. The text elaborates, step by step, how each of the factors contributing to the company's rise affected the firm as it stands today. Numerous photographs and drawings complement the text.

Excellent photographs cover many operations in steelmaking and show views of the Inland plants. Heavy machinery — blooming mills, cranes, bar mills, continuous rolling mills, all in operation—has been included in the photographs. Captions give capacities, speeds and other data concerning their vast potentialities.

Inland's management-employee relationship is stressed, with pictures showing employees undergoing various health tests in the Inland clinic. Safety first is "sold" to employees with posters, signs, moving pictures and meetings. Inland's excellent safety record is brought out in this new book.

The book's latter section is devoted to Inland's contribution to the war effort and tells the story of its preparation for war, and its record breaking production. A short resume gives Inland's plans for the future peacetime world.

The book is concluded with the following statement:

"The strength to which Inland has grown in 50 years has been made possible because of the system which exists uniquely here in America. Some people call it the free enterprise system. Others call it the American way. Whatever it is termed, it is the system that offers everybody freedom of choice, freedom of opportunity. It is the system that rewards initiative and courage and enterprise and hard work. It is the system that encourages business, rather than stifles it. And therefore it is the system that results in more employment for more millions, under better conditions. It is the system that creates and produces and distributes more—that has brought better living to more people—than any other system on earth.

"Inland is a product, and a part, of that system. It's a good system—one that has proved by the past that it possesses the strength needed for the future."

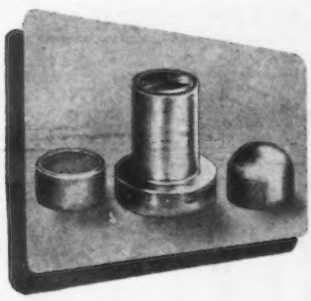
how to Fit the Tool Steel to the Job...

Longer tool life — more output per week from every tool — depends a lot upon selecting the proper tool steel for each job.

And that is where Carpenter can help you—by offering a tried-and-proved method of finding the *one* tool steel that will do each job best.

In thousands of plants, the Carpenter Matched Set Method of selecting tool steel is providing longer tool life. It is saving many hours that might otherwise be spent for re-grinding, repairing or replacing tools that fail prematurely. It is giving tool steel users an *easier* method of selecting the proper tool steel *at the start of each job.* For help in using the Matched Set Method to solve *your* tool steel problems, ask for the Manual shown below.

And for on-the-spot service, take advantage of the experience of your nearby Carpenter representative. He can show you how to put this useful method to work, improve heat treating procedure and boost output per tool. Put his experience to work on your problems today.



How One Tool Steel User Solved A Tool Failure Problem...

THE TOOL: A coining punch for forming bearing races from 1015 steel. Production speed—16,000 pieces per day.

THE PROBLEM: Again and again, tools would fail after running only a half-day.

THE SOLUTION: Needing *greater toughness,* they selected Solar tool steel and got these results:

1. Tool life increased from 8,000 to 200,000 pieces, and the tool room had 48 fewer tools to make each month.
2. Output was stepped up 11,160 pieces per month.

THE CARPENTER STEEL COMPANY, 121 W. BERN ST., READING, PA.

Put the Carpenter . . .

MATCHED TOOL STEEL MANUAL

. . to work in your plant!

Ask for this handy Manual. It contains an alphabetical *Tool Index* and *Steel Selector* and *simplified* heat treating instructions. You can quickly spot the proper tool steel for any one of more than 200 types of tools. This Manual is offered free to tool steel users in the U.S.A. who request it on their company letterheads.

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Why should industry pay exorbitant taxes and forego even reasonable profits for extensive Government regulation calculated to completely socialize it? . . . Renegotiation has not been fair.

WASHINGTON — "It is a fact that during the past eight years attempts have been made to limit excessive profits on the manufacture of war materials, and that neither the Congress, the Treasury Department, the War Department, the Navy Department, the Maritime Commission, nor any other department of the Government has as yet been able to formulate a satisfactory plan of eliminating excessive profits or recapturing excess profits on the production."

With this somewhat doleful admission, Senator David I. Walsh concludes a report dissenting from the new tax bill favorably reported by the Senate Finance Committee, of which he is a member. The segment of industry which has been under the ministrations of the Price Adjustment Boards may possibly disagree with the Senator's concept of the Government's profit limiting ability.

Senator Walsh's report is a scholarly, sincere-appearing and fair-sounding document. It says that the Senate amendments to the House tax bill will emasculate the renegotiation law, create a new crop of war millionaires and social repercussions. It points out that some of the new provisions such as the one exempting standard commercial articles is sure to permit unrestrained profiteering to the damage of other taxpayers.

With seemly restraint it knocks cold the arguments for renegotiation after taxes. The report soberly reminds its readers that war kills men —that there should be equality of sacrifice, but that there isn't a chance of such an ideal state of affairs being achieved. Business is invited by Senator Walsh to avoid the repetition of World War I "scandals," by creating 23,000 millionaires.

The 1942 after-tax profits of an anonymous list of 200 war contractors is published. The profit calculations are based on net worth and it is before renegotiation.

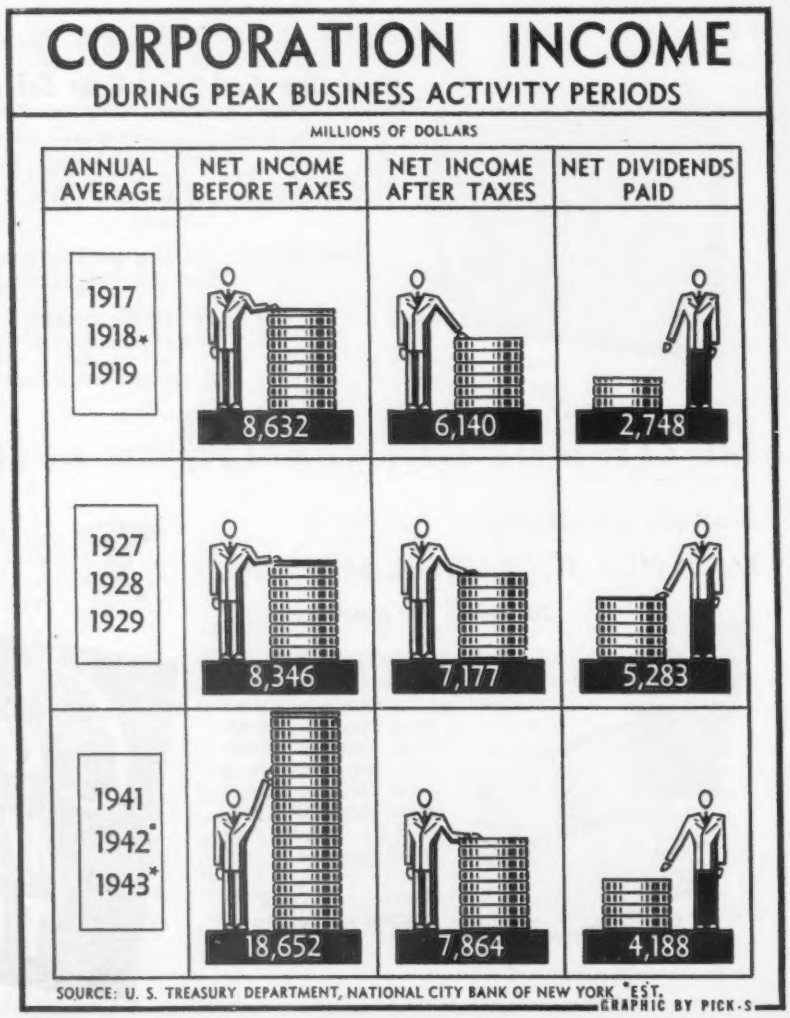
APPROXIMATELY one-half of the contractors made less than 50 per cent profit on investments, but only one-tenth of them made between 40 and 50 per cent profit. About one-sixth made between 30 and 40 per cent; another sixth made between 20 and 30 per cent, while one-fiftieth of the group made less than 20 per cent.

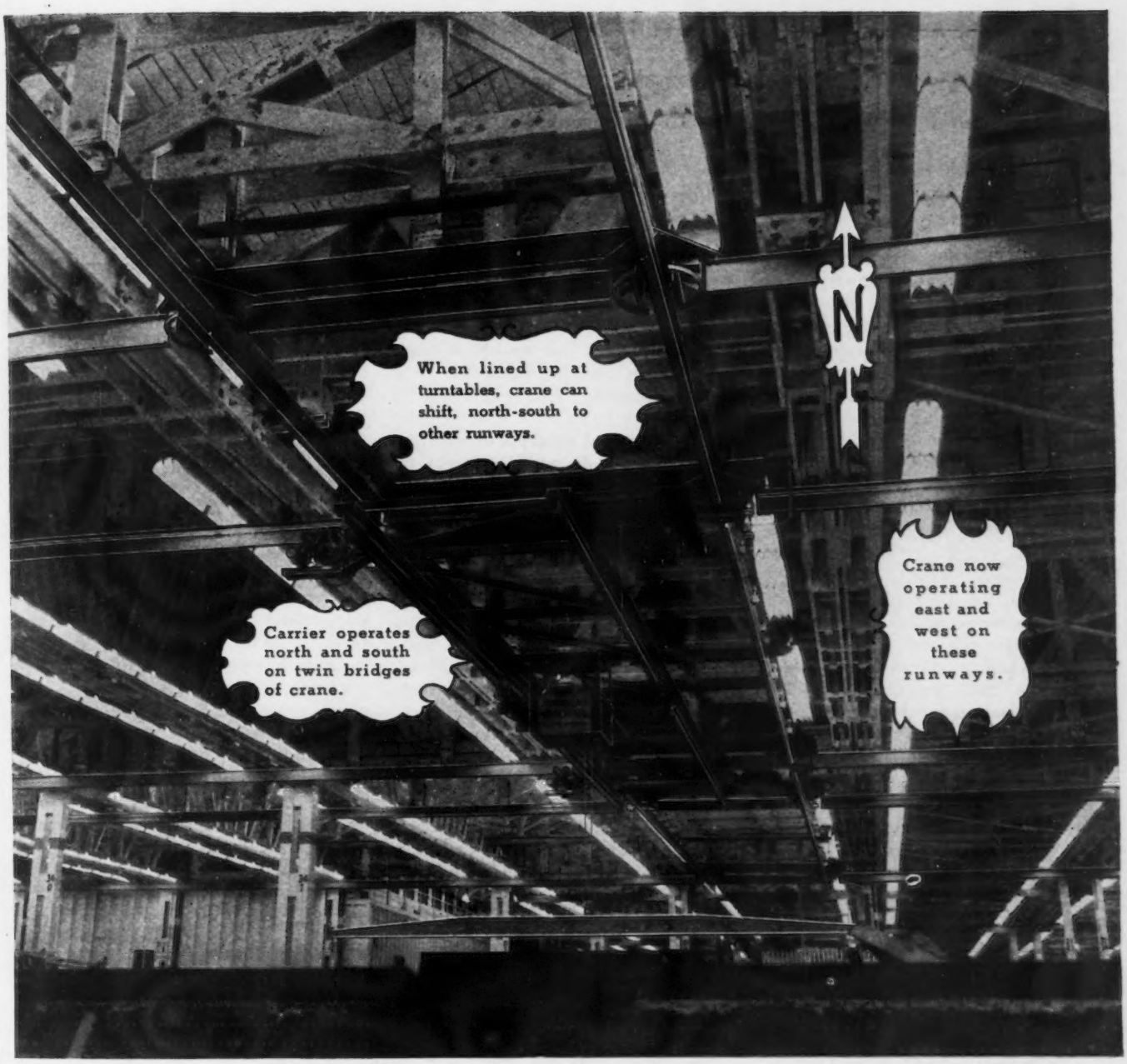
The profiteer list included 39 contractors whose profits were above 100 per cent. In this group of manufacturers some very high profits are set forth with one as high as 630 per cent.

The report says:

"To wage this war, the Nation must expend its substance and lives of its young men on an appalling scale. Despite much talk of equalizing the sacrifices that can never be done in sober fact. To achieve the defeat of Hitler and Japan, thousands must contribute their lives or broken bodies. Measured by their sacrifice, any lesser contribution of time or effort, or money seems but a paltry mite. Equality of sacrifice there can never be. To those who die or are maimed, we are eternally in debt.

"But if we cannot match their supreme sacrifices we must do our best to spread the burdens of the war as fairly as we can. Every class and group must do its share to carry the Nation's war load. Above all else, we must make certain that no group or class shall exploit the war for its selfish benefit. This is but simple fairness to our soldiers and sailors and





No One-Way Streets

Cranes no longer need lead a one-track life. American MonoRail engineering now makes it possible for crane bridges to operate north, east, south or west to furnish hoist hook service throughout the largest plants ever built.

The photo shows how this was accomplished in the largest timber structure ever built. And while it is one of the first installations of its kind in the country, plant engineers claim that it is proving a big production help.

Regardless of size, American MonoRail engineering service is available on any project. This service is offered cheerfully and without obligation.

SEND FOR BULLETIN C-1. A 56 PAGE BOOK SHOWING SUCCESSFUL APPLICATIONS OF AMERICAN MONORAIL SYSTEMS.

THE AMERICAN MONORAIL CO.

13103 Athens Avenue ★ Cleveland 7, Ohio

also to our people—who are enduring unwonted restraints for the common good."

WHO can disagree with Senator Walsh? No patriotic American could.

And yet there are those in Government who think that it is fair to hammer the profits of industry down to irreducible minimums while labor and the farm group have been permitted to let their incomes rise practically unchecked. There is no law to renegotiate these profits.

Furthermore, there are those in Government who would have everyone lose sight of the fact that the President has endorsed the National Resources Planning Board's formula for converting the United States to state socialism.

The Congress-killed NRPB advocated that the Government controls now in existence be continued for an indefinite period, and that the Government should dictate production, guarantee "full employment" to all, with artificial distribution of all goods for an indeterminate period, called transition.

If the Government succeeds in putting this program into effect after the war what difference does it make what war contractors make in the way of profits? The NRPB plan means confiscation by the Government of all means of production—the confiscation would merely take a little more from industry if profits are allowed to go unchecked.

In speaking of equality of sacrifice, what equality can there be in making industry pay exorbitant taxes and forego reasonable profits for extensive Government regulation which is calculated to completely socialize it? Isn't this political profiteering? Business pays the bulk of the tax bill through direct taxes and the taxes the Government imposes on its employees.

THE original concepts of taxation have been discarded. Once Government taxation aimed at providing revenues for running the departments of government. Now Government taxes for social purposes, to provide the wherewithal for social experiments.

Business pays the piper when the Government sets up competitive businesses, when it engages in relief activities, when it establishes new Government agencies with swollen payrolls.

And when profits are slashed beyond reason, what common-sense or equity is there in establishing wasteful, inefficient and politically-minded lending agencies to provide a WPA for industry after the war, to effect industrial recovery under the auspices of an administration which has indicated a revengeful attitude toward all business? Such a program as this is guaranteed to put more Government in business and to eventually snap the control of private management.

The war has so increased productive means that no normal peacetime economy can effectively use those means.

These facts are being used as an excuse for those who want to collectivize America as a result of this war—which is now designated as "the people's revolution" by such of our leaders as Vice-president Henry Wallace.

WHO can say what profit on net worth is enough to take industry safely through the next few years to come? Bankruptcies are good guarantees for businesses getting further under Government control through having to seek Government financing.

Unemployment and business failure is a certainty sometime after the war which is bound to be distressing and yet it is to be preferred to political profiteering of social-minded leaders who refuse to see the end of America's industrial might in a generation or two of state socialism.

The argument that the Government could not possibly arrive at proper prices when manufacturers had no ideas of cost is valid and the usual legal assumption that men must be bound by their contracts when they enter into them does not hold under the extraordinary buying problems of war.

BUT renegotiation itself has not been fair. The Price Adjustment Boards have been accused time and time again of coercive methods. There is no formula. Competing contractors receive varied treatment.

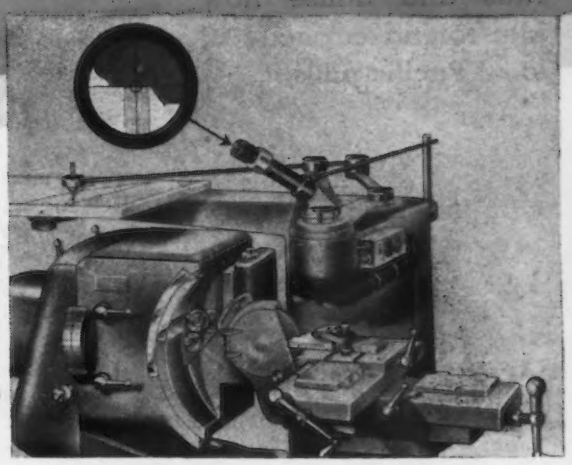
Government negotiators have invaded the privacy of war contractor's records and renegotiation "agreements" have resulted from the judgments of the minds of these men who have no real guiding standards in making decisions.

Obviously, it would save time and be more fair if the standard procedures and the personnel of the Bureau of Internal Revenue were employed and if need be legislation passed to lift the excess profits tax to 100 per cent. The argument that there would be no incentive to hold prices down if the excess profits tax alone were relied upon has no standing.

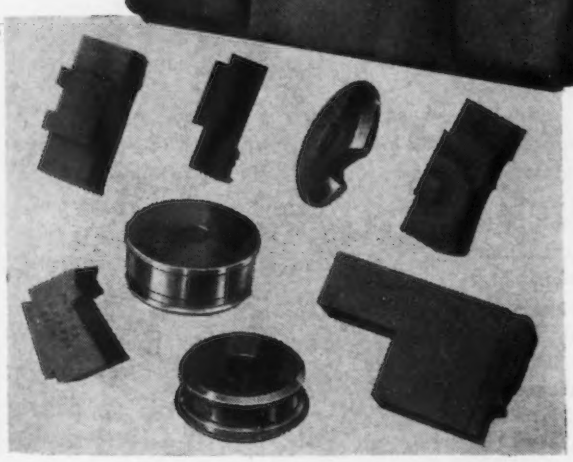
THE BULL OF THE WOODS — BY J. R. WILLIAMS

The SHEFFIELD MICRO-FORM GRINDER

With Pantograph and Microscope



Operator feeds grinding wheel toward point marked by cross hairs.



Typical flat and circular form tools possible to produce on Micro-Form Grinder.

Manufactured under Patent No. 1,811,940

FINISH GRINDS PROFILES DIRECT FROM DRAWING

No Templates Nor Masters

- Grinds both circular and flat form tools, templates, profile gages, cams, dies, etc. to accuracy of .0003".
- Especially suited for grinding cemented carbides and hardened steel.
- Grinding time, especially on intricate profiles, reduced as much as 50-75% compared to other methods.
- Not limited by regularity nor irregularity of work, nor by straight lines, angles or curves.
- Can be used reversely for making layouts from parts having unknown profiles, and for checking parts against layout drawings.

WRITE FOR FULL DETAILS • BULLETIN M-120-143

ARMY E NAVY

SHEFFIELD MASTER CRAFTSMEN

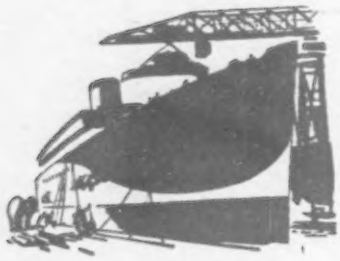
THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS—GAGES—MEASURING INSTRUMENTS—CONTRACT SERVICES

WEST COAST . . . OSGOOD MURDOCK

• Relaxation or removal of restriction on use of reinforcing bars and light shapes would save manpower and materials and utilize now idle rolling capacity of local Pacific mills.



SAN FRANCISCO—Relaxation of restrictions on production of reinforcing bars and light shapes, perhaps complete removal of restraint, at least in the Pacific market area, seems practical and logical to steel production executives and to the construction industry, starting now and henceforth, at least until the current situation changes again.

Most of the independent and local rolling mills on the West Coast are confined to the production of bars and light shapes and are entirely caught up and operating at reduced pace in limited capacity. Meanwhile the substitution of wood timber structural members on major military and war industry establishments continues, and bridges, war highways, runways and other authorized structures absorb additional manpower, wood and other materials because of limitation on reinforcing bars and light structurals that are readily available from Pacific Coast mills.

At Seattle, Northwest Steel Rolling Mills is reported now operating a single day shift. On San Francisco Bay, Judson is operating one of three open hearths and Pacific States one of three electric furnaces. At both San Francisco and Los Angeles, Bethlehem is partially shut down with idle open hearths and rolls.

Scrap is plentiful throughout the Coast area, most mills having three months supply and some accumulating a surplus. In recent weeks scrap has been selling below ceiling price for the first time since ceilings were imposed.

It is pointed out that the saving of manpower and substitute materials, especially wood, should be the prime consideration, but that the situation in this far Western critical area deserves separate consideration in this respect, to maintain maximum production and secure best results most efficiently and with least expenditure of manpower.

Although plate rolling capacity of the Kaiser Fontana plant is rated at approximately 800 tons daily, output has risen to as high as 1300 tons of prime plate in a single day, and it is probable that January production will average 1000 tons per day. Practically all plate is used by California Shipbuilding Corp. at Wilmington, about 50 miles from the mill, and the entire output of the mill has not been sufficient to supply Cal-Ship's demand for plate.

SPORADIC, irreverant, defiant and even picturesque strikes continue to speckle the record of constantly swelling far Western production. Compared to total manhours exerted, the losses through these strikes are infinitesimal. Their occasional occurrence is in spite of generally improved relations in the far West between labor and management and the intelligent, judicious, level-headed leadership on both sides of the bargaining table.

At South San Francisco, 500 CIO mill workers, half the entire plant force, were out at the Bethlehem plant because of a debate whether chargers' helpers in the billet mill should receive the same pay as chargers. Molders in the Pacific Northwest, 6000 strong, were in a state of armed truce awaiting a WLB wage decision over a request for 8c. an hr. more, straight across the board. Shiprights at the Moore yard in Oakland refused to launch several hulls because of a Maritime Commission order banning the traditional practice of paying a full day's wages to the launching crew no matter what hour of the day it occurred. This beef now has to be avoided by arranging launchings at the end of a shift or, when they occur early in a shift, by holding over the launching crew from the previous shift and paying overtime.

One of the most senseless and disturbing disputes occurred also at the Moore yard when a new naval auxiliary vessel, built at another yard, was brought into Moore's repair yard for the final installation of special Navy equipment. Since shipyard machinists receive higher pay for repair work than for work on new vessels, the union demanded repair men's pay because the ship was at a repair dock, and built at another yard. There was only a difference of 14c. an hr., and a few hours work of a few machinists. The Navy stood pat on instructions and the union refused to yield. Thereupon the Navy ordered its enlisted men and rated machinists to perform the work and the vessel was completed and made ready for sea.

At Marinship, Boilermakers Local No. 6 AFL, the local Committee Against Segregation and Discrimination, and the yard management continue in a three way toss the bean bag game over whether Negroes shall be full members of the union or members of an auxiliary specified by the national boilermakers. It is understood that the union local wants to drop the matter and the management of the yard is only anxious to fulfill its union agreement, but that the national officers of the union still insist on carrying out a traditional policy.

WHILE Congressman Warren G. Magnuson was in Seattle with Senator M. C. Wallgren holding hearings in the home town and attracting considerable local attention over an investigation of structural defects and splits in Liberty ships, Mr. Magnuson pointed with just pride to the fact that the Puget Sound area has produced more auxiliary naval vessels per manhour paid for than any other section of the country. He further predicts that naval facilities in the Puget Sound area will be greatly expanded in the near future, requiring the expenditure of millions of dollars. Since the Navy has expanded its previous one inaccessible yard on San Francisco Bay into two major establishments, there may be a possibility of a second Puget Sound Navy Yard, constructed on an already existing nucleus, as at Tacoma.

Shipping and embarkation activities both in the Puget Sound and San Francisco Bay areas are steadily ac-

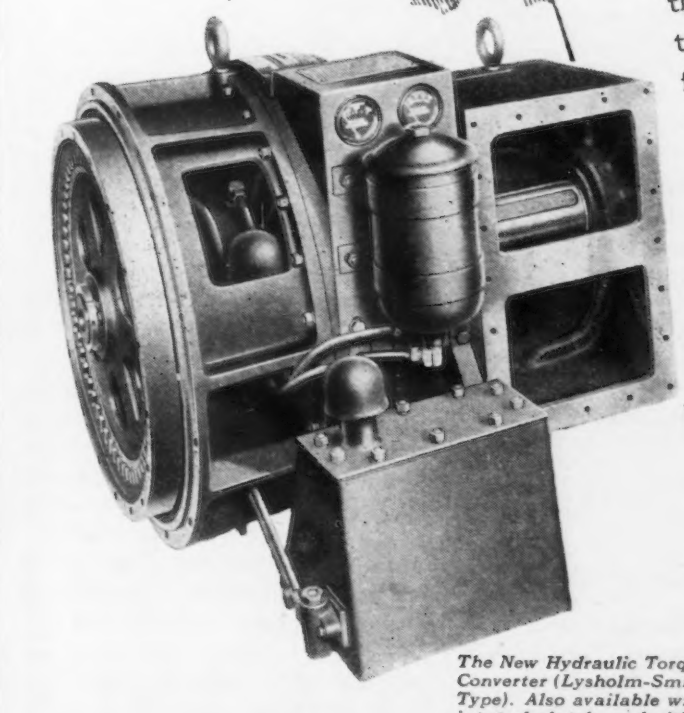
LIFTING WAR CLOUDS WILL REVEAL A NEW TWIN DISC HYDRAULIC TORQUE CONVERTER

As soon as war conditions permit, Twin Disc is ready to produce and deliver a new model Hydraulic Torque Converter, incorporating a series of important improvements. Years of field experience with a limited number of hard-working "pre-war" models, plus the developments coming out of our intensive effort to provide the armed services with ever-better equipment, have brought about changes that will mean added wear-life and fewer service interruptions.

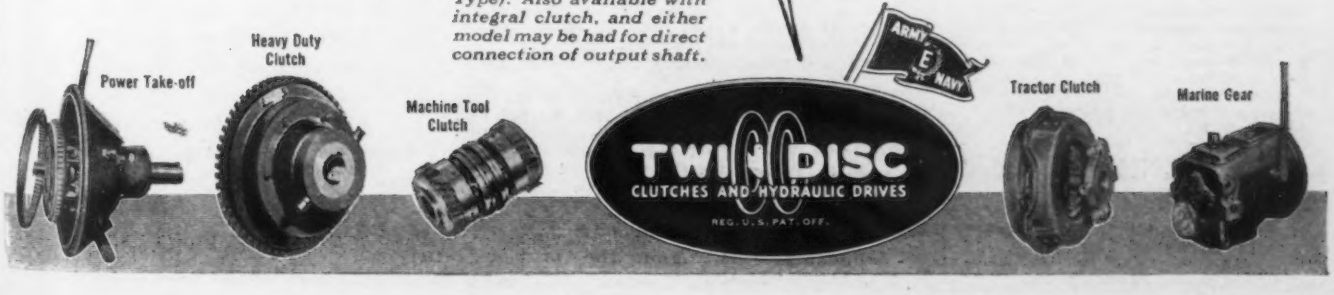
An entirely new sealing arrangement is employed. These new seals have been proved by thousands of hours of service under the most trying conditions. Bearings have been isolated from the fluid and are independently lubricated. A positive-action external pump now supplies the basic pressure within the housing.

Space does not permit full details here.

We'll be glad to send you a copy of Bulletin No. 135, which tells all about the new models. Even though you cannot now get immediate delivery, you will want the facts on which to base your own post-war planning. Send for Bulletin No. 135 today. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



The New Hydraulic Torque Converter (Lysholm-Smith Type). Also available with integral clutch, and either model may be had for direct connection of output shaft.



celerating, and every preparation continues to be made for increasing repair, supply and reinforcement activities for major Pacific engagements.

ALTHOUGH the new P-61 night fighter has been in production by Northrup Aircraft Co. at Hawthorne for three or four months, and although the planes have been steadily flying over southern California in trial runs, official mention only occurred last week after an Army-Navy show in the Coliseum. They call the ship a Black Widow and it is of divided tail construction like the Lockheed P-38. It is said to have a fairly long range and great speed and flying characteristics. It is powered with two Pratt & Whitney motors and heavily armored and armed.

LEADING suggestion, amounting to considerable pressure has been advanced to secure the appointment of one far Western man on the Industry Advisory Committee on Steel to the WPB at Washington. Because of the rapid industrial development of the far Western area and the location here of major additions to steel producing facilities, it is held in the far West that one member of a 15 man advisory committee should come from the Pacific slope and represent the growing interests of this region. It is understood that the Kaiser management has been especially in sympathy with this recommendation, although others in the trade on the West Coast suggest that Mr. Kaiser and his organization are well and ably represented in high councils at Washington and have secured uncanny results and seemingly universally sympathetic consideration of requests and suggestions.

The one millionth steel cartridge case made by the Norris Stamping & Mfg. Co. of Los Angeles was recently personally presented by Lt. Gen. William P. Knudsen on behalf of the United States Army to President K. T. Norris, one of the most brilliant and rapidly moving stars in the heavens of Army Ordnance. On his last previous visit, Gen. Knudsen had presented the one millionth brass cartridge case as a lasting souvenir to the Norris organization. A fourth star has been added to the company's Army-Navy "E" flag, the first won by any firm in the entire West.

o o o

Republic Starts Two New Electrolytic Plate Lines

Niles, Ohio

• • • **The nation's** tin plate capacity was increased by approximately 3,600,000 base boxes per year when Republic Steel Corp. formally opened its new electrolytic lines here Jan. 15. The placing of these two lines in operation not only marks the inception of two of the largest capacity lines in the industry but also nearly the last included within the tin plate expansion program. While termed an expansion program it should be noted that the building of electrolytic lines has not been so important from the standpoint of adding capacity as the potential tin saving involved in their operation. These two new lines alone are expected to save approximately 1500 tons of tin compared with the same capacity in hot dipped plate. A large assembly of Congressmen, Army and state officials as well as industry figures toured the new installation.

P. S. Killian Named Purchasing Agent of Bethlehem Steel Co.

• • • **Paul S. Killian,** senior assistant purchasing agent of the Bethlehem Steel Co. since 1941, has been elected purchasing agent, it was announced by Charles R. Holton, vice president in charge of the company's purchasing.

Mr. Killian joined Bethlehem Steel Co. on May 21, 1917, when he started working in the purchasing department at Bethlehem, Pa., as a stenographer. After working in various capacities in that department he was advanced to a division head in 1923. On Jan. 1, 1934, he was made assistant to the purchasing agent; on Jan. 1, 1936, he was named an assistant purchasing agent, and on Jan. 1, 1941, he was appointed senior assistant purchasing agent.

Tower Sets Post-War Steel Production At 70 Million Tons

Cleveland

• • • **Before** the annual convention of the Institute of Scrap Iron and Steel, at Cleveland, on Jan. 12, Walter S. Tower, president of the American Iron and Steel Institute made several observations on the future production rate of steel in the United States. Annual capacity for production of steel ingots is now pressing 95 million net tons, a figure that will be exceeded if and when the entire government-sponsored expansion program is finished. After the close of the war, an estimated 10 per cent of this capacity will be discarded because it is old and inefficient. Therefore, steel ingot capacity will be close to 90 million tons.

Mr. Tower stated that some semi-official calculations figure that demand will be as high as 120 million ingot tons or about 85 million tons in terms of finished steel in the early years of return to peace. On this basis he states that neither the scrap nor the ore would be available to support such a demand for any length of time.

While peace time demand for ingots has never reached 65 million tons or 45 million tons of rolled products, Mr. Tower appraises post-war needs to be between 45 and 50 million tons of finished products or 67 to 70 million tons of ingots per year. This would be satisfactory if costs were reasonably related to market prices, but this is problematical. It is obvious now, said Mr. Tower that there must be closer scrutiny of costs.

. . . Cited for Awards . . .

• • • **The following** companies have been awarded the Army-Navy E award for excellence in war production:

Anchor Duck Mills, Rome, Ga.
Arrowhead Rubber Co., Vernon, Cal.
L. F. Grammes & Sons, Inc., Allentown, Pa.
Hanlon-Waters, Inc., Tulsa, Okla.
Heyden Chemical Corp., Cherokee Ordnance Works, Danville, Pa.
Hercules Powder Co., Brunswick Plant, Brunswick, Ga.
Kermath Mfg. Co., Detroit.
McCabe Powers Auto Body Co., St. Louis.
J. T. McDonald Logging Co., Sutter Creek, Cal.
Adolf Meller Co., Providence.
Mixing Equipment Co., Inc., Rochester, N. Y.
Northwestern Corp., Morris, Ill.
Raybestor Manhattan, Inc., United States Asbestos Division, Manheim, Pa.
Shell Chemical Co., Dominguez Alcohol Plant, Wilmington, Cal.
Shell Union Oil Corp., Shell Chemical Division, Martinez Alcohol Plant, Martinez, Cal.
Square D Company, Kolesman Instrument Division, Jewel Bearing Plant, Suffern, N. Y.
R. D. Suman & Co., Inc., Richmond, Ind.
United Metal Box Co., Inc., Brooklyn.
Willard Storage Battery Co., Cleveland Plant, Cleveland.
Winter Brothers Stamping Co., Detroit.
Winton Lumber Co., Martell Mill, Martell, Cal.
Youngstown Sheet & Tube Co., Chicago District Works, East Chicago, Ind.
H. M. Harper Co., Chicago (third award).
Charles H. Besly & Co., Chicago.

Maritime M

Homestead Valve Mfg Co., Inc., Coraopolis, Pa. (gold star).

TITUSVILLE

FORGINGS
SHAFTING
CRANKSHAFTS

Typical Struthers Wells Forged Marine Propeller Shafts

2000 Ton Hydraulic Forging Press

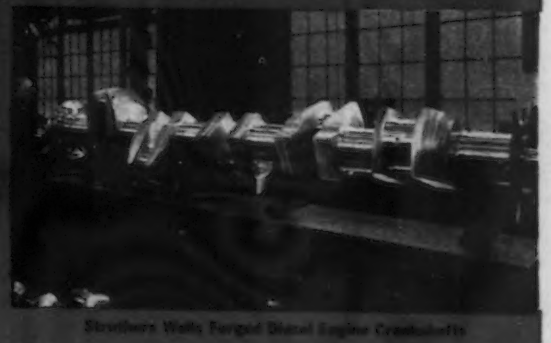
TITUSVILLE a name to remember now, and for your postwar planning. Out of our experience in serving America and her Allies since the opening of World War II — incredible advances in speed, precision, and economy of manufacturing have been made. These, plus our 50 years' training in forging and welding practice, assure the quality, operating characteristics and uniformity you must have in your postwar products.

Modern facilities include a complete forge plant with forge presses up to 2000 tons; two large welding shops with 172 welding machines; complete heat treating facilities; and three large modern machine shops—Producing heavy carbon and alloy steel forgings rough turned or finish machined complete; Line shafts, Propeller shafts, Steel pipe moulds, Straightening and leveling rolls, Finished crankshafts, Pressure vessels, High pressure seamless pipe.

Let TITUSVILLE Forge technicians and craftsmen cooperate with you!

View of section of Struthers Wells, Titusville Forge Division, modern equipped Machine Shop

The Army-Navy "E" Awarded for Outstanding Production Performance.



Struthers Wells Forged Diesel Engine Crankshafts

STRUTHERS WELLS CORPORATION

TITUSVILLE FORGE DIVISION

TITUSVILLE · PENNSYLVANIA

Fatigue Cracks . . . BY A. H. DIX

Nails

• • • We boast at every opportunity that most of the questions addressed to your favorite family journal are answered. But occasionally we strike a deceptively simple one that throws us for a loss. Such a one is, *"When and where were the first machine cut nails made?"*

The encyclopedia isn't much help, nor were the various authorities we consulted. If you have any inside information on this, will you send it along to fatten our batting average?

Nor Balm in Gilead

• • • *Apropos of nothing, we would like to pass along something we read in Cecil Brown's "Suez to Singapore." A British censor refused to O.K. the line, "General Berganzoli took asylum in Bengazi," on the grounds that there is no asylum in Bengazi.*

Stalled Reindeer

We did not receive the Dec. 9th and 16th issues. We do not know whether or not Santa Claus had anything to do with this interruption, but whoever or whatever is the cause somebody evidently knows a good thing when seen.

Will you send them and bill us.

—Edward E. Woelfle,
Woelfle Bros., Ltd., Kitchener, Ont.

St. Nick can take the rap. This year the post office staggered under the heaviest burden of Christmas mail in history, resulting in many delays. Undelivered copies will be replaced without charge.

Hemoglobin Normal

In a recent issue you referred to librarians as being bloodless. We would like to know on what you base such an observation.

We have been called many things but this is the unkindest cut of all. Might we suggest that we are not always as we seem? We are anxious to have this corrected in case the Red Cross should come across your statement.

—Paula M. Strain
Edith A. Hill
Helen L. Hurd

Admittedly, our generality was based on limited evidence, for our contacts with librarians outside of their working hours have been nil, and for all we know, their unfrolicsome air is but a professional mask. We are, therefore, glad to certify that we know of no reason why a librarian should be inferior as a blood donor to say a chanteuse or a riveteuse.

Stoppers

• • • He ran out on the Turkey but the Tanker Sailed! *—Westinghouse.*

Stuffing Gas Back Down the Hole will Toast a Lot of Toes!*—Dresser Industries.*

Eggless Omelet

• • • A Virginian who is competing in the Pabst contest for postwar employment ideas writes:

My plan has been prepared. However, there is need for good sound data and statistics for supporting this plan. Can you supply them?

Which reminds us of the wire a body-building-by-mail institute received from a student, "HAVE COMPLETED COURSE. PLEASE SEND MUSCLE."

Memory-Clingers

Speaking of names, there is the Syracusan who is on the advisory board of the Committee for Constitutional Government—Cloud Wampler.

—Larry

Then there's Rockaway, New Jersey's chief of police, Dewey Pott.

Fable

A Kaiser shipyard worker who was much impressed with the fabulous doings of his boss was showing his Eastern brother through the yard. Kaiser was such a great man, he said, that all he had to do was to sit at a great desk and push a button for whatever he wanted done.

Pointing to a partially completed ship he said it would be launched before dark. The brother looked doubtful.

Ten minutes later an eclipse darkened the sky and gave the impression of evening. The brother said, "Look! It is dark and the ship is not finished." The shipyard worker said, "Don't worry. He'll do something about it."

Hardly were the words out of his mouth when the eclipse ended. "By God," the brother said, awestricken, "he found the right button."

—Mac

Stop Order on L.C. "K"

• • • Our knuckles were cracked recently for writing Magnaflux with a small "m." In acknowledging the crack we remarked that the same thing happened whenever we lower-cased Monel, Bakelite, or any other trade name, for the capital is warning that the name is private property.

C. H. (Eastman Kodak) Steele took exception to insistence on that capital. "Why worry," he said, "whether a trade name is generic or specific?" But now he takes it all back:

I now discover what everyone else in the Company seems to know, that our Legal and Advertising people raise Merry Hell every time they find Kodak spelled with a small initial letter or used generically. The old slogan, "It it isn't an Eastman, it isn't a Kodak," still means precisely what it says, and woe betide transgressors.

A correcting note in "Fatigue Cracks" might let me get my very red face part way out of the dog house.

—C. H. Steele,
Eastman Kodak Co., Rochester, N. Y.

P.S. If "Merry Hell" is a bit on the strong side for the other seventeen readers, tone it down.

All eighteen readers are hardy souls and can take "Merry Hell" unwatered. "Merry Hell" is what the Eastman people better start raising with Funk & Wagnalls, for our edition of the desk standard dictionary not only spells Kodak with a small "k," but has as the chief definition, *"To take an instantaneous picture of,"* which gives the impression that you can kodak with a Graflex, a Minicam, or even a Brownie.

Casualty

Your item on cable-ese reminds me to remind you that the cable companies have ruined the art by their recent notice that any word not in the dictionary shall be charged for at the rate of five letters equal one word.

This takes the fun out of things like "smorning" (this morning), "Clevelandwards" (to Cleveland), "Sevenish" (about seven). And your list of "uns" should have included the useful "unknow," as in "unknow story."

Cleaned up for publication in your family journal, there is the famous message a disgruntled foreign correspondent sent to his chief, "Lakewards injump."

—Deac

Puzzles

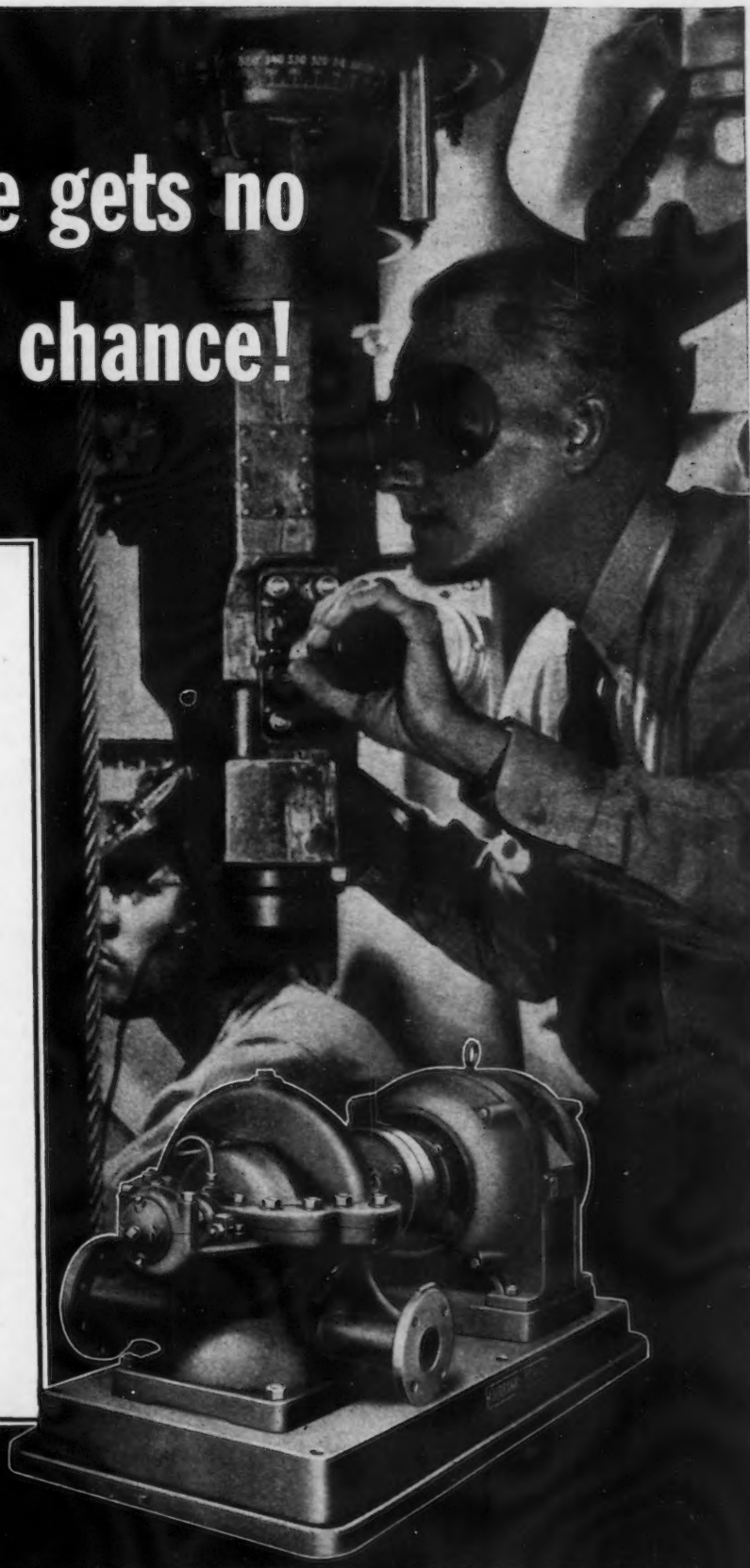
Last week's problem comes out this way: 354 from 486 leaves 132.

In his excellent series on tubes and tube making (issues of Dec. 16, 23 and 30) Dr. B. P. Planner explains that the Pilger (German for "pilgrim") process, in which the tube is carried forward and backward, gets its name from the Jumping Procession of Echtermach (Luxemburg) whose ritual required the atoning pilgrims to take three steps forward and two steps backward.

Which reminds us of this one—to be done in your head within 15 seconds:

A frog in a 21-ft. well climbs 3 ft. each day and slips back 2 ft. each night. In how many days will it be out of the well?

...and failure gets no second chance!



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MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Pumps

Dear Editor:

SMOOTH TALKER

Sir:

A gentleman who gave the name of B. E. Plumner recently called to renew our subscription for THE IRON AGE. He said he represented the Consolidated Trade Journals of Chicago, Kansas City, Atlanta and New Orleans.

He is in his middle thirties, reddish blonde, sharp features, rather prominent nose, about 5 ft. 8 in., 160 lb. He was a smooth talker. We gave him a check for $6 made out to THE IRON AGE.

C. W. ROTHE
Fi-Ro Machine & Welding Works,
203 N. Pearl Street,
Natchez, Miss.

● We have no representative in Mississippi. Consolidated Trade Journals is unknown to us, and is not listed in the Chicago telephone directory. Our subscription rate is $8 a year. Inasmuch as the check was made out to The Iron Age the loss will be sustained by whoever cashed it without proper endorsement.—Ed.

TOOL DISPLAY BOARD

Sir:

Your Oct. 14, 1943, issue illustrates on page 73 a tool display board which Westinghouse places near tool cribs and cutter grinders, to show the proper point angles for drilling various metals and non-metals.

Is it possible to get a more legible copy? We would like to set up similar displays in some of the Yard's shops.

BEN REZNEK,
Associate Metallurgist
Norfolk Navy Yard,
Portsmouth, Va.

● A copy of the captions used on the board, specifying the proper point angles for drilling various materials, has been mailed to you.—Ed.

PASSIVATION

Sir:

What can your technical staff tell us about "passivation" (we believe that to be the word) of stainless steel? The process, as we understand it, is a dipping of the finished stainless steel product in a solution of nitric acid. The purpose, as understood, is to clean the bright surface of dirt, and especially from particles of steel resulting from grinding, or burring of stampings.

G. H. PARKER
R. I. Warp Stop Equipment Co.,
248 Pine Street,
Pawtucket, R. I.

● Passivation is accomplished by immersing the material in 10-20 per cent solution nitric acid at 140 deg F. for about 20 min. or in a 40-50 per cent solution at room temperature for one hour. The latter procedure is better as no heating or exhaust hoods are needed. Earthenware crocks may be used to hold the acid and the material can be handled with wooden trays.—Ed.

PROJECTION WELDING

Sir:

Is it possible to convert projection welders originally made for steel to the welding of aluminum?

SHEET METAL FABRICATOR
Ohio

● Projection welding of aluminum has been done to a very limited extent. If the object is merely to make good commercial welds, projection welders for steel can be converted to aluminum rather easily, but owing to the fact that aluminum welding demands a much higher amperage the capacity of the machine in gage size of aluminum will be considerably less than in the case of steel. For aluminum spot welding data, see "Recommended Practices for Spot Welding of Aluminum Alloys," issued by the American Welding Society, 33 W. 39th St., New York, price $1.—Ed.

DROSS REMOVAL

Sir:

Can you refer us to any one who can acquaint us with any improved method of taking the dross out of a galvanizing kettle, different from the process of using a deep dipper or shovel made up of bars with spaces between them to allow the good metal to filter through?

W. H. ROSS
Fittings Limited,
Oshawa, Canada

● Get in touch with Wallace G. Imhoff, Vineland, N. J., galvanizing consultant.—Ed.

THREAD GAGES

Sir:

We are interested in obtaining more detailed information on the special internal thread gages, illustrated on page 72 of the Dec. 9 issue.

E. M. CONNERS
Fisher Body Detroit Division,
General Motors Corporation,
Central Development and
Experimental Unit,
6051 Hastings Street,
Detroit 11

● Write to C. H. Borneman, Supervisor, Tool & Gage Service, General Electric Co., Schenectady, N. Y.—Ed.

SEIZED PATENTS

Sir:

I have read Reader Tolley's letter about seized patents, Jan. 6 issue. My experience, so far, has been similar.

Is he correct in assuming that exclusive license is given by APC? Cannot others obtain license to patents that have already been licensed?

E. W. EKSTRAND,
President
Ekstrand Machines, Inc.,
65 Springdale Avenue,
Newark 7, N. J.

● Licenses to manufacture under seized patents are not exclusive. Any number of firms may be granted manufacturing licenses under the same patent. What Reader Tolley refers to is the fact that lists of seized patents include those for which exclusive manufacturing rights were obtained before the war began. These prewar arrangements continue in force.—Ed.

INFRA-RED RAYS

Sir:

Your Dec. 9 issue describes the drying of impregnated castings with infra-red rays.

It has occurred to me that this source of heat could be employed for drying molds in a steel foundry.

P. CHAPMAN,
Metallurgist
Canadian Car & Foundry Co., Ltd.,
621 West Craig Street,
Montreal, Que., Canada

● This is already being done. See July 15, 1943 issue, page 61. For additional information write to Infra-Red Engineers, Inc., 812 Huron Rd., Cleveland.—Ed.

COPPER-CLAD BOTTOMS

Sir:

We have been told that an article was published some time ago describing the process used in manufacturing stainless steel utensils with a copper-clad bottom.

Did this article appear in IRON AGE?

KITCHEN UTENSIL MANUFACTURER

● Not in Iron Age, nor, so far as we know, in any other publication. The process is not especially difficult. Standard copper-plating solutions are used and the utensils are immersed part way or stopped off in any one of several accepted ways. The only thing out of the ordinary is that the utensils are rotated constantly during the plating operation.—Ed.

MODERN KITCHENS

Sir:

There is a growing consciousness of the inadequacy of the kitchen layout and fittings in the average British home and I feel there is bound to be a considerable demand for these things after our two countries have together settled their accounts with the enemies of freedom and progress, and we can once again turn our attention to the homes we both value so highly.

May I therefore request that you obtain for me one or two pamphlets giving information on these?

WILLIAM HOPE
42 Ullswater Road,
Flixton, Manchester,
England

● Your inquiry is being turned over to the Modern Kitchen Bureau, Division of Edison Electric Institute, 420 Lexington Ave., New York.—Ed.

X-RAY COUNTING TUBES

Sir:

In your June 10, 1943 issue you presented an article entitled, "Testing With X-Ray Counting Tubes." The idea was that steel cylinders and tanks could be tested for flaws and irregularities through the use of an X-Ray element and a Geiger counter-system.

Is such apparatus being manufactured in the United States?

L. P. WENZELL,
Technical Assistant
Monsanto Chemical Co.,
Monsanto, Ill.

● So far as we know no complete set-ups of this type are available as yet, but individual pieces of equipment could be assembled from established sources as for instance, Fisher Scientific Co., Pittsburgh.—Ed.

THE Next JOB

WHEN the last gun has fired, the conversion from war work to peace-time stampings will be simple at Transue—change dies and obtain the right steel sheets. Production and engineering experience gained these last few years will be valuable in planning and making deep drawn steel stampings for much-needed civilian products.

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This Industrial Week . . .

- **Order M-126 Stays on; Use of Excess Steel Spurred**
- **Union Demands Before WLB Soon; Steel Firms Compile Cost Data**
- **Competition for Alloy Steel Orders Becomes More Intense**
- **National Steel Ingot Output Rises Slightly to 98.5 Per Cent**

MIXED trends which have perplexed many an industrialist during recent months are more apparent than ever. Headlines which on Jan. 7 proclaimed probable widespread relaxation of metal goods manufacture through the easing of order M-126 were disproved Jan. 13 when the Army, Navy and WPB decided not to revoke the order. On the other hand, at a meeting with industrialists Monday, Donald M. Nelson of WPB indicated that limited civilian output is being started in certain areas to use excess and idle stocks of available metals, although no general resumption of civilian output can be allowed at this time when new allied war action is imminent.

Excess steel stocks are estimated to be about 3,500,000 to 4,000,000 tons now and can be expected to increase, particularly after the invasion is successful. Surplus steel from Canada also is being sold in this country, without rigid restriction.

Meanwhile, as the time for the widely-heralded invasion approaches, equipment is being rushed to completion with production schedules telescoped and additional workers assigned to the manufacturing tasks. National steel ingot production increased slightly this week to 98.5 per cent of capacity from last week's rate of 98 per cent.

THE Presidential demand for a National Service Act has aroused consternation and indignation among labor unionists and the steel union's demands for higher wages are expected soon to be placed before the War Labor Board. At the same time, steel companies, large and small, are filling out complicated cost sheet forms on specific carbon steel products for the OPA which is studying the need for a price increase. It is expected that OPA will process one product at a time and render decisions product by product. If price adjustments come quickly enough, smaller marginal companies may be greatly assisted.

Much of the current news has centered around the machine tool industry. The need for orderly distribution of the estimated $2,500,000,000 worth of surplus machine tools in the postwar world has stressed before the House Small Business Committee last week by leaders of the industry, who advocated keeping the best machines in this country. Changes in the Lend-Lease setup as it affects machine tool shipments to Britain are reported being talked over in Washington. The industry vigorously is opposing section 801 of the proposed new tax bill which it is asserted would allow Government procurement officers to set arbitrary prices on machinery purchased by the Government or by any contractor or subcontractor, without consideration of existing prices or manufacturing costs.

OTHER highlights of the news include the placing before the Senate of a proposal that corporations be permitted to set aside as reserves up to 20 per cent of the normal net income tax; a WPB plan to lay before auto makers a suggestion that controls be maintained for three years after the end of the European war; the tapering of operations by a number of aircraft, shipbuilding and ordnance plants; the loss of 13,000 tons ship late in a strike at the Irvin Works of Carnegie-Illinois Steel Corp.

Competition for alloy steel orders is more intense due to the smaller volume of business available. Allotments for first quarter were below total alloy steel production capacity. Output of electric furnaces at 4,621,462 tons in 1943 represented an increase of over 300

Chicago Electric Furnaces May Close

Washington

• • • Indicative of the reduced demand for electric furnace alloy steel capacity, the government may announce soon that the Republic Steel Corp.'s nine 70-ton electric furnaces at Chicago will be closed for the duration.

The newly-built furnaces are nearly complete and six of them can now be operated. Three of them have been used and there are three which are complete except for cable installations. A 36-in. bar mill and three new open hearths, together with cooling and other equipment, may receive the same treatment at the hands of the government.

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per cent above 1929 production. The new mark is expected to remain an all-time high for many years.

ALTHOUGH restrictions have been lifted from dealer purchases of idle and excess steel, enabling warehouses to buy the material more freely and permitting new dealers to handle such stocks, the action is not as beneficial to steel users as last week's announcements indicated. When the steel enters a warehouse it loses its identity as excess material and hence becomes more difficult to dispose of. The new dealers with lower overhead may be able to undersell regular jobbers.

The continuation of restrictions on construction is a blow to many producers and sellers of construction steel, whose production facilities are in low gear. Mills are idling on the west coast and concrete bar makers over the nation are averaging no more than 25,000 tons a month in orders against a normal 75,000 to 100,000 tons per month. Instances of price cutting have been reported in the concrete bar market. The 15,000 tons of concrete bars required at Savannah, Ga., and the 10,000 tons at Houston, Texas, which were supposed to have been used for concrete barges and for which the Maritime Commission took bids Jan. 5, will be up for new bids Jan. 23. All of the first bids were rejected because of low prices.

THE fall in demand for beehive furnace coke, the long distance between coke ovens and coal supplies, the high cost of operations at many plants despite OPA relief, and the increase in by-product coke supplies, are expected to drastically reduce the number of beehive coke ovens in blast this year. Some observers at Connellsville, Pa., believe that 1944 may see the practical extinction of that part of the beehive coke industry built up by the war with the exception of those plants which are maintained by steel companies or are leased by steel companies. Plants which still have coal available nearby, and which produce high grade foundry coke, will maintain output.

Pittsburgh district steel ingot operations have gained half a point to 98 per cent and in Chicago output was up one point to 103 per cent. The Cleveland operating rate gained three and a half points to 96.5 per cent and Buffalo has snapped back to 104.5 per cent for the first time since the week of Nov. 11. Eastern district operations increased 18 points to 103 per cent. Declines in operations occurred in Youngstown, down half a point to 97 per cent; Detroit, down four and a half points to 99 per cent; and St. Louis, down two and a half to 101.5. Unchanged from last week's operating rate are Wheeling at 95 and Birmingham at 99. At least 5 million tons of steel ingot capacity will be eliminated when the steel industry emerges from the war, according to Walter S. Tower, president, American Iron and Steel Institute, who addressed the Institute of Scrap Iron and Steel at Cleveland this past week.

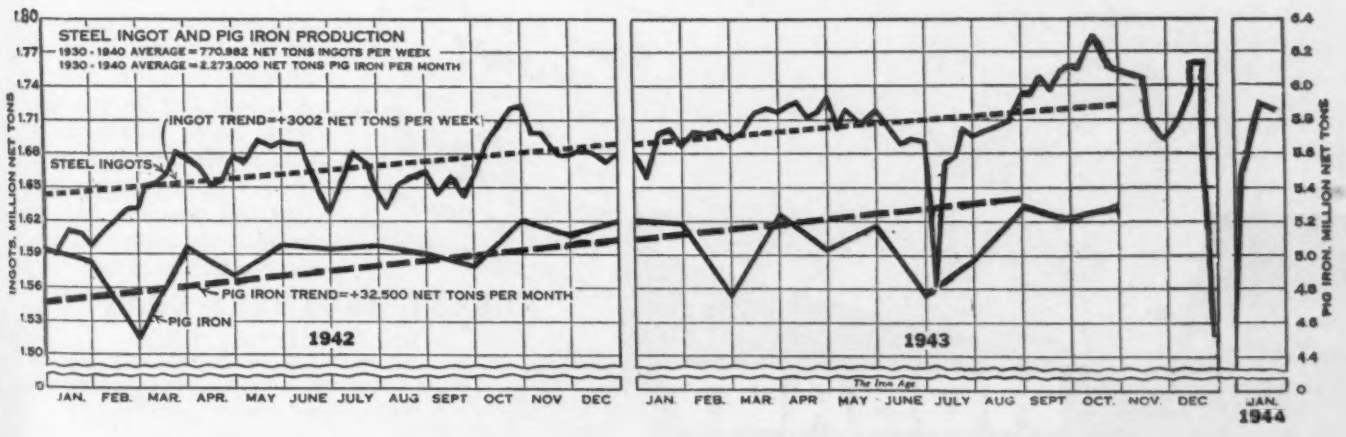
Steel Wage Issue to WLB Soon

Pittsburgh

• • • A War Labor Board panel is expected to take over the steel wage demands in the steel industry soon, following a request made early this week by U. S. Steel Corp. steel producing subsidiaries to the Secretary of Labor, to certify to the WLB steel union wage issues.

John A. Stevens of U. S. Steel Corp. of Delaware, said: "Proposals now being referred to the board are of such a nature as not to permit solution in collective bargaining, since they either involve departure from a National Economic Stabilization Program or concern fundamental matters of principle on which the respective viewpoints cannot be reconciled." He stated that most of the proposals would involve increases in cost which the subsidiary companies are financially unable to absorb.

Other proposals of the USWA, not involving wage increases, will continue to be the subject of collective bargaining, according to Stevens. It is understood that a WLB panel, to hear the steel wage case, is now in the process of being formed. It is expected to hear all steel companies.

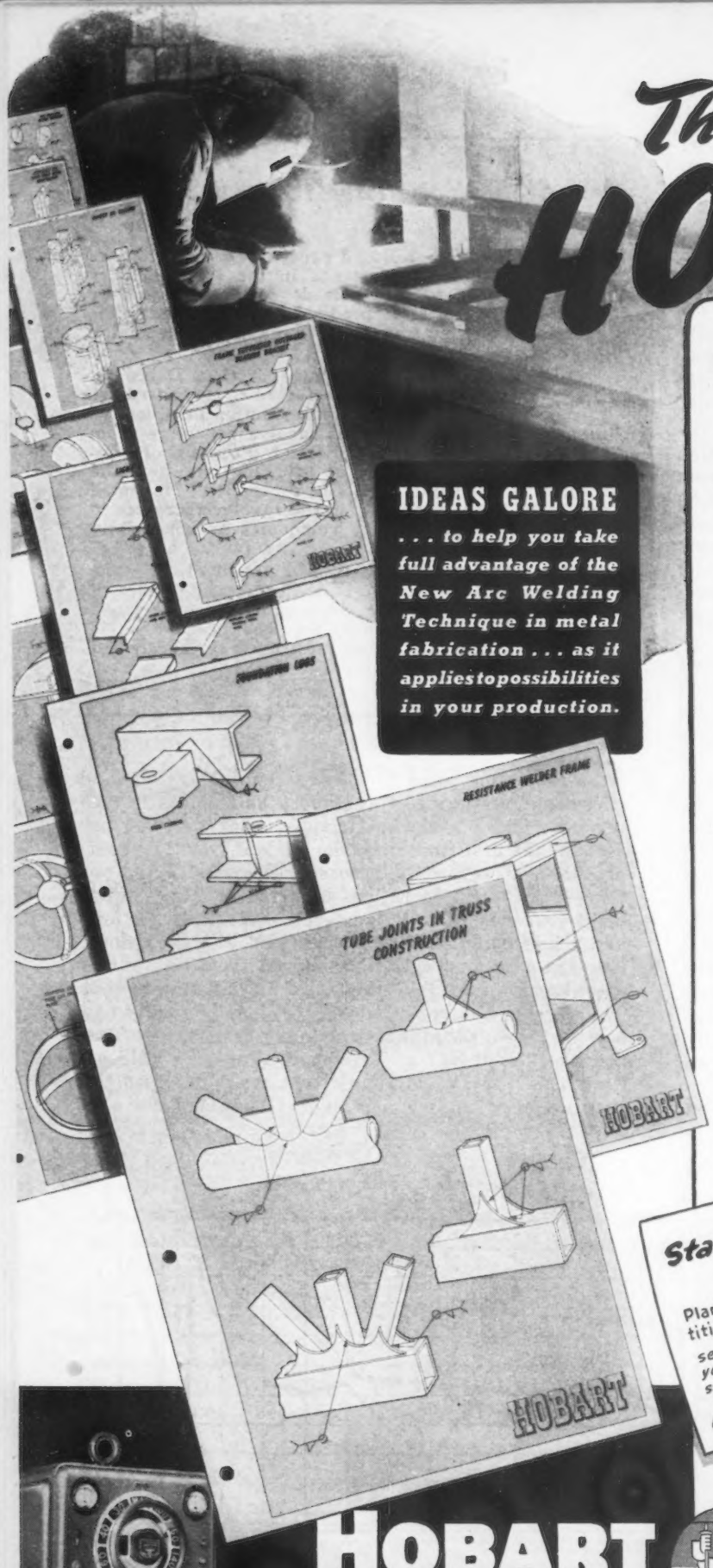


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 13	97.5	102.0	97.5	91.0	93.0	102.0*	95.0	99.0	103.5	95.0	95.0	104.0	86.0	98.0
January 20	98.0	103.0	97.0	90.5	96.5	104.5	95.0	99.0	99.0	95.0	97.0	101.5	103.0	98.5

* Revised

The New HOBART



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News OF Industry

Civilian Output Approved on Regional Basis

HEAVY GOING: *Down at the stern as she pitches in a heavy sea this escort carrier plows through the Atlantic, shepherding a convoy to an allied port. Planes are lashed to the flight deck, with their wings folded back.*

Washington

• • • **WPB Chairman** Donald M. Nelson on Monday told leading industrialists that limited civilian production will be started in three or four WPB regions to use excess and idle stocks of available metals. An order to this effect is being circulated in WPB.

The WMC designation of regions according to the freeness of labor supply will govern. Manufacturers in cities in the regions selected designated as group 3 and group 4 labor areas and who employ 50 or fewer employees will be permitted to resume civilian production. Smaller manufacturers in tighter labor areas also will be permitted to get into civilian production. If the plan proves successful it will be extended on a nationwide basis.

In a statement to the press, however, WPB said that Mr. Nelson and the 14 top-flight executives agreed that with America's major offensives still to come there can be no general resumption of civilian production at the present. July 1 is the accepted date for fairly large-scale reconversion involving large industries, such as the automobile, railroad and petroleum industries, which have first priority.

Business men who attended the first of a series of meetings with WPB on reconversion were: J. L. McCaffrey, International Harvester Co.; Eugene G. Grace, president, Bethlehem Steel Co.; Alvan Macauley, president, Packard Motor Co.; James H. Marks, vice-president, Packard; Henry M. Reed, president, American Radiator & Standard Sanitary Corp.; Henry J. Kaiser, president, The Kaiser Co., Inc.; A. W. Robertson, chairman, Westinghouse Electric & Mfg. Co.; E. Tappan Stannard, president, Kennecott Copper Co.; Fred Lazarus, F. & R. Lazarus Co.; Otto A. Seyferth, United States Chamber of Commerce, president, Muskegon Foundry Co.; A. H. Nicoll, Graybar Electric Co.; Henning W. Prentis, president, Armstrong Cork Co.; Fred W. Nichol, vice-president, International Business Machines Co.; Robert Gaylord, president, National Association of Manufacturers.

AFL president William Green and CIO president Philip Murray will meet with Mr. Nelson some time in the near future, a WPB spokesman said.

Small manufacturing concerns, those with less than 50 employees, in the regions indicated, will ask WPB for permission to begin production. The company must show that it has little or no war work, that the civilian product it wishes to make is of relatively high essentiality, and that the metals it needs in the forms required are held as idle or excess by the Redistribution Division.

Lists of excess materials are available in WPB regional offices and also in the WPB metals divisions.

The size of the new program can best be seen by the fact that there are more than 3,500,000 tons of idle and excess steel stocks available. Considerable amounts of aluminum and adequate supplies of idle and excess copper are said to be available.

o o o

WPB Plans 3 Year Auto Control

Washington

• • • **At a future** meeting with automobile manufacturers, WPB expects to propose that wartime controls be maintained for three years after the end of the European war to insure every producer equal competitive start in production.

Arthur D. Whiteside of WPB says that under the plan each auto company would be allowed to make as many cars in the three-year period as the company made in 1941. The full quota could be made at any time in the three-year period.

At least one spokesman for the auto industry said that in his opinion the Whiteside plan would be generally opposed by the industry. When the war ends the industry should be allowed to determine its own pattern through competition, he said.

Mr. Whiteside said, "General Motors is making engines and cannot get out of war production immediately. The company would prefer to make one-third of its 1941 production for three years than to make the bulk of its pre-war output the first year the war ends."

When asked whether the automobile industry would "go for the idea," Mr. Whiteside said that in his opinion the industry would and that passenger car manufacture must start as soon as manpower, materials and capacity are available—very likely as soon as the war in Europe is over. But, Mr. Whiteside said, automobile dealers may find it "hard going" during the three years.

"Besides," he declared, "WPB's legislation runs out in December this year. Any new legislation will provide for the agency's continuance at least a year to a year and a half into the post-war period."

WPB Orders Relaxation Examined To Prevent "War Is Over" Attitude

Washington

• • • **Although WPB will** take firm steps toward planning reconversions, it has refused to revoke Order M-126 which forbids the use of iron and steel in the manufacture of about 400 classifications of so-called "non-essential" goods. In an all-day session last Thursday, WPB and the Army and Navy representatives met to decide whether this order should be revoked or relaxed.

The decision not to do anything "at present" represents, observers believe, a determination on the part of the services to do nothing that would make it appear that the home front has decided the war is over. Consequently, no substantial production for civilian use will be permitted before the European invasion is successful, although M-126 does not represent a substantial beginning.

WPB did take an important preparatory step toward the reconversion date by permitting warehouses and dealers to buy idle and excess steel stocks without restriction. The action was taken in an amendment to Order M-21-b-1 (see page 106).

Other moves affecting reconversion prospects pertained to resumption of construction, relaxation of orders governing hard-facing materials, and alloy scrap.

The stocks, which will be subject to all WPB restrictions on the use of steel except in WMC groups 3 and 4 labor areas, are estimated to be about 3,500,000 to 4,000,000 tons now. These supplies are expected to grow possibly as large as 10,000,000 to 15,000,000 tons.

WPB released the restrictions on warehouse purchases so that when other limitations are lifted, such as permission granted to use idle and excess stocks without reference to any other WPB order (THE IRON AGE, Jan. 6, page 144), civilian type steel stocks will be available against this day.

Steel Division officials say that cold finished strip is rather plentiful in all sizes and gages, as are small alloy billets and rounds from idle stocks. Off dimension bars and rounds also can be bought.

Structurals, bars, channels and angles can be bought, but bar shapes and angles, which include small size angles and T's, are scarce.

Because Canada has discontinued ship construction and production exceeds consumption, surplus Canadian steel is being sold in this country practically without restriction. While only in limited quantities, these uncontrolled steel purchases form sort of a welcome "gray" market.

Significantly, the biggest movement in the American civilian type excess steels is to the starved export markets, mostly cold finished steel and hot rolled strip, that up to now United States warehouses have rejected. Alloy bars and billets are slow-moving.

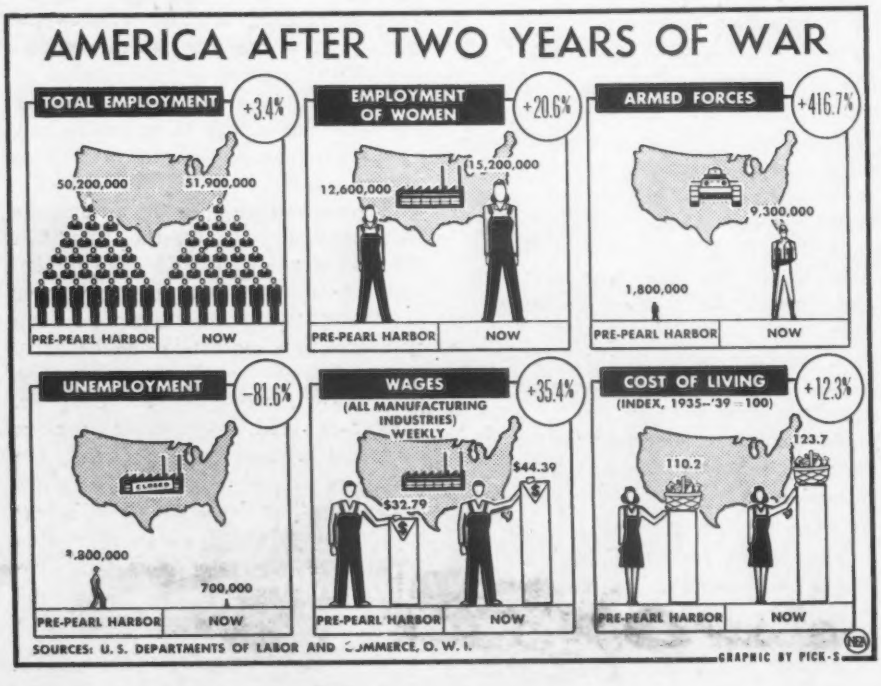
An announcement, made on Wednesday of last week by WPB, that restrictions would continue on construction and facilities without modification until the future course of the war becomes clearer.

WPB has predicted that the value of all construction both Governmental and private will be only $3,900,000,000 in 1944, about half the value of all construction in 1940 and 1943 when construction amounted to $6,830,000,000 and $7,595,000,000 respectively.

It is probable that construction will not for a long time reach the highs of 1941 and 1942 with the all-time highs of $11,129,000,000 and $13,389,000,000. But peacetime construction particularly private housing is expected to boom as soon as bans are lifted.

At the same time because of the current satisfactory supply-demand of the alloying materials involved, WPB has revoked Order L-223 restricting the use of ferroalloys in coating base metals by fusion welding of alloying metals. Quantities used for hard-facing are low.

WPB said last Thursday that restrictions on the use of low alloy steel scrap had been removed and that mills can use certain low alloy steel scrap in carbon steel at their discretion because of the plentiful supply of alloy scrap. (See scrap market, page 158.) This change was effected by amendment to Supplementary Order M-24-c.



Canada Eases Use Limits On Steel and Light Metals

Ottawa

• • • **While certain** material shortages still exist, Canadian construction control has also been eased to permit dwelling construction. The release of metals will not result in any perceptible increase in consumer goods because most of these still require scarce items and because their manufacture would not have any labor priority.

Eased restrictions on steel pipe, cast iron pipe, wire and wire rods will permit the production of more water pipe, drainage pipe, bailing wire, box strapping, and other such items. Lifting of these restrictions followed the removal of restrictions on the sale and use of aluminum scrap and secondary aluminum ingots derived from scrap. A new order cancels aluminum restrictions on the sale and use of rivets, cast welding rod, welding wire, metallizing wire, wire for anodizing, and tie wire for electrical conductors.

o o o

Seeking safety from the fierce drive of the Japs, the Hung Sung Engineering Corp. succeeded in hauling a few machines into a cave at Chungking. Conveniences are few, but the enthusiasm of the workers is reported high.

o o o

China Fights: Shoulders Are Hoists in Crude Shops in Caves

• • • Valiant Nation, Undaunted by Pitiful Lack of Equipment, Makes Tools of War in Small Caverns to Oppose Highly Mechanized Japs

Straining their backs, workmen move a large piece of machinery into place in the Chungking cave. As in most of the plants in Free China, there are no overhead hoists.

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RIGHT

A corner of the machine shop at the Ming Sung shipyards in Chungking is shown at right. All workers are filing, evidence of the amount of hand labor which china must do.

At the Ming Sung shipyards in Chungking, workers haul a small ship up the ways by physical strength. Hand winches are shown at lower left and right. The yard is a far cry from the modern layouts at mighty shipbuilding plants in the U. S.

U.S. Should Retain the Best of Its Machine Tools, House Group Told

Washington

• • • **Views expressed** on Capitol Hill last week indicated that an estimated $2,500,000,000 worth of surplus machine tools would be distributed in an orderly manner in the postwar world, rather than to be dumped on the market haphazardly. It was also evident that the newest tools and those most suitable for maintaing high-level production in a peacetime economy would remain in the United States. This is significant in view of whispered plans, in high Government circles, for exporting untold numbers of machine tools to Europe, particularly Russia, to aid in rehabilitation work.

These facts were brought out in testimony given to the House Small Business Committee by representatives of the machine tool industry in the first open hearing on the Committee's bill, HR 3873, which sets up a system for distribution of Government surpluses.

The bill would amend the RFC act so as to include a surplus property section and would establish a Surplus Property Board. The chairman of the board would be the chairman of the board of directors of the Defense Supplies Corp. and its membership would include the Secretaries of War, Navy and Treasury, as well as three individuals to be appointed by the President, with the consent of the Senate. The three individuals so appointed shall be businessmen who have had at least five years' experience in the business of the retail sale and distribution of merchandise.

This board would be charged with determining and prescribing the methods to be used by the various government agencies in making and maintaining inventories of property and shall determine what property held by these agencies should be sold or leased and shall advise RFC of all such determinations.

Under the section headed "Duties of Governmental Agencies" the bill provides for the maintenance of uniform and accurate inventories of property by the agencies and requests cooperation of the agencies in the determination of surpluses as well as the sale of such property.

Property which is classed as surplus wil be sold or leased by the RFC. An important feature of the bill is the section which provides for the setting up, by RFC, of advisory committees for each class of available surplus property. The members of these committees are to be selected from persons who are familiar with the handling and marketing of such property. RFC when disposing of property is required, under the bill, to consult with the appropriate committee or committees on questions of price, time, method and manner of sale.

The bill, introduced by Chairman Patman on Dec. 18, charges RFC with the following responsibilities in the disposition of surpluses:

1. Distribution of such property shall be made through established trade channels.
2. The acquisition of large quantities of such property for speculative purposes should not be permitted.
3. Surplus property should be sold or leased at prices low enough to achieve their disposition, but high enough to enable the United States to secure a fair return.
4. The prices at which any particular property or class of property is sold or leased should be uniform.
5. The sale or lease of surplus property should be at a rate which will not unduly disrupt trade and commerce.
6. Disposition of property should take into consideration the establishment of small business enterprises and the strengthening of already existing small businesses.
7. All sales are to be made in accordance with regulations set up by the Surplus Property Board and property is to be advertised for competitive bidding, except in cases where the board determines that competitive bidding would be contrary to the public interest.

The bill also gives the board authority to dispose of property which is not salable, or for any other reason impracticable to sell or lease under the provisions of the act.

Representatives of the machine tool industry, including manufacturers and dealers, were in unanimous agreement on the bill and have agreed to actively support its passage. They also urged the Committee to push the bill through the House as soon as possible. Mr. Patman said he expected the Banking and Currency Committee to begin hearings on the measure very shortly and that he would urge action as soon as possible. This latter committee will report the bill to the House. The House Small Business Committee, being a special committee, has no authority to report bills.

George R. Shuman, vice-president, Prussian Machinery Corp., Detroit, and Burrell Wright, Esq., representing the machine tool group, presented testimony of a similar nature in outlining the problems confronting the machine tool makers.

Mr. Shuman told the Committee that $3,000,000,000 worth of machine tools had been built in the last three years, which is more than 15 times a normal year's production. In the light of these facts he said that HR 3875 was the "first constructive step toward their problem."

Mr. Shuman asked the Committee to allow the personnel of the machine tool industry to handle the disposition of surplus machinery. It was his view, through his experience in OPM, WPB, OPA and Army Ordnance, that the Government did not have the proper trained men to do the job. Testimony by later witnesses seemed to convince the committee of the validity of this argument.

Mr. Shuman also said that definite commissions should be paid to dealers who are able to dispose of machines for the Government, provided the dealer has a purchaser for the machine. He also urged reallocation of all usable machines, whether new or used, provided these machines would be put to use, and not stored. After prolonged discussion between industry representatives and the Committee it appeared that the committee was favorable to these suggestions and would probably incorporate them in a revised bill.

Additional suggestions by Mr. Shuman and reiterated by other industry members include: listing and cataloging of all machinery held by the Government; such a catalog should be distributed to all manufacturers and dealers; the newest and most usable machines not to be exported and those exported to be sold at manufacturers' standard prices; used machines to be sold by regularly constituted dealers within the industry; and prices should be established on a base of machinery of equal value.

THE IRON AGE asked members of the committee about their attitude respecting exportation of machine tools and found them in solid agreement that the best machine tools, as well as the latest models, should be retained in this country.

R. A. Vine, Vine Machinery Co., Detroit, presented the dealer's side of the problem. Mr. Vine objected to the present system which requires three competitive bids on the sale of government machinery that is to be resold. He contended that this would permit machinery to fall into the hands of speculators and seemed to favor sales on the basis of individual machinery for a specific use. Committee members were warm to this proposal.

Mr. Vine also asked the committee to strengthen the portion of the bill which requires accurate inventories to be maintained. He requested adequate technical descriptions so users will know exactly what is available

and can request such machinery as they can use, rather than have it bought up by "traders" who happen to be on the spot. He intimated that the recent Detroit fiasco evolving around Army sale of machine tools could have been avoided had adequate descriptions been available.

When told that it might take six to eight years to dispose of the surplus machine tools available at the war's end, the committee members seemed to favor a slow, orderly disposal.

In emphasizing the size of the problem, Mr. Shuman estimated that the automotive industry would only be able to utilize 10 to 20 per cent of government machine tools in their plants.

Citing specific examples, Mr. Shuman said that General Motors would be able to buy approximately 15 per cent of the 55,000 government tools now in its plant, while Chrysler would be able to use 20 per cent of 19,000 government tools.

Effect of Tool Exports Examined

Washington

• • • **While exports** of machine tools to United Nation's countries have undoubtedly been necessary to the successful prosecution of the war, one effect at least will be the shutting-off of normal peacetime markets, according to WPB officials.

While machine tool exports increased in 1941 over the 1939 figure — the shipments being $93,404,000 in 1939 and $200,190,000 in 1941—the downward trend in foreign demand is illustrated by the net decrease to $159,340,000 in 1942.

For the year ended December, 1943, exports will be up again to about the 1940 level of something over $200,000,000.

In 1939, the United Kingdom bought $25,570,000 worth of tools. In the first real production year of 1940 for the British dominions, more than $125,000,000 of tools were purchased from the United States which is five times the 1939 dollar value.

The United Kingdom imported approximately $124,000,000 in 1941 and $77,359,000 in 1942. Indications are that approximately the same amount of imports in 1943 were sent to the United Kingdom.

The declining demand in the last two years for which statistics are available illustrates that even under Lend-Lease, England and her dominions have an ever-decreasing need for machine tools.

On the other hand, Canada has been shipped about 29 times the 1939 value of machine tools in the past three years, about $114,000,000. While shipments to Russia are less than the imports of United Kingdom, Russia has received approximately $150,000,000 worth of machine tools and demand for this equipment seems to be increasing.

Complete Government Control of Machine Prices

• • • Section 801 of the proposed Revenue Act of 1943 (H.R. 3687) as reported to the Senate, if enacted, will allow any government procurement officer to set any price he pleases on machinery purchased for the government or by any contractor or subcontractor, without any consideration of existing prices or manufacturing costs. It is legalized confiscation.

Here are the facts:

Section 9 of the Selective Training and Service Act of 1940, already establishes the right of the Secretary to set what he considers a fair price on articles or services required by the government, and compels the acceptance of the contract.. But there is no explicit authority to delegate this power and it affects prime contracts only.

The pending Revenue Act of 1943, as passed by the House, in paragraph b-403-f-1 provided that "whenever, in the opinion of the Secretary of a Department the price under any contract with such Department or subcontract which affects such Department exceeds a fair price, the Secretary may require the contractor or subcontractor to negotiate to fix a fair price thereunder. If an agreement is not reached, the Secretary by order may fix the price which he determines to be a fair price for performance under such contract or subcontract after the date of the order."

This and all other references to "forward pricing" were eliminated by the Senate Finance Committee, who have, however, added the new "Section 801" to the bill.

This new section is not confined to the forward pricing of "contracts" and "subcontracts" as defined in the amendments to the renegotiation act, nor is it subject to any of the other restrictions embodied in that amendment. It empowers any procurement officer to whom the secretary may delegate this authority to set the price on any contract or subcontract for services or articles directly or indirectly required for the war, all the way back to the mine.

If the price is too low, suit may be brought in "any appropriate court" (the Court of Claims). This leaves to a supply contractor no practical remedy, since he can not bring suit on each of several hundred orders.

This bill when passed by the Senate, will go to conference, and the conference committee will be made up of members of the Senate Finance Committee and the House Ways and Means Committee. We attach a list of these men. We suggest that you write to each of them expressing your opinion of Section 801 of the Revenue Act of 1943, and that you consult or write to the Congressmen and Senators from your district if they are not on these two committees. In view of the existing provisions of the Selective Training and Service Act of 1940, this sweeping extension of authority is entirely unnecessary.

—The Editor.

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See Editorial, "You Can't Do This To Me," In This Issue, Page 45

Typical Strikes That Public Seldom Hears About Listed, Indicating "Battle of Home Front" Is No Idle Phrase

• • • **One aspect** of the war effort that never will be revealed fully is the damaging effect of minor strikes, slowdowns, absenteeism and kindred actions arising from controversies that fail to make the headlines. The "diary" reproduced in part below is an example of what many companies have been up against in their effort to help win the war. Timken's problems in this respect are by no means abnormal.

Washington

• • • **The following list** showing the war and pre-war record of labor, in part, in the plants of Timken Roller Bearing Co. was furnished the Smith House Committee to investigate the acts of executive agencies beyond the scope of their authority.

The evidence was introduced by the Timken Co. on Dec. 6 at hearings presided over by Representative Howard Smith, Democrat of Virginia, in which the legality of maintenance of membership clauses ordered incorporated in contracts by the War Labor Board was at issue. The exhibit listed strikes since 1937 only, 1943 strikes are listed below.

The number of strikes increased after December, 1941, the month in which the leaders of organized labor gave the government their "no strike" pledge.

14. **March 15 to 18, 1943**
25,790 man hours lost
Gambrinus Bearing Factory. Refusal of screw machine operators to work with and teach negroes who were upgraded to machine helpers.

15. **April 2 to 11, 1943**
36,875 man hours lost
Gambrinus Bearing Factory. Protest over union's withdrawal of the membership of an employee and his discharge by the company in accordance with the directive of the National War Labor Board.

16. **April 1, 1943**
54.6 man hours lost
Columbus Plant. Department 71. 14 men stopped work from 11.00 to 11.50 P.M. Department 72. 31 men stopped work from 11.00 P.M. to 12.24 A.M. Protest against swing shift.

17. **April 2, 1943**
46.8 man hours lost
Columbus Plant. Department 71. 12 men stopped work from 7.00 to 8.18 A.M. Department 72. 24 men stopped work from 7.00 to 8.18 A.M. Protest against swing shift.

18. **April 19 to 20, 1943**
49.4 man hours lost
Columbus Plant. Department 72. 26 men stopped work from 11.00 P.M. to 12.50 A.M. Protest against swing shift.

19. **May 1, 1943**
88 man hours lost
Columbus Plant. Department 72. 11 men did not work. Protest against swing shift.

20. **May 2, 1943**
1 man hour lost
Columbus Plant. Department 72. 5 men stopped work from 7.00 to 7.12 A.M. Protest against swing shift.

21. **May 12 to 15, 1943**
5,023 man hours lost
Columbus Plant. Departments 71 and 72. Protest against swing shift.

22. **May 18 to 19, 1943**
480 man hours lost
Canton Bearing Factory. Department 73. 64 men failed to report for work in protest against staggered layoff of 19 men due to shortage of stock caused by strikes at Gambrinus in March and April.

23. **May 24 to 26, 1943**
35,010 man hours lost
Canton Bearing Factory. Departments 73, 84, 76, 74, 78 and 59. Protest against the employment of females replacing males as machine operators.

24. **May 26, 1943**
55 man hours lost
Camden Avenue Plant. 22 women refused to work and were ordered to leave the plant. Protest against delay of War Labor Board in acting on union's demand for 5½ cents per hour wage increase.

25. **May 27 to 29, 1943**
1288.2 man hrs. lost—strike
1322.5 man hrs. lost—discipline
2610.7 man hrs. lost—total
Mt. Vernon Plant. 101 employees left the plant in sympathy with 54 employees who were disciplined for smoking by a three-day layoff.

26. **May 31 to June 1, 1943**
234 man hours lost
Columbus Plant. Department 86. Refusal to meet wage demands of chip-washer attendants.

27. **June 9, 1943**
7.5 man hours lost
Gambrinus Bearing Plant. Department 61. 15 Gridley Screw Machine operators stopped working for ½ hour in protest against overtime work of an employee who previously had assisted negro trainees. They also demanded an 8-hour day, 48-hour week instead of a 7½-hour day, 45-hour week.

28. **July 8, 1943**
156.8 man hours lost
Canton Bearing Factory. Departments 67-1 and 67-2. 33 men refused to work and were ordered to leave the plant. Protest against a 7½-hour day and a ½-hour lunch period in these predominately female departments.

29. **July 13 to 17, 1943**
17,176 man hours lost
Canton Steel Mill. Some of the recorders in Department 190 refused to work on a 3½ crew schedule which the Company installed to comply with an order of the War Manpower Commission to establish a 48-hour week. Nine departments struck in sympathy.

30. **July 19 to 20, 1943**
228.3 man hours lost
Gambrinus Steel Mill. Tool Steel Mill Department 736. 20 men struck because they refused to continue to work on other jobs at their regular rate of pay.

31. **July 21, 1943**
13.5 man hours lost
Canton Bearing Factory. Department 73. 27 operators of Landis and Norton O.D. cone grinders stopped work from 8.00 to 8.30 a. m. in protest against a new system of checking grinding time and capacity of the machines.

32. **Aug. 13, 1943**
12 man hours lost
Columbus Plant. Department 72. Refusal of negro female operators to harden Cone No. 5557 which they claimed was too heavy.

33. **Aug. 26 to 28, 1943**
1234 man hours lost
Canton Steel Mill. Machine Shop Department 181. Refusal to work with negro female machine operator trainees.

34. **Sept. 7, 1943**
270 man hours lost
Canton Steel Mill. Inspection Department 133. Refusal to work with office employees who were assigned to work part-time in the department. Demand for Sunday work and double-time.

35. **Oct. 12 to 16, 1943**
21,516 man hours lost
Canton Bearing Factory. Department 59. Demand of women for piece work rates on seven new Type H Landis grinders. Departments 33, 34, 73, 76, 79, 84 and 91 struck in sympathy.

36. **Oct. 14, 1943**
260 man hours lost
Canton Steel Mill. 10-in. Mill Department 136. 40 men on the 12 to 8 turn stopped work at 1.30 a. m. due to the absence of 4 men of the crew of 48 men.

37. **Oct. 25, 1943**
43.2 man hours lost
Canton Steel Mill. 10-in. Mill Department 136. Stranders on 4 to 12 turn did not commence working until 4.54 p. m. Protest against the advancement of a Bundler to fill a strander vacancy in accordance with demand of Union representatives.

38. **Nov. 5, 1943**
34.5 man hours lost
Canton Bearing Plant. Department 72. Girls went to sleep on chairs which were then removed. 23 girls refused to work from 6.30 to 8 a. m.

39. **Nov. 10, 1943**
29.25 man hours lost
Columbus Plant. Plancor 920. Roll Inspection Department 82. Girls demanded that window shades be drawn to prevent sunlight from shining on work.

40. **Nov. 25, 1943**
288 man hours lost
Canton Bearing Factory. Department 64. Protest of night shift (6.30 p. m. to 6.30 a. m.) against the computation of overtime pay for the Thanksgiving holiday.

G. E. and Bell Cooperate on Design of Jet Propelled Airplane

ITALIAN CAMPINI PLANE: *This Campini jet propelled plane made a flight from Milan to Rome, Italy, at an average speed of 130 miles per hour, with one stop enroute in 1941. Previously, it had flown for 10 min. at Milan in August, 1940.*

DESIGNER: *Harland M. Poyer, chief engineer of Bell Aircraft's Niagara Frontier Division, was responsible for the design of America's first jet propulsion airplane. First flown on Oct. 1, 1942, the ship powered by two jet propulsion engines designed by General Electric Co., has since made hundreds of flights.*

New York

• • • **Behind Gen. H. H. Arnold's** recent announcement that American-built jet propulsion powered fighter planes had passed experimented tests is a background of many months of close cooperative effort between British and American air forces, the Bell Aircraft Co., and General Electric Co. Jet propulsion as such is by no means a new idea. Experiments were made down through the years using various fuels, but one of the best known developments was the Italian Caproni-Campini jet propelled airplane. (THE IRON AGE, April 16, 1942, page 64.) First test flights of this ship were made in August, 1940, at Taleido Airport Milan, Italy. An improved model, a two-passenger 11,000 lb. ship, was later developed. For propulsion, air enters a nose duct and passes into a two-stage centrifugal compressor. The air is then ejected through a smaller duct with a controlled outlet behind the tail.

Other countries have worked on jet propulsion, but in recent years, of course, the war shrouded any developments with secrecy. The latest investigation of jet propulsion made public by the National Advisory Committee for Aeronautics in the United States, prior to the war, reported that after full developmental work was completed the system could become 70 to 80 per cent efficient at speeds *above those of sound.*

The British Royal Air Force, in July, 1941, transmitted to the U. S. Army Air Forces information on a jet propulsion engine which had flown successfully two months before, and the engine used was sent to the United States and turned over to General Electric Co., in September, 1941.

In less than six months from the time General Electric Co., received the engine, the first of a number of jet propulsion engines of modified design was ready for test. Bell Aircraft Co., built a plane around this engine design, suitable to operate with two of these units. In October, 1942, the first successful flight in this country in this type of ship was made. Since that time, this jet propelled ship has made hundreds of flights, and, as Gen. Arnold pointed out, there is a great deal of hope being held for this type of aircraft for both military and commercial use.

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Service Act Opposed; More Strikes Cut Into Output

• • • **On the** labor front this week, opposition to the President's demand for a national service act was becoming broader. Wilfred Sykes, president of Inland Steel Co., one of many executives attacking the proposal, stated "there is no substitute for the initiative and willing effort of free men and women."

The threat of unemployment in the present war economy, according to Dr. W. P. Edmunds, area director of the WMC in Cleveland, is just a rumor. Layoffs in that area have totaled only 1000 (Thompson Products Co.) and reemployment of these workers has been rapid. Requests for workers on file at present in the Cleveland USES office total about 18,000, some 12,000 of which are for men.

Meanwhile organized labor continues through its usual turmoil. The Weirton Independent Union, Inc., vs. Weirton Steel Co., fight over a 22c. per hr. raise will go to the WLB soon; 48 scarfers held up 13,000 tons of ship plate production at Carnegie-Illinois' Irwin Works by striking; the annealing department of Allegheny-Ludlum's Leechburg mill was forced down when 63 men struck; and 200 from the Youngwood, Pa., plant of Robertshaw Co., struck to protest the USWA's suspension of seven local union officers who were accused of leading an unauthorized strike at the company's Scottdale and Youngwood, Pa., plants.

Pressed Steel Car Co., McKees Rocks, Pa., was hit by a strike when 150 workers walked out protesting high work requirements, and Bethlehem Steel Co.'s plant near San Francisco just recently resumed work after a stoppage involving more than 500 USWA members.

Simplified Pricing Method Set On Steel Sales from Warehouses

Washington

• • • **A simplified** procedure of pricing steel products sold from warehouses in carload lots was announced last week by the OPA. Establishment of the new pricing method coincides with the WPB announcement that beginning Jan. 13 warehouses no longer need to obtain certification of shipments of any amount of steel products they wish to ship from warehouses. Heretofore, they had to obtain certificates for amounts of 40,000 lb. or more.

The new method permits warehouses to calculate ceilings on carload shipments, whereas they previously had to obtain certification from WPB on such shipments and then apply to OPA for the ceiling price that could be charged for it.

The level of prices under the new change remain substantially unchanged. The new procedures are as follows for pricing carload shipments.

Standard wire nails, annealed smooth merchant quality wire, and galvanized smooth merchant wire: On shipments within the city or free delivery area of warehoused products, the maximum delivered price shall be the l.c.l. ceiling price plus extras, less a deduction of 15c. per 100 lb. On shipments outside the free delivery area, the maximum delivered price shall be the carload price plus the carload rate of freight from shipping point to destination.

Galvanized roofing and siding, and merchant wire products including poultry netting, screen cloth, and hardware cloth: The maximum delivered price is established as the higher of the following two alternatives—(1) The mill straight carload price to a jobber at the customer's destination, based on the governing basing point plus a 15 per cent mark-up, or (2) the mill straight carload price to a jobber at the shipping point, based on the governing basing point, plus a 15 per cent mark-up less a deduction of 20c. per 100 lb., plus the carload freight rate from shipping point to destination.

Secondary or rejected iron or steel production and re-usable iron and steel products not specifically priced by OPA: The maximum delivered price for these products will be the mill price and if that is not satisfactory to the seller, a proposed price may be submitted to OPA for approval.

Secondary and rejected hot rolled sheets, cold rolled sheets, galvanized sheets, cold rolled strip, hot rolled strip, and tin mill black plate: The maximum delivered price is fixed as the established ceiling price for 39,999 lb., except where the carload freight rates shall be used as freight factors rather than l.c.l. rates.

Basic heavy line steels: The maximum delivered price is fixed as the established ceiling price for 39,999 lb., except that carload freight rates shall be used in computing freight rather than l.c.l. rates.

Pipe and tubular products: Destination prices are set for each product on a similar basis to that provided for l.c.l. shipments except that the distributor's percentage mark-ups are lowered about 5 per cent. For carload shipments, however, a maximum freight absorption is established.

All other products for which carload prices are not established by the foregoing methods: The maximum delivered price for these products, if they were sold on a quantity plan on April 16, 1941, is established as the maximum delivered price for 500 lb. quantity, less 35c. per 100 lb. It is provided, however, that if the applicable price for a product is lower than the 500 lb. quantity price less 35c. per 100 lb., the lower price shall be the ceiling for the item. For products not sold on established quantity plans on April 16, 1941, the maximum price is fixed as the l.c.l. price less 15c. per 100 lb.

Under the new set-up, each seller must record all purchases and sales for OPA inspection. Sellers are no longer required, however, to submit to OPA monthly reports of sales of 40,000 lb. or more to one customer in any semi-monthly period. Sellers must supply buyers with complete invoices of shipments. Sub-dividing order to give sellers higher prices permitted on smaller shipments is specifically outlawed.

The new ceiling prices for carload shipments are applicable to material put through "the operations commonly known as the warehousing of iron and steel products," and for all material whether sold or shipped in carload or in l.c.l. quantities which has not been warehoused, no higher than mill prices may be charged.

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Electric Output in '43 Shows Huge Gain

Pittsburgh

• • • **Electric** steel production, in 1943, not only set a new record but the mark probably will remain an all-time high for a few years. The 1943 production of 4,621,462 tons of electric steel represents roughly an increase of about 333 per cent over 1929 output.

On the basis of percentage of capacity operations, electric steel output last December reached its lowest point since Pearl Harbor, with operations averaging 87.2 per cent of rated capacity. Tonnage output is expected to decline over the next three months. As explained in previous issues, many customers are free to revert to the open hearth product if they so desire.

In the first quarter of 1942, the percentage of alloy steel made in the open hearth was 67 per cent. By the first quarter of 1943, the open hearths were turning out 75 per cent of alloy steel production. The trend during the third quarter of 1943 was downward for the participation of the open hearths, when they produced about 69 per cent of the alloy steel. The heavy pressure during October and November for transferring alloy steel to the electric furnaces made itself felt, as far as the open hearths were concerned, since November data indicates that the open hearths produced only 63 per cent of the total alloy steel made in that month.

Most observers are aware that even before the war ends there will be drastic competition for available alloy steel business between open hearths and the electric furnaces. Reports have been current that at least one company has, in a technical manner, eliminated the $10.00 premium for electric steel.

AIRCRAFT MODIFICATION: *To meet the needs of services in various theaters of combat, military aircraft modification centers are maintained. Here, at the Daggett, Cal., "mod" center an astro-dome on a temporary mount is being put into position on the gunner's upper escape hatch. The hatch will be stowed in the bomb bay loading platform.*

Wide World Photo

Senate Gets Plan to Help Build Corporate Reserves for Post-War Era

Washington

• • • **Taking up** the renegotiation provisions of the tax bill, the Senate has before it an amendment which is designed to assist war contractors in financing conversion to peace production. It was offered by Senator Truman of Missouri at the request of Senator Hatch of New Mexico. It would permit the setting aside as reserves up to 20 per cent of the normal net income tax to be invested in a special issue of non-negotiable, non-interest-bearing Government bonds. These bonds would be redeemable 18 months after the war. Upon redemption the income from the bonds would be subject to the Federal tax in effect at that time.

While the proposal has been received with considerable favor by the Senate, it is reported that final action on it will come either in the nature of a compromise of some sort or that it may be made the subject for separate legislation. Whether the legislation may be enacted is clouded by the reported opposition of the Treasury Department. The Treasury is said to favor aid to postwar industry by extension to three years of the provisions for a two-year carry-back, as well as carry-forward of losses, with the requirement of a cash refund by the Government in the event of application of carry-back provision.

At the war's end, many contractors, individual and corporate, Senator Truman told the Senate, will doubtless suffer large inventory losses. He pointed out that they feel a strong moral obligation to make substantial severance payments to unneeded wartime employees after cancellation of war contracts.

Headed by Senator Truman, the Special Committee Investigating the National Defense Program through its staff has made a survey within the past six months of the postwar reserve requirements of 100 war contractors.

Senator Truman said that the most striking feature of the replies is not the amount of money which will be required, nor the variety, but the complete uncertainty of the contractors themselves as to how much will be required and the purposes for which it will be required. Of the 86 companies whose answers have been tabulated, the Senator said, 28 have literally thrown up their hands and said they have no idea of any kind upon which they can make even a remote estimate as to how much money they will need or what they will need it for.

Said Senator Truman: "At one extreme we find the Sun Oil Co. of Philadelphia, whose executives stated that they did not think the company would require any substantial amount of money for postwar reconversion. As illustrations of the other extremes we find that the General Motors Corp. expects to need $150,000,000, General Electric Co. expects to need $50,000,000, Ford Motor Co. expects to need $70,000,000, Douglas Aircraft Co. expects to need $63,000,000, the Glenn L. Martin Co. expects to need $105,000,000 and numerous other companies expect to need only slightly smaller sums.

"Two points are perfectly clear as a result of this study: First, any provision designed to solve the postwar reserve problem must be extremely flexible. Second, any provision to be effective must be reasonably self-administering and must avoid, insofar as possible, a requirement of determination by Government administrators of the amount of money needed."

o o o

Supreme Court Gets Mine Wage Case

Washington

• • • **Arguments** were heard last week by the Supreme Court in the so-called portal-to-portal pay case in which steel companies, appealing from a lower court decision, maintained that iron ore miners are not entitled to underground travel time under the Federal Wage Act. The Act provides for a standard 40-hr. work week with time-and-half pay for overtime.

Directly, the cases concern employees of the Tennessee Coal, Iron & Railroad Co., the Republic Steel Corp., and the Sloss-Sheffield Steel & Iron Co., who operate 13 underground iron ore mines in Jefferson County, Ala. More broadly, however, decision in the case is awaited, not only because of its effect on steel costs, but also by reason of the fact that it probably will be a determining factor in the portal-to-portal case now in the lower court in which the United Mine Workers are demanding travel time pay for mining coal. In the new contract UMW was granted time allowance by the Government.

The Fifth Circuit Court of Appeals has held that the time spent underground by ore miners, aside from the lunch period is working time under the Wage-Hour Act. The Government, through Solicitor General Fahy, supported the position of the miners, who were represented by Crampton Harris.

Appearing for the Tennessee Coal, Iron & Railroad Co., Attorney Nathan I. Miller, former New York governor, contended that the Wage-Hour law did not provide for portal-to-portal pay and said that no allowance for such pay is made in the contract producers have with iron ore miners. Taking the same position, Attorney Borden Burr, representing the Republic Steel Corp., said that Congress in enacting the law did not intend that the accepted method of computing wages should be changed or that portal-to-portal pay be required.

"The facts show that from time immemorial underground portal-to-portal time has never been paid for, and the contracts, without exception, are based on that proposition," Mr. Burr said. "Congress could not have intended that these contracts be wiped out."

Indicating that a more liberal construction of the act might be made, Justice Frankfurter declared that since Congress did not define the term "work-week," it apparently had left the definition to be determined by "adjudicatory" processes. The Justice pointed out that if the court defines "work-week" as including travel time then "no contract can set this aside." Mr. Harris maintained that America is the only country that does not have portal-to-portal pay.

The arguments brought about the question of the beneficiary from a workman's lunch, the employee who eats it or the operator. Justice Rutledge had inquired whether all the time men spent underground should be considered as time spent in behalf of the employer, including the eating period.

Mr. Harris said that he did not think a man, while eating lunch is doing anything for his employer. Justice Roberts suggested that the employees could not work in the afternoon if they did not have lunch.

Jahco Ordered to Pay $7,000,000

Washington

• • • **Jack & Heintz, Inc.,** Cleveland, aircraft accessory manufacturers whose 84-hr. work week with high take-home pays and bonuses was the subject of Congressional investigation in March, 1942, will reduce by $7,000,000 the cost of products sold to the Government during the year ending Oct. 31, 1942. After tax adjustments on this amount, the net reduction to the Government will be about $1,750,000. Since the company has refused to make this refund to effect this reduction voluntarily, the Hon. Robert P. Patterson, Undersecretary of War, directed the repayment by the company to the Government of these excessive profits, as authorized by the price adjustment statute.

Jack & Heintz which in the past has voluntarily made several quite drastic reductions in price of products purchased by the Government, protested the renegotiation of this latest amount. Judge Patterson stated that "among the factors considered in making this determination were the satisfactory production accomplishment of the company and the success of the management in meeting production schedules. However, the fact that a company operates satisfactorily cannot be allowed to serve as an excuse for war profiteering. It must be borne in mind that the company's business was financed principally by the Government, which purchased its entire output."

During the 1942 fiscal year, Jahco made a profit of $8,361,000 before taxes. This was the figure used in renegotiation and expense deductions allowed by the Treasury Department were similarly allowed in renegotiation, according to the War Department.

William S. Jack, president, charged that the administration was flirting with a revolution by such arbitrary practices because soldiers coming home after the war will find factories without money for postwar reconversion. The men will object when offered jobs in a glorified WPA.

Lake Shipments Near Record Despite Adverse Conditions

Cleveland

• • • **Despite a shipping** season that was far from ideal, Great Lakes carriers transported the second largest tonnage in their history during 1943, according to A. T. Wood, director of the ODT's Great Lakes division. The bulk freight traffic covering the four major commodities, iron ore, coal, grain, and limestone, totaled 175,690,915 net tons. This tonnage was surpassed only by shipments in 1942 which amounted to 182,731,421 net tons.

From navigational and dock operating points of view, the Lake season was the most unsatisfactory encountered in nearly 20 years. Ice conditions in the spring, prolonged dense fogs in early summer, and an early winter characterized by below-zero temperatures in November were deterrents that entailed a full month's shipping loss. Frozen ore that had to be thawed before it could be loaded into the vessels also slowed up loading operations.

Shipments are shown in table below.

COMMODITY	1943 Net Tons	1942 Net Tons
Iron Ore	94,533,434	108,125,990
Bituminous Coal		
From Lake Erie	46,059,334	47,814,592
From Lake Ontario	4,069,396	3,624,256
From Lake Michigan	1,062,371	185,000
Anthracite Coal		
From Lake Erie	680,929	909,949
From Lake Ontario	155,730	334,773
Grain*		
From Lake Michigan	154,240	428,295
From Lake Superior	11,655,876	8,073,291
Limestone	17,339,675	18,570,048
TOTAL	175,690,915	182,731,421

* Equal to 421,961,725 bu. in 1943 and 299,237,926 bu. in 1942.

WPB Tightens Controls On All Contract Letting

Washington

• • • **While WPB** is lifting its restrictions on materials and facilities, as enumerated in its L and M orders, it plans to draw in the reins smartly on the actual letting of contracts. This will apply not only to war contracts but also to the letting of contracts for production of civilian type goods. These controls are to be exercised through the policies laid down on controls affecting manpower. The new program is outlined in the recently issued General Operations Circular No. 193. Controls over production, materials and facilities are tightened. Coincidentally, War Manpower Commission has released an appeal to the Smaller War Plants Corporation to assist in the actual shifting of contracts from certain areas and placing such contracts or subcontracts with plants where the labor supply is not restricted. The WMC will certify the short labor areas and the availability of labor; the SWPC will certify the plant facilities that are available for taking on subcontracts and will certify the subcontracts that might be shifted.

WPB Relaxes Limitations On Use of Alloy Bearing Scrap

Washington

• • • **Low alloy steel** scrap may be used in the manufacture of carbon steel at the discretion of the mill, according to the WPB, because of shortages of carbon steel scrap and the plentiful supplies of alloy scrap. In an announcement last week, WPB stated that copper scrap may be used in melting carbon steel, and further lifting of limitations on melting alloy scrap were announced this week. The newly amended order (M-24-c) provides that alloy scrap shall be melted only in production of alloy iron or alloy steel except:

1—Chromium or chromium-vanadium steel scrap with 1.65 per cent chromium maximum.

2—Chromium-molybdenum steel scrap with 0.27 per cent molybdenum maximum.

3—Nickel-chromium-molybdenum steel scrap, with maximums of 0.70 per cent nickel; 0.60 per cent chromium; and 0.25 per cent molybdenum.

Dealers and producers of alloy scrap are still required to segregate it, except producers turning out less than 10 tons of scrap a month which has low alloy content.

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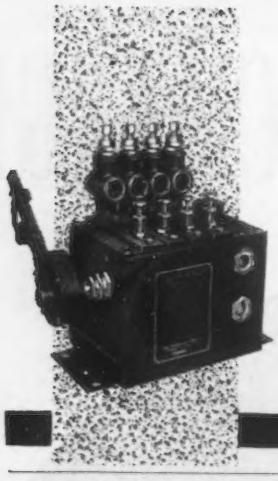

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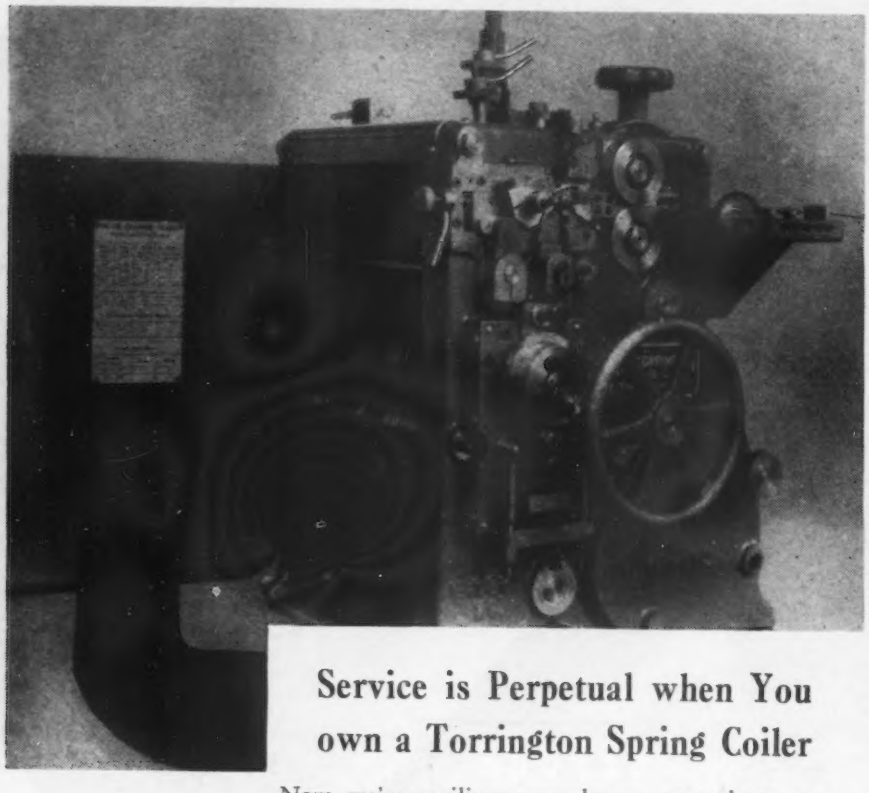

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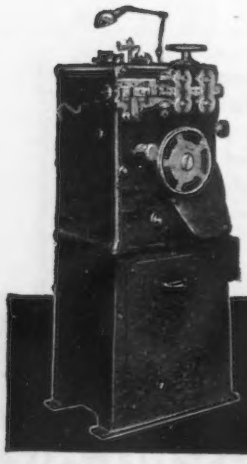

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Restrictions Removed on Warehouse Idle Stock Sales

Washington

• • • **All restrictions** on the purchase of idle and excess general steel products by warehouses or dealers were removed by WPB this week in an amendment to order M-21-b-1. The amendment also permits any person to qualify as a dealer, even though he was not in business on Aug. 9, 1941 as required in the original order. Dealers may not buy from producers except for direct shipment to consumers; they may purchase idle and excess stocks; and they may purchase from other distributors. No authorization is required from WPB to begin operations as a dealer, but such operations must be in conformity with Priorities Regulation No. 13, which outlines procedures under which materials may be sold by persons not in the regular business of selling such materials.

Warehouses may purchase idle and excess inventories of any type without limitation, but in re-ordering material from producers they are still confined to the products in which they dealt during the base period. Under the amended order, dealers as well as warehouses may order steel from producers or suppliers for direct shipment to customers on the basis of the customers' allotment numbers. Warehouse reports on form WPB-2888 will henceforth be required quarterly instead of monthly. No reports are required of dealers, but records are subject to WPB inspection.

Price Briefs

• Amdt. 3 to RMPR 125 makes a readjustment in the maximum prices for copper and copper base alloy castings that will restore part or all of the reductions made last February in ceilings for some types of castings. Order effective Feb. 1. (Release No. OPA-T-1618)

•

• Amdt. 20 to RPS 49 simplifies procedure for pricing steel products sold out of warehouses in carload quantities. (Release No. OPA-T-1640)

•

• Amdt. 1 to MPR 43 places used steel drums under price control in Puerto Rico.

•

• Amdt. 26 to Order A-1 of MPR 188 provides manufacturers on 1000 different kinds of manually-operated valves a uniform method of establishing maximum prices for sales to producers of various types of appliances. (Release No. OPA-3808)

•

• Amdt. 10 to RPS 41 makes an upward adjustment of 17 per cent in the ceiling prices for miscellaneous freight car castings to compensate for increased production costs, principally labor. (Release No. OPA-3812)

•

• Order No. 28 under Section 1499.3(c) of the GMPR sets prices for transfer of brass and bronze valve inventories. (Release No. OPA-T-1649)

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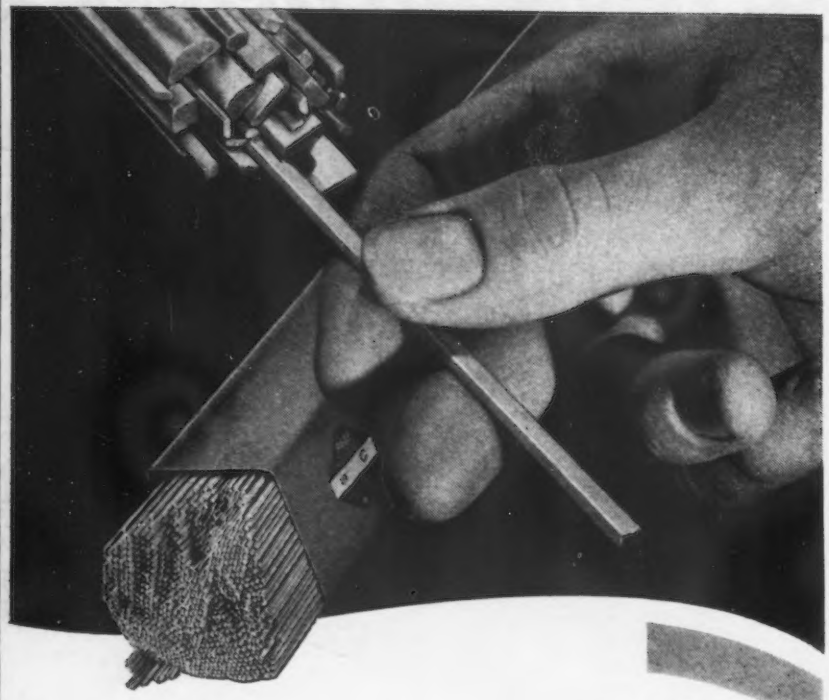
PAGE for WIRE



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Priority Changes

L-126—Amended order changes specifications to permit greatly increased use of copper and aluminum strip and tubing in the manufacture of commercial and industrial coil and tube assemblies for refrigeration condensers or coolers. (1-11-44)

•

L-190—Amended order permits manufacture of two more types of railway track scales. (1-15-44)

•

L-192—Amended order lifts restrictions on construction equipment and repair parts. (1-10-44)

•

L-250—Amended order relieves manufacturers of electric motor controllers from the technicality of obtaining an AA-5, or higher, priority before starting production on these units or parts for them. (1-15-44)

•

L-260—Amended order permits furniture manufacturers to use limited quantity of steel springs.

•

L-292—Sched. II shifts baking machinery production to materials quota basis. (1-15-44)

•

L-292—Sched. III makes a change in the unit quota regulations covering the manufacture of canning machinery and equipment from specific numbers of each piece of machinery to an over-all tonnage basis. (1-11-44)

•

M-2-b—Amended order simplifies procedures governing the allocation and use of magnesium and magnesium products and the segregation and disposal of magnesium scrap. (1-13-44)

•

M-21-b-1—Amended order removes all restrictions on the purchase of idle and excess general steel products by distributors and relaxes other restrictions on the activities of distributors. (1-12-44)

CMP Developments

• Int. 10 to Reg. 1 outlines the procedure that shall be followed when a customer wishes to make changes in an authorized controlled material order placed with a producer. (Release No. WPB-4822)

•

• Dir. 22 to Reg. 1 makes provisions for carrying out WPB decision that out-of-line allotments are to be continued under CMP.

•

• Amended Reg. 4 modifies rules governing sales of copper, steel, and aluminum in controlled materials forms and shapes by warehouses and distributors to ease applicable restrictions on such transactions. (Release No. WPB-4850)

•

• Dir. 2 to Reg. 5A requires each governmental agency to compute its quota of MRO supplies and keep its computation and supporting work sheets in its file for two years.

•

• Amdt. 3 to Reg. 5 adjusts preference ratings available to various industries for MRO supplies to reflect a revised pattern of relative urgency. (Release No. WPB-4805)

COMING EVENTS

Feb. 21 to 24—American Institute of Mining & Metallurgical Engineers, New York.

March 14, 15—National Association of Waste Materials, Inc., New York.

April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.

April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

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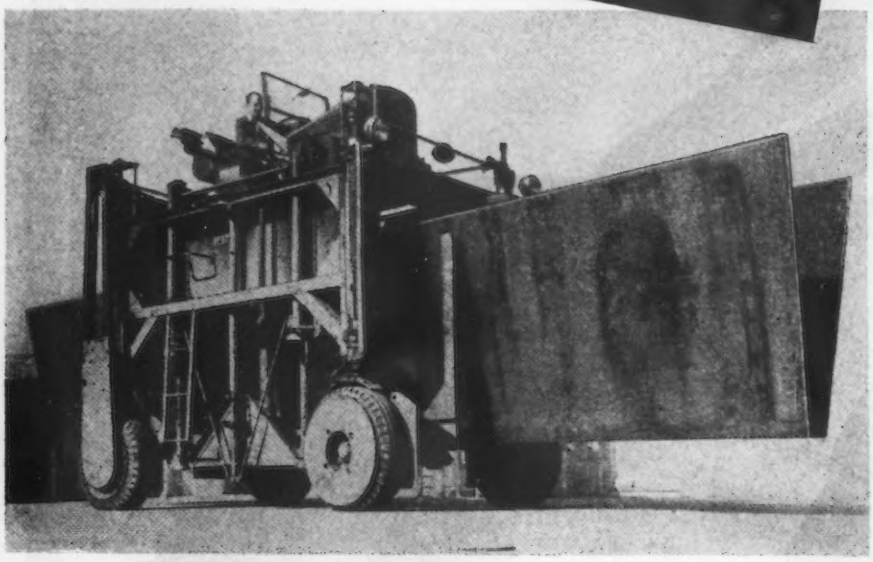

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Nine-Point Plan Aims at Speeding Termination Payments

New York

• • • A nine point recommendation summarizing ways whereby the procedure for settling terminated contract claims might be made more effective has been issued by the National Credit Office, Inc., here. These recommendations would unify so far as possible the procedures of the various procurement agencies, place decisive authority with the contracting officers, create necessary legislation to implement such procedure, put subcontract settlement in the hands of the prime contractor and guarantee loans against terminated contracts as well as expedited payments.

Settlements of terminated contracts may now be effected either by application of the formula which is included in the termination clause of government contracts, or by negotiation. Under the former, the formula most frequently employed specifies that the contractor is to be reimbursed for completed units at the contract price; for his investment in work-in-process and raw materials; for the cost of settling outstanding claims and commitments; and for such profit as may be allowed. The profit allowance is to be determined by approximating the profit that would have been realized were the entire contract completed and multiplying that figure by the percentage of completion of the uncompleted portion of the contract. Thorough audits are conducted. Although this is a satisfactory method in normal times, it became evident more than a year ago it would not suffice under the present volume of cancellations. The government simply does not have the requisite number of auditors necessary to do the job quickly enough.

The basic principles of present termination procedure are sound. The following recommendations suggest several ways whereby that procedure can be speeded up and made even more effective:

1. All procurement agencies should issue manuals outlining their procedure. Contractors should thoroughly familiarize themselves with those provisions so that their claims can be prepared quickly and promptly.
2. Congress is urged to enact legislation recognizing and affirming the authority of the contracting officers to make conclusive negotiated settlements; to provide for speedy partial payments on an installment basis; and to stipulate that contracts subsequently deemed to be informal because of deficiencies in language or form, letters of intent, and contracts not including a termination clause be

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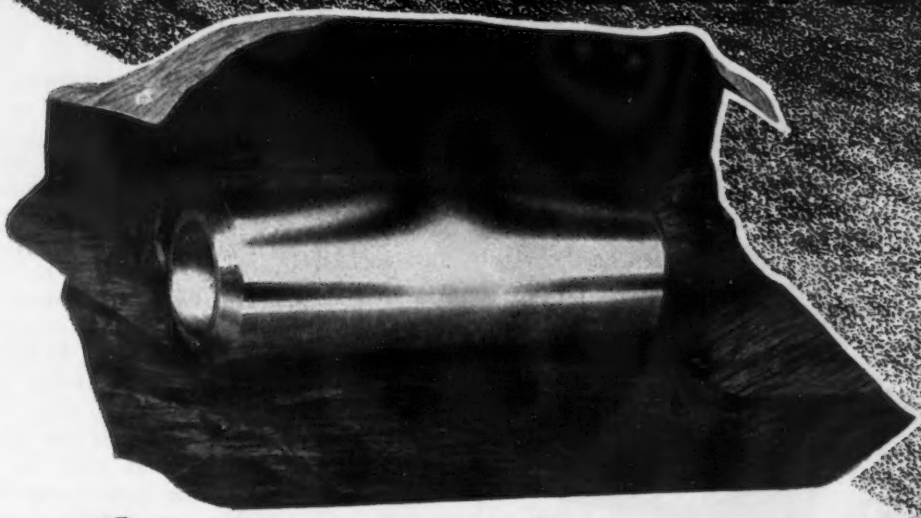

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subject to settlement under the same regulations.

3. The Government should not assume liability for sub-contractors' claims. It is not in keeping with our philosophy of business; it would nullify much of the present procedure; and it would be administratively impossible.

4. Prime contractors should be encouraged to speed settlements with their sub-contractors and suppliers without too much dependence on the prior approval of the contracting officer. They have that right—implement it by agreeing on the principles to be used in making the settlements.

5. Contractors should adjust their accounting records wherever feasible so as to use the inventory basis for presenting claims under the negotiated type of settlement. Avoid reliance upon the formula method.

6. The Government should go further in clarifying ambiguous accounting principles.

7. Correlate Government planning for disposal of inventory at the end of the war as far in advance as possible.

8. Standardize the procedure of the several procurement agencies to the extent necessary to make it possible for the contractor to develop all the accounting data required of him from the same set of records.

9. Authorize the procurement agencies to guarantee loans against terminated contracts which are cancelled after the cessation of hostilities.

Termination is new only in its present magnitude. A well defined set of principles had been built up prior to and after the last war. Not until August of this year, however, did the War Department issue its Termination Manual, officially designated as Procurement Regulation 15.

Procurement Regulation 15 is predicated on the belief the contracting officers have the right to bind the Government to negotiated settlements, and as indicated previously, the procurement agencies are firm in their conviction that they do have that right. The recent controversy has, however, created confusion in the minds of the contractors, and has emphasized the possibility that Congress can transfer powers now resting with the Services to the Controller General. To eliminate confusion and uncertainty of this sort, it is urged that Congress specifically recognize and affirm this authority in the contracting officers.

The government—the Prime Contractor—the Sub-contractor. Perhaps no other phase of termination is so broad in its implications and potentialities. Certainly it has already caused a considerable amount of ill-will. A simple statement of the basic facts will be useful in understanding the problem.

1. The government has no legal responsibility or mutuality with sub-contractors. It has no inherent rights whereby it can restrict the amount that the prime contractor is to pay to his sub-contractor.

2. Opposed to this absence of legal responsibility, the government does have a responsibility to itself to discourage the payment to sub-contractors of exorbitant and unsubstantiated amounts for which the prime contractors might seek reimbursement.

3. There are many who advocate the

• Roustabout Cranes are hustling war materiel at home and overseas. (U. S. Signal Corps Photo).

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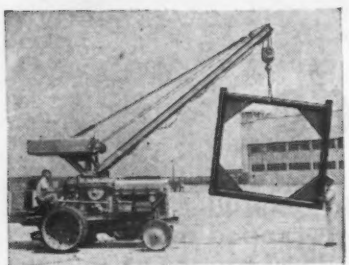

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PROMPT DELIVERY—Come to America's Headquarters for Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

Send the Coupon for Illustrated Catalog

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St., Dept. RA, Chicago 7, Ill.

ARMY E NAVY
MOUNTED WHEELS
SMALL GRINDING WHEELS

TEST WHEEL FREE—

So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

• *Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.*

RA-1
Send catalog. Interested in ☐ Mounted Wheels ☐ Grinding Wheels ☐ Send Test Wheel. Size.....

Name.....

Address.....

STEEL MOST VERSATILE OF METALS IS LIMITED ONLY BY MAN'S INGENUITY—

BRIGHT FINISH HOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS

A WIDE SELECTION FOR PARTICULAR APPLICATIONS

Steel has many valuable characteristics as a result of modern steel production and special finishing operations. Thomas specializes in cold rolled strip steel and offers the following refinements:

(1) Accurate gauges
(2) Finishes for painting and plating
(3) Uniform tempers ranging from dead soft to hard
(4) Special edges
(5) Non-scalloping deep drawing qualities
(6) Low and high carbon content
(7) Fine grain for special requirements
(8) Variety of non-ferrous and lacquer finishes.

As a result of this wide range of cold rolled strip steel qualities, Thomastrip has helped many engineers, designers, and fabricators. Many important problems have been solved by Thomas engineers who will gladly help you.

Thomastrip
COLD ROLLED STRIP STEEL

THE THOMAS STEEL CO. - WARREN, OHIO

assumption by the government of the responsibility to the sub-contractor. These include both prime contractors and sub-contractors.

The prime contractors who would like to see the government assume this role primarily are motivated by the hope it would relieve them of a substantial amount of work, and would absolve themselves of any responsibility for dissatisfaction of the sub-contractors with the final settlement.

The sub-contractors who favor this view hold the opinion their chances for a more liberal settlement would be better in dealing directly with the government. There is nothing in experience to substantiate that contention. Others envision the possibilities of credit losses if they must continue to look to their prime contractors for payment.

Today the government rightfully denies any direct liability to the sub-contractors, but does exercise a practical veto power through stipulating it will reimburse prime contractors for settlements with their suppliers, only when those settlements are approved in advance by the contracting officer. The result is the prime contractors as a rule refuse to make any disbursements to their suppliers until that approval has been obtained. Delays are inevitable.

The root of the trouble is the apprehension sustained by the prime contractor that he will be unable to obtain complete reimbursement for what he pays his suppliers. Knowing the basis upon which he will be compensated, he will have no hesitancy in making settlements with his suppliers on that same basis. The government has reiterated its intention of being fair and equitable, and its sincerity has been amply demonstrated in application. If the prime and the sub-contractors will agree to adhere to the same principles in reaching their settlements as used by the government, certainly the same result must be obtained.

The responsibility rests upon the contractor to demonstrate conclusively that his claim consists only of expenses actually incurred and that these expenses are clearly applicable to the contract. Any accounting system that will develop the facts from which that determination can be made is adequate. It is clearly within the right of the government to specify the standards for gaging the accuracy and nonesty of the accounting information and outline those standards in advance so that all who use them may prepare themselves. Even though further clarification is needed, contractors will do

SHE SIMPLY GUIDES AS THE LOAD RIDES

Automatic TRANSPORTER

NO STRAINING--TUGGING--PULLING NOR PUSHING

•

POSITIVE MECHANICAL BRAKE--CONTROLS IN STEERING HANDLE--FORWARD AND REVERSE SPEEDS--FRONT WHEEL POWER DRIVE--SHOCKLESS HYDRAULIC PLATFORM LIFT WITH EASY FOOT CONTROL

• *Miss War Worker and a* TRANSPORTER *can transport the same tonnage of material a given distance that would require the physical effort of three men handling in the conventional way.*

• *The* TRANSPORTER *is built in 4000- and 6000-pound capacity platform type lift trucks for skid transportation and in a pallet type fork lift truck for unit loads up to 4000 pounds on open- or double-faced pallets.*

★ Miss War Worker, whose job it is to transport materials, becomes a high efficiency employee with a TRANSPORTER. Her work consists only of guiding the TRANSPORTER and walking along with the load. This mechanized material-handling truck transports tons of bulk material of various sizes and shapes, or packaged products, doing all the heavy work and accomplishing it quickly and at low cost.

The TRANSPORTER is designed for short hauls within the plant — it handles loads in elevators, along narrow aisles, and is valuable for use in areas where floor loads are restricted. Get details on this modern material-handling truck that has the forward and reverse control buttons in the handle for easy guiding of loads.

MANUFACTURERS FOR OVER THIRTY FIVE YEARS *Electric Propelled* INDUSTRIAL TRUCKS

AUTOMATIC TRANSPORTATION CO.

75 WEST 87th STREET — DIV. OF THE YALE & TOWNE MFG. CO. — CHICAGO 20, ILLINOIS

ELIMINATE THE HOME-FRONT
BOOBY-TRAPS
FROM YOUR PLANT

Oil and grease on your floors are booby-traps that make casualties of the soldiers of production, by causing slipping and falling accidents, inviting costly fires, and side-tracking vital manpower into non-productive cleaning labor. Rid your plant of these aids-to-the-Axis quickly, efficiently and economically by using SPEEDI-DRI—a white, granular substance, easily spread by hand, that absorbs *all* oil and grease, sets up an immediate non-skid surface, retards fire, and saves a lot of labor needed elsewhere. Write for free sample or demonstration.

GRUMMAN AIRCRAFT says:

"We use SPEEDI-DRI in practically every plant," writes A. W. Stevens, Maintenance Supervisor of Grumman Aircraft. "Maintenance crews use it to dry up leaks on oil hydraulic breakdowns. It makes their work safer and cleaner."

SPEEDI·DRI
OIL AND GREASE ABSORBENT

SUPPLIERS

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REFINERS LUBRICATING CO.
New York 1, N. Y.

Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia 6, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Russ Building, San Francisco 4, Calif.

Prompt Service from Warehouse Stocks in Leading Cities

well to appraise their accounting records now to see if they will meet minimum requirements.

Disposition of inventory is admittedly a problem of first magnitude which extends far beyond the area covered by termination. Not until the inventory has been sold, can the termination of the contract to which it applies be concluded. Although it goes beyond termination, its influence upon the promptness with which the termination can be wound up is too great to be ignored. Undoubtedly the proper agencies of government are appraising the need for all types of supplies and materials here and abroad. A system that will permit quick comparison of the items involved in a terminated contract with those needed supplies and materials may be one logical approach.

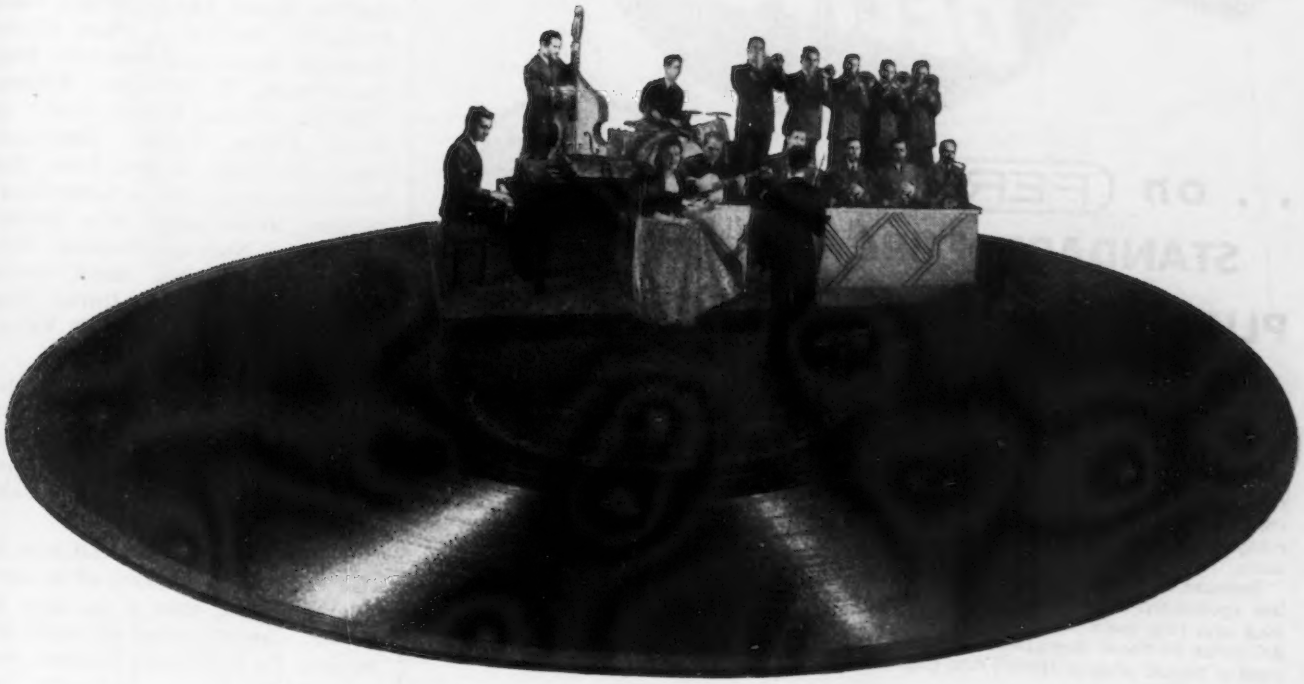
Many contractors are performing work for more than one procurement agency. Standardization among these agencies obviously then, will be of material assistance to them. Many proposals have been heard. The War Production Board has been endeavoring to devise a termination clause that can be used by all departments. Others have suggested that the agency having the predominant interest in a specific contractor be charged with the responsibility of negotiating the settlement of all his contracts. More recently has come the thought that a super-board of some kind be established to supervise termination work in all the services.

But to obtain a partial payment today, the contractor must prove conclusively that the amount is clearly due. A payment made on that basis is not a partial payment at all; it is complete reimbursement for that particular obligation. The proof cannot be gathered within a short enough interval under present restrictions.

There was announced several weeks ago the new VT loan, whereby the contractor may arrange for a commitment to be used after his contracts have been cancelled. We are heartily in favor of this plan. But it is very questionable if the government agencies have the right to guarantee loans to be made entirely after a contractor's orders have been terminated. Therefore it is urged Congress be requested to authorize the making of guaranteed loans against terminated contracts, at the close of hostilities. The availability of such legislation should not be permitted to relax our efforts in other directions to improve the general procedure.

A Record of Performance

. . . THAT WINS INDUSTRY'S APPLAUSE!



Like a giant orchestra, all of Industry plays a symphony of Victory. The blare of the starting whistle, the blast of the furnace, the rhythm of the riveting gun, the melody of the saw and hammer, the precision of the lathe . . . all these, rendered on a giant scale, will help to strike the final note of Victory!

Quite naturally, we're proud of our performance in 1943. . . . a record in tune with America's rising crescendo of production. That we hope to play an encore in the months to come goes without saying, for Levinson Steel is constantly seeking and developing new ways to improve and speed its service to Industry.

THE LEVINSON STEEL CO.

Warehouse Steel Products—Fabricated Structural Steel

PITTSBURGH, PA.

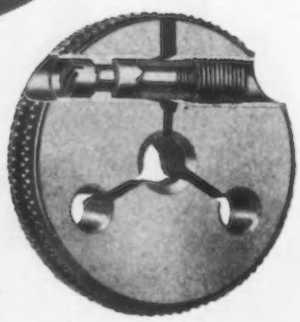
Levinson Steel Sales Co., Sales Agents

LS LEVINSON STEEL

. . on PERFEX

STANDARD THREAD

PLUG and RING GAGES



The above illustration shows a thread ring gage and a cut-away view of its locking device. Like all PERFEX gages these ring gages are made under the personal supervision of men who have had years of experience in precision gage and tool manufacture. Each PERFEX gage is checked and rechecked in air-conditioned inspection rooms before they are shipped. This insures extreme accuracy and eliminates costly delays in rejects by the customer.

The PERFEX GAGE & TOOL COMPANY carries 75% of standard thread plug and ring gages in stock to insure a 48-hour delivery service.

This announcement is in keeping with PERFEX's new "stepped-up" production schedules. It is just another reason why both large and small manufacturers have come to recognize PERFEX as a young progressive company that has made accuracy its creed for better work.

Because the PERFEX GAGE & TOOL COMPANY has specialized in the manufacture of standard thread plug and ring gages it is able to fulfill its promises on deliveries to those manufacturers who are urgently in need of thread plug or thread ring gages.

Wire or write your order today, sending complete specifications and blueprints.

ACCURACY PERFEX OUR CREED

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3602 GAYLORD DETROIT, MICHIGAN

FOR INFORMATION ON PRICES SEND THIS COUPON TODAY

Perfex Gage & Tool Company
3603 Gaylord Avenue
Detroit, Michigan

Gentlemen:

Please send me name of the Perfex representative in this territory.

Name_____ Position_____

Company_____

Address_____

City_____ State_____

Lend-Lease Totals $18.6 Billion to Date

Washington

• • • **The United States** has furnished $18,600,000,000 worth of goods under lend-lease agreements out of $60,754,000,000 made available by Congress for this purpose, the President revealed in a report to the legislative branch.

The following is a list of all the countries that the President's report reveals as either receiving or eligible to lend-lease aid: Australia, Belgium, Bolivia, Brazil, Canada, Chile, China, Columbia, Costa Rica, Cuba, Czechoslavakia, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fighting France, French North and West Africa, Greece, Guatemala, Haiti, Honduras, Iceland, India, Iran, Iraq, Jugoslavia, Liberia, Luxembourg, Mexico, Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Poland, Saudi Arabia, South Africa, Turkey, United Kingdom, Russia, Uruguay, and Venezuela.

The following countries have signed reciprocal lend-lease agreements: Australia, Belgium, Fighting France, French North and West Africa, Netherlands, New Zealand, and the United Kingdom.

The report says that lend-lease has received in the 2½ years of its operation only 3 per cent of the farm machinery output, valued at about $34,000,000. To the United Kingdom went $20,642,000 of this machinery. Australia and New Zealand received not quite $6,500,000 worth in addition. Another $1,250,000 worth was shipped to India.

Through October of this year value of lend-lease exports to the United Kingdom amounted to $5,980,379,000; to Russia, $3,550,443,000; to Africa, Middle East and Mediterranean area $2,168,299,000; to China, India, Australia and New Zealand $1,603,346,000; to other countries, $541,790,000.

The report says that reverse lend-lease amounted to $1,174,900,000 up to June, 1943. The United Kingdom contributed $871,000,000; Australia, $196,000,000; New Zealand, $51,000,000; and India, $56,900,000.

However, the report continues, the principal benefit the United States receives under the lend-lease program is the assistance given by its allies in waging war. The report declares that the war will be shorter because of the lend-lease assistance, and that this is a benefit beyond price.

ARCOS ELECTRODE
STUB END IDENTIFICATION
COLOR CHART

For Arcos Electrodes manufactured after May 1, 1943

GRADE	TYPE No. (See Note)	END COLOR (Primary)	SIDE COLOR (Secondary)
Chromend 16/7	301X	Yellow	Black
Chromend K	308	Yellow	.....
Chromang	307	Black	Blue
Chromend 19/9 Cb	347	Yellow	White
Chromend K-Mo	316	Yellow	Green
Chromend K-Mo-Cb	316 + Cb	Yellow	Brown
Chromend 18/8 Mo	317	Yellow	Red
Chromend KS	302 + B	Yellow	.....
Stainlend K	308	Black	White
Chromend HC	309	Black	Blue
Chromend 25/12 Cb	309 + Cb	Black	White
Stainlend HC	309	Red	.....
Chromend HCN	310	Red	Blue
Chromend 25/20 Cb	310 + Cb	Red	White
Chromend 25/20 Mo	310 + Mo	Green	Light Green
Chromend HN	311	Green	Brown
Chromend 8/18	325	Green	Yellow
Chromend 25/3 Mo	329	Green	Red
Chromend 29/9	312	Green	.....
Chromend 15/35	330	Green	Blue
Chromend 13/60	.....	Green	Orange
Chromend 13/75	Inconel	Green	White
Chromend 15/85	.....	Light Green	White
Chromend 20/80	.....	Black	Orange
Nickelend	Nickel	Grey	.....
Chromend 2M	2% Cr.—Mo.	.....	.....
Manganend 2M(S)	Special	Grey	Blue
Chromend 5M	502	Grey	Brown
Chromend 12	410	Grey	Green
Chromend 16	430	Grey	Red
Chromend 18	442	Grey	Yellow
Chromend 28	446	Orange	Blue
Mixend	Monel	Orange	.....
Reformend	M. S. for C. I.	Orange	Red
Manganend 13	13% Mn. Steel	.....	.....
Bronzend E	Everdur	.....	.....
Bronzend P	Phos. Bronze	.....	.....
Carend	Mild Steel	.....	.....

Note:—Type numbers are those of the American Iron and Steel Institute. The weld metal analysis nearest to that specified by A.I.S.T. is the one here used for reference.

NOTE: Where the grade name indicates analysis, the first figure is the % Chromium and the second figure is the % Nickel. (For instance, Chromend 20/80 is 20% Cr. and 80% Ni.)

A copy of this chart may be obtained from Arcos Corporation or any of their distributors listed below.

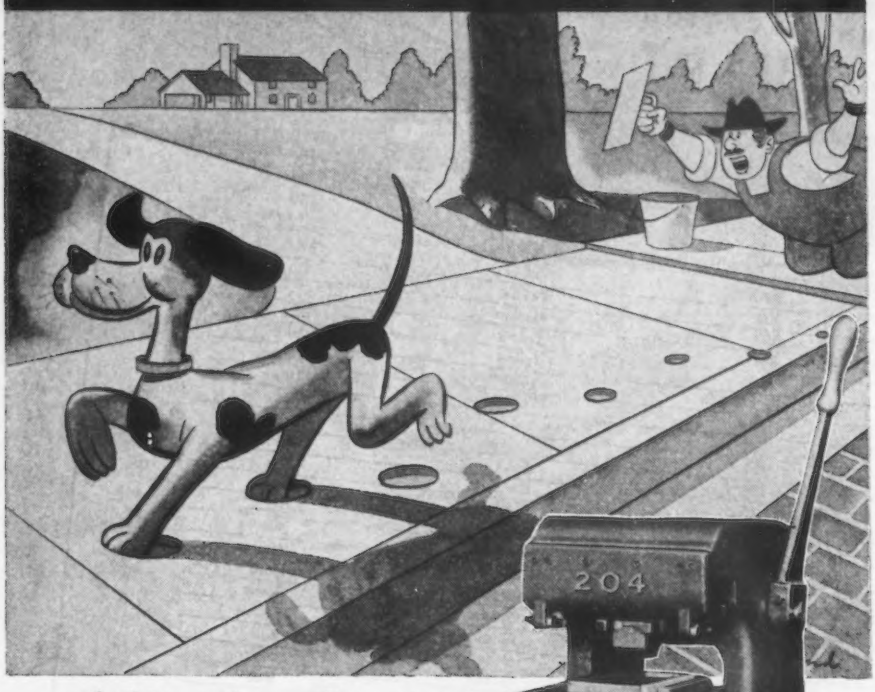
ARCOS CORPORATION 401 N. BROAD ST., PHILADELPHIA 8, PA.

Distributors Warehouse Stocks in the Following Cities:

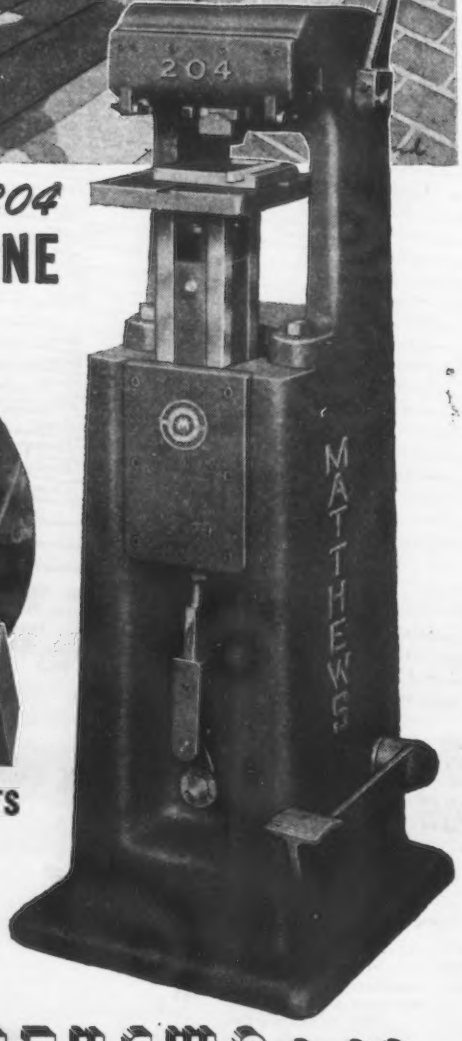
Borger, Texas.....Hart Industrial Supply Co.
Boston, Mass. (Belmont), H. Boker & Co., Inc., W. E. Fluke
Buffalo, N.Y.....Root, Neal & Co.
Chicago, Ill.....Machinery & Welder Corp.
Cincinnati, Ohio.....Williams & Co., Inc.
Cleveland, Ohio.....Williams & Co., Inc.
Columbus, Ohio.....Williams & Co., Inc.
Detroit, Michigan....C. E. Philips & Co., Inc.
Erie, Penna.....Boyd Welding Co.
Fresno, Calif.....Victor Equipment Co.
Ft. Wayne, Ind..Wayne Welding Sup. Co., Inc.
Honolulu, Hawaii.Hawaiian Gas Products, Ltd.
Houston, Texas..Champion Rivet Co. of Texas
Kansas City, Mo..Welders Supply & Repair Co.
Kingsport, Tenn.....Slip-Not Belting Corp.
Los Angeles, Calif.....Victor Equipment Co.
Milwaukee, Wis....Machinery & Welder Corp.
Moline, Ill.....Machinery & Welder Corp.
New Orleans, La.....Wm. D. Seymour Co.
New York, N. Y.....H. Boker & Co., Inc.
Oklahoma City, Okla..Hart Industrial Supply Co.
Pampa, Texas.....Hart Industrial Supply Co.
Pittsburgh, Pa.....Williams & Co., Inc.
Rochester, N. Y.....Welding Supply Co.
San Diego, Calif.....Victor Equipment Co.
San Francisco, Calif....Victor Equipment Co.
Seattle, Wash.....Victor Equipment Co.
St. Louis, Mo.....Machinery & Welder Corp.
Syracuse, N. Y.....Welding Supply Co.
Wichita, Kansas.....Watkins, Inc.

"QUALITY WELD METAL EASILY DEPOSITED"

DEEP... LEGIBLE MARKING!



with Matthews No. 204
MARKING MACHINE



MARKS ROUND OR FLAT PARTS

A range of parts up to 6" in dia. or thickness . . . legibly marked with this NEW General Purpose Marking Machine. Round parts marked with flat dies . . . flat parts marked with roller dies.

Write today for literature!

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New York, Boston, Chicago, Philadelphia, Newark, Syracuse

District Sales Offices

Cleveland Detroit Hartford Birmingham

Briefly Told—

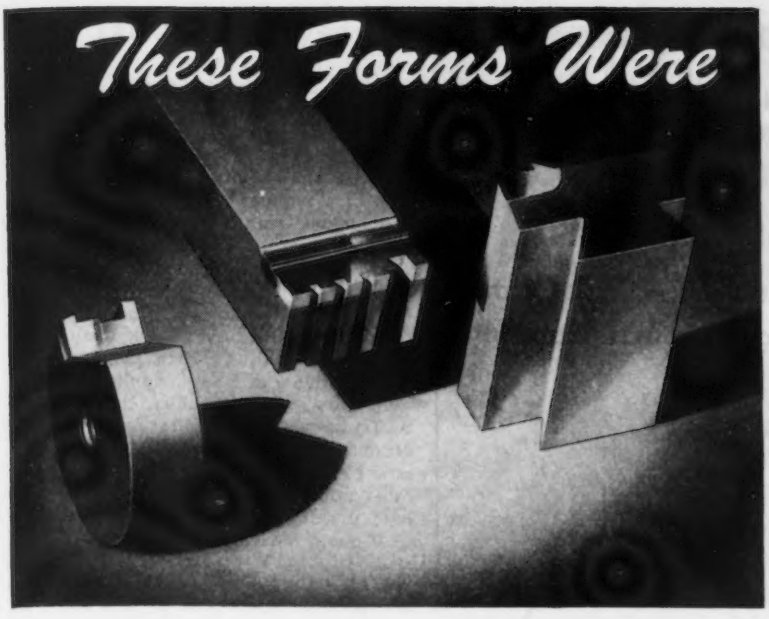
• Diamond drilling in Pend Oreille County in northeastern Washington has added 9,000,000 tons of zinc and lead ores to the nation's known reserves of war minerals, The Bureau of Mines announced. Earlier exploration and development by some of the mine operators in the district, known as the Metaline area, had revealed more than 3,000,000 tons of zinc and lead ores. Although the Metaline area has been worked for zinc and lead since 1907, production was relatively small until recent years. Ample electrical energy can be made available for the Metaline region. A Grand Coulee Dam power line could be extended to that area if conditions demanded. Flanking the Pend Oreille River near Metaline and Metaline Falls, the mineralized area extends northward into Canada. A Canadian mine just north of the International Border has substantial reserves of similar ore. Three mines now are in active production in the area, the Grandview, Metaline, and Josephine workings. Two modern flotation mills treat the ores from these mines. Although the Bureau's program will determine the extent of the mineralization, supplemental details are expected to be provided by closer-spaced drilling and development of underground workings by the mining companies which already have made a partial development of the region.

•

• Hon. J. A. MacKinnon, Minister of Trade and Commerce, in his year-end review, stated that Canadian exports, exclusive of new gold, had an aggregate value of $2,379,000,000 for the first 10 months of 1943, an increase of $489,000,000 over the corresponding period of 1942. When the final returns for the complete year become available, Canadian exports will probably be found to have totaled about $2,900,000,000, or including new gold, will approximate $3,000,000,000. To a very large extent these exports consist of food products or munitions of war. Altogether, production of munitions of war is now at the rate of $55,000,000 per week, while the grand total production of the war industries since the outbreak of war is nearing $6,000,000,000. Altogether, the total number of persons in recorded employment in manufacturing, logging, mining, construction, transportation, communications, services, trade and finance, reached on Oct. 1 the record aggregate of 1,952,000. National income in 1943 is likely to be more than $8,500,000,000, double the pre-war figure.

•

• Test flying of a new troop carrying glider, the CG-13, has started at the Ford airport. The new model carries pilot, co-pilot, approximately 30 fully equipped soldiers and there is ample clearance for two jeeps or a howitzer and one jeep complete with crews and ammunition. The CG-13 was designed by Waco



FINISH GROUND

From The Rough

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In One Setting

WITHOUT REMOVAL

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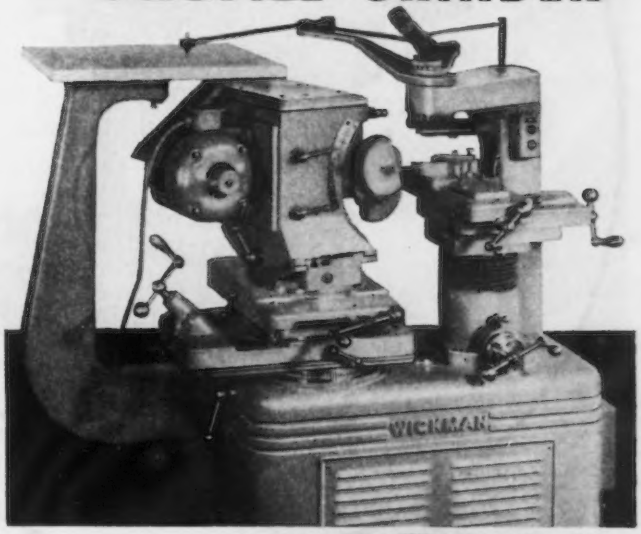
PROFILE GRINDER

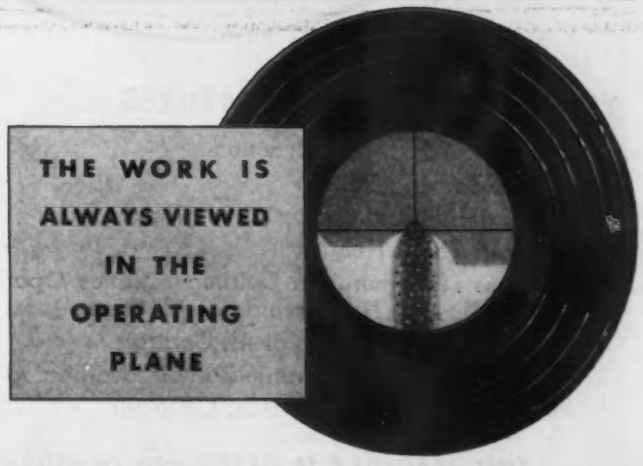
THE Wickman Profile Grinder provides a method of grinding in which a fifty times size layout of the form, a pantograph system, microscopic inspection, and a universal grinder are coordinated to provide profile grinding to an accuracy within ±.0005". Because of the extremely accurate method by which the profile is transferred directly from the drawing to the part, no further inspection or checking of the part is necessary. Before the part is removed from the machine, the profile which was ground is known to be correct.

In the grinding of a wide range of regular or irregular shapes including those ground in tungsten-carbide, the Wickman Profile Grinder has reduced machining time to approximately one-fourth that required by usual methods.

With an average amount of profile grinding work in your plant, this machine can make possible extremely worthwhile production savings. Let us send you full information.

BUY MORE WAR BONDS





THE WORK IS ALWAYS VIEWED IN THE OPERATING PLANE

WICKMAN PROFILE GRINDER

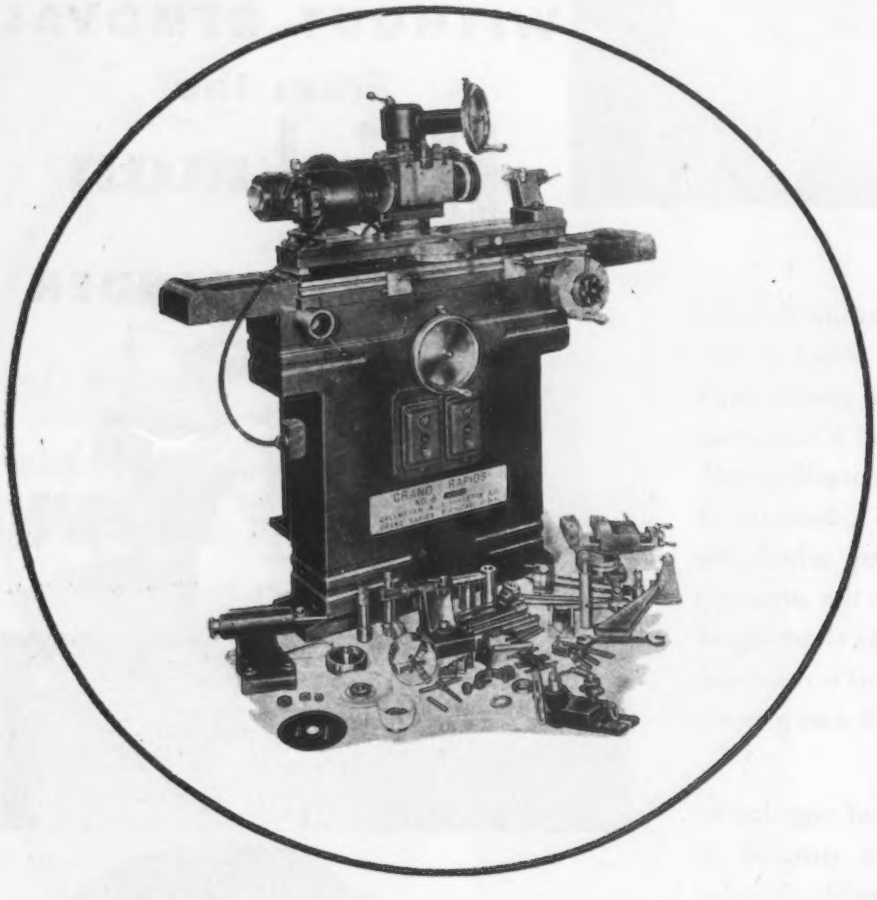
THE Wickman CORPORATION

15537 WOODROW WILSON AVE.
DETROIT, MICHIGAN

GRAND RAPIDS

UNIVERSAL CUTTER—TOOL GRINDERS

Are available in several sizes and types. We illustrate the No. 6 machine on which we can give you reasonably prompt delivery.



THIS NO. 6 GRINDER FEATURES

Cabinet Base Construction
Ball Bearing Table
Hardened and Ground Steel Ways
Fixed Table Height
Cross Movement on Column Enables Operator to Stand Close to His Machine at All Times
Convenient Location of All Controls
All Wheel Shafts Mounted on Grease-Sealed Ball Bearings
Provision for Built-In Dust Collector

THIS MACHINE IS DESCRIBED IN BULLETIN 11-1-41

GALLMEYER & LIVINGSTON CO.
200 STRAIGHT AVE., S.W.
GRAND RAPIDS 4 MICHIGAN

NEWS OF INDUSTRY

Aircraft Co., and is being built by Ford, which continues production of a smaller glider at its Iron Mountain plant.

•

• First substantial step toward alleviation of a manpower shortage in Alabama coal mines was seen by Governmental officials here in announcement that the Federal Housing Authority has approved housing construction for workers at Sayre, a small community near Birmingham where Republic Steel Corp. operates a coal mine. FHA has approved construction of 140 publicly-financed temporary dwelling units there. James A. Downey, Jr., area director of the War Manpower Commission, said the manpower shortage at Sayre, as in many other mining communities in the Birmingham district, could be traced directly to inadequate housing.

•

• With the cutting down of many plant operating schedules, abandonment of night shifts, and discharge of workers, the acute shortage of skilled workers no longer exists in Massachusetts. The labor bottleneck today is in unskilled male workers for heavy jobs.

•

• John F. Tinsley, Crompton & Knowles Loom Works, Worcester, Mass.; William S. Newell, president, Bath Iron Works, Bath, Me.; and Ralph E. Thompson, president, Reed Prentice Mfg. Co., Worcester, are members of the civilian committee investigating New England naval, marine, and coast guard shore stations as ordered by Secretary Frank Knox. Purpose of the investigation is to determine if such stations are using personnel to the best advantage. Portsmouth and Charleston Navy Yards were the first to be inspected. The investigation is part of a nation-wide survey.

•

• H. C. Houghton, assistant to the general manager, Mrs. Irene Stevens, personnel director for women, and Irene Damon, safety inspector, Bethlehem Steel Corp., addressed the Massachusetts Safety Council at a dinner meeting Jan. 13 in Boston on the problems of women workers in the shipbuilding industry.

•

• General Electric Co., Lynn, Mass., has made its peace with the director of the Massachusetts OPA. Company workers are again eligible for special gasoline rationing privileges. On Dec. 8 this privilege was taken from them for not fulfilling car-sharing requirements.

•

• Subject to approval of an incentive plan by the War Labor Board, the Electric Boat Co., Groton, Conn., will give its submarine workers bonuses running as high as 10 per cent monthly, depending on the increased production. A survey to determine the amount of increased work each employee can contribute has been completed.

•

• Lundquist Tool & Mfg. Co. 1943 production was 500 per cent greater than the 1942, and 1000 per cent greater than the 1939.

•

• Davis Engineering Co., Worcester, Mass., has devised an automatic strut-bending and forming machine that combines three formerly separate manufacturing operations. It is claimed this unit

POWER
IS OUR BUSINESS

POWER

Ready-Power manufactures a complete line of Power Units for: Industry • Transportation • Utilities • Construction • Agriculture • Oil Fields • Military and Naval Operations—and wherever electric power from Diesel gasoline or natural gas engines is needed. Since 1924, Ready-Power products have "covered the globe" and have built for Ready-Power in user satisfaction, a "reservoir of good will." Ready-Power is an Organization of Engineers with wide experience, modern plant facilities, and with pride in accomplishment. The Ready-Power Company likes their business — works hard at it and knows that by keeping faith, will continue to prosper.

Manufacturers of Ready-Power Gas-Electric Power Units for the operation of electrical industrial trucks.

Ready-Power gasoline, natural gas and Diesel-engined electrical plants, switchboards, etc., for all power needs.

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Productioneered

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● "Shotgun Coverage" or precision processing? Manufacturers who put their production programs on "cost based on efficiency" schedules never hesitate in THEIR selection of sub-zero testing and processing equipment. . . . They know that Kold-Hold equipment is productioneered* to insure the capacity and temperature best suited to fit specific cold processing application.

They know that "shotgun coverage" gives them extra compression and excess refrigerant (which they can't utilize) at a higher initial cost . . . Kold-Hold's precision processing, obtainable with Kold-Hold Sub-Zero machines, assures you efficient handling of the job for which the unit was intended . . . Here are several suggestions from Kold-Hold's Standard lines.

400T45

2.0 & 4.0 Cu. Ft. capacities at —45° & —60° F. Kold-Hold's most popular models. High efficiency, low cost maintenance and portability have established their acceptance in rivet storing, aging of steel and steel parts, chemical processing and pitch removal from optical lens. Designed for heavy duty.

1100T45

5.4 & 11.0 Cu. Ft. Capacities at —45° & —60° F. Virtually every application utilizing sub-zero processing can use these units to good advantage. Wherever —45° to —60° F. temperatures in these capacities is specified for cold processing, Kold-Hold units in this series are selected. In expansion fitting, aging of metals, aluminum alloy storage and numerous other applications, these machines provide reliable, fast, efficient low temperature performance.

505T75

5.0 & 11.0 Cu. Ft. Capacities at —75° & —90° F. For real "bottleneck-breakers" these Kold-Hold machines are unequalled in processing and testing of materials (including expansion fits, stabilizing steel and hardening of metals). Rated heat extraction on the —75° machines approximately 300 BTU per hour attaining —75° in 1½ hours. . . . On the —90° unit an approximate extraction of 100 BTU per hour reaching rated temperature in 2 hours.

Let Kold-Hold engineers help you determine which capacity and temperature is best suited to your cold processing application.

KOLD-HOLD

*Engineered for Production

438 NORTH GRAND AVENUE LANSING, 4, MICHIGAN

NEWS OF INDUSTRY

will out-produce the machines before in use by the company by about 17 times.

●

● Norton Co. maintains one of the largest research laboratories in the east. Much of the current research activities are governed by war requirements. However, the company is confident some of the projects will have far-reaching effects in the postwar period. More than 100 trained specialists are employed in the laboratory department.

●

● The Botwinik Bros., of Massachusetts, Inc., Worcester, Mass., new plant is one of the three largest in the United States devoted to reconditioning of machine tools. The plant is modernly equipped, including a 10-ton electric traveling and smaller cranes. It also has an enclosed railroad siding, recreation lounge, and a modern kitchen.

●

● General Electric has leased 60,000 sq. ft. of floor space in the Appleton Co., Lowell, Mass., plant and within a few months will begin the manufacture of electrically-heated blankets and suits for stratosphere flying. Employment will be given to 500, mostly women.

●

● Another New England foundry is folding its tent after more than 80 years of operations, the E. D. Jones & Sons Co., Pittsfield. Peak foundry employment was 51, but is only 24 now. Suspension will be Feb. 1, because company officials claim it is more economical to purchase castings.

●

● Some 13,000 white collar employees of Westinghouse Electric & Mfg. Co., whose fixed salaries range from $2400 to $5000 annually, will receive a sum averaging $4.42 a week, retroactive to April 8, 1943, to cover time and a half for work over 40 hours per week. A petition for this increase for overtime employment was made jointly by Westinghouse and the CIO United Electrical Radio and Machine Workers Union. As a result, the company will disburse about $57,500 more weekly to the white collar group than it had paid heretofore. This CIO union represents 42 Westinghouse plants, totaling about 80,000 workers.

●

● More than 23,150,000 shells ranging in size from 20 to 105 mm. were produced by the Armstrong Cork Co., during 1943. The year's production figures for some other major munitions operations of the company were as follows: More than 30,170,000 sq. yd. of camouflage netting of several types. More than 2,950,000 yd. of duck in varying widths for tents, tarpaulins, etc., coated with a waterproofing and fireproofing compound. More than 4,790,000 magnesium incendiary bomb bodies, 730,000 bomb racks of several types, 1,250,000 anti-aircraft cartridge cases, and aircraft parts of many kinds and sub-assemblies of several types for more than 5750 military airplanes. Also, the company turned out large numbers of plastic gun turrets of four types for military planes. Many of the regular floor covering products of the company, which in peace time is a nonmetal working concern, also are going into military uses. Armstrong's shoe materials are widely used in military foot-gear and many others of the company's products, such as insulating materials, packings, gaskets,

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can be moved and stored by a few men

in a short time only *by the use*

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seals, glass containers and closures are being used, directly or indirectly, for military purposes.

•

• National headquarters of the Selective System announced that in the future Army, Navy, or other Government agency representatives in industries and plants may be asked, where production urgency requires, to make joint certification with employers as to the necessity of workers in such plants for whom deferments are sought. The certification plan and procedures will be extended to industries and establishments where production urgency exists, however, only when the director of Selective Service determines that such plans and procedures are required and the Army, Navy, or other Government agency concurs. Similar procedures have been in effect in West Coast aircraft and parts plants since Nov. 6 and were recently authorized for approximately 15 plane and parts plants outside the California-Washington-Oregon area.

•

• The management of New Departure Division of General Motors, Bristol, Connecticut, announced that in the months of November and December, 1943, that company alone made more ball bearings than it produced during the entire four years of World War I. Actual figures are, of course, a military secret. This is eloquent commentary on the increased use of ball bearings in mechanized warfare and emphasizes the superhuman efforts that are being exerted.

•

• Two novel war financing features are incorporated in the $30,000,000 "V" loan recently arranged for the Crosley Corp., Cincinnati, through the Federal Reserve Bank of Cleveland. One of the novel features of this credit is an accelerating working capital agreement. The Crosley Corp. agrees to increase its working capital each year of the loan by the amount of 50 per cent of its net profits after taxes and all charges, or $1,000,000 a year, whichever is the lesser. This line of credit will be used: (1) as working capital for war production; and (2) as insurance against tying up company working capital due to contract reductions and terminations. The commitment commission on the loan is 0.25 per cent per annum on the unused portion of the credit, and the interest rate on the borrowed portion of the credit is 3 per cent per annum. The borrowing formula is also a novel arrangement, with Crosley permitted to borrow 100 per cent of its net accounts receivable arising out of war production contracts, plus 90 per cent of the aggregate dollar volume of its inventories, plus 90 per cent of the outstanding amount of advances and progress payments made and of termination payments made, plus an amount of $3,000,000 or five per cent of the amount to become due on unperformed and uncancelled war contracts, whichever is lower.

•

• Announcement of pension and retirement provisions of the S. G. Taylor Memorial Pension Plan has been made to employees of S. G. Taylor Chain Co., Hammond, Ind., by the president, E. W. Taylor, grandson of the founder of the company, the late S. G. Taylor, Sr. The employee pension is based on the base wage or salary of the individual. Each em-

What's Ahead?

No. 1 in a Series

Experts are working experimentally on a universal sign language for use during the period of reconstruction following the war. It has a vocabulary of about two thousand words and can be learned in about a month.

★

Reshingling of homes may be entirely eliminated after the war. With plentiful cheap aluminum as one of the benefits of the great disaster, we expect to have aluminum shingles, and the glass industry has already developed a lifetime glass shingle.

★

Radio waves are now being used to spread the layer of tin on tin cans and thinner than it was before the war.

★

The Diesel engine is close to its long-sought ideal of one pound per horse power. This may indicate that this thrifty engine, already scheduled to power our postwar trucks, may also be suitable for our pleasure cars.

★

Little by little new ideas combine to make flying more practical for tomorrow's civilians. One of these is a simple device for night landing which uses two lamps aimed toward the ground. The beams of these lamps are focused so that they come together to form a single spot of light on the ground when the plane is at exactly the right height for "setting down."

★

A new fuse for artillery shells is said to be so sensitive that it will explode the shell on hitting a raindrop.

★

The use of aluminum can reduce the weight of a freight car from forty-five thousand to fifteen thousand pounds with a corresponding increase in capacity.

★

Factories have been built with heating pipes permanently laid in the solid concrete floor. The method seems to be practical, economical and suitable for the heating of our homes.

★

In spite of the war, the Dutch have been able to produce a new hybrid plant, a cross between the carrot and the beet called the "wobbie".

To supply a Pacific coast shipyard with 152' one-piece keels for Navy minesweepers, giant trailers are being used that haul 60 tons of Douglas fir logs of this length.

★

Experiments are being made with artificial teeth held in place by magnets.

★

It is expected that vast amounts of magnesium will be used after the war, and it is encouraging to know that our supply is large and beyond the reach of the enemy. Although there is only fourteen one-hundredths of one percent of magnesium in sea water, there are four and one-half million tons in a cubic mile.

★

Fifty thousand patents, formerly the legal property of our enemies, are now available to American industry.

★

The electron microscope will now measure particles as small as one-millionth of an inch.

★

The Civil Aeronautics Administration expects us to have half a million private and commercial airplanes by 1950.

★

A new synthetic textile filament, the finest yet produced by man or nature, is so small that it takes twenty thousand miles of it to weigh a pound.

Automobile tires are now being checked for invisible flaws by passing high-frequency sound waves through them.

★

Plastic bearings for machinery will require no lubricants for moderate speeds and loads, and in many cases water has been found to give sufficient lubrication for even high speeds and heavy loads.

★

"Facsimile", a method of printing a miniature newspaper by radio in individual homes, was tried experimentally before the war began. By this method the printing is done during the night and a newspaper, complete with illustrations and advertising, is ready at breakfast time.

★

There is a very good chance that we may have television in full color and three dimensions. It may also be possible to store up television broadcasts to be re-run later.

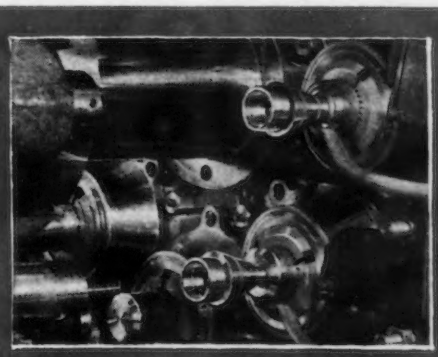
★

A micro-hardness tester is now made that can test a single microscopic grain of metal.

★

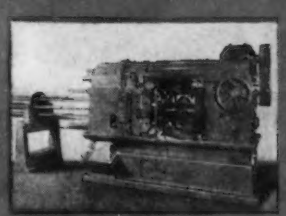
Shipwrecked sailors will soon have the benefit of a tiny searchlight no bigger than a walnut that is visible for 60 to 70 miles and good for 100 hours of use.

★



This big 8 spindle Conomatic completes seventeen operations required in the machining of an artillery shell fuse body *in 18 seconds.*

This is real production—the sort of production needed to win the war. Manufacturers will need this sort of production *after the war* if they are to meet competition, particularly if new ideas and better merchandise are to be put in the hands of all our people.



CONE

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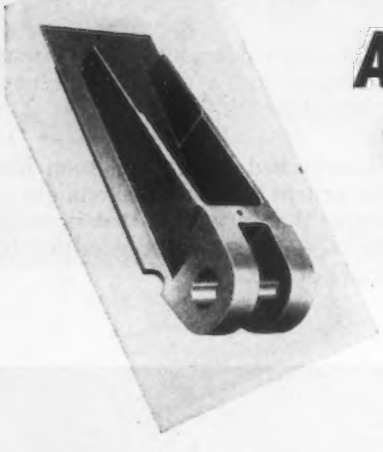
WINDSOR, VERMONT, U. S. A.



A Small Part on which the SAFETY of all Hinges . . .

The Vought Corsair, the Navy's newest shipboard fighter and the fastest plane of its type in the world, is powered with a Pratt & Whitney Aircraft 2,000 horsepower Double Wasp engine. It is built with folding wings which operate efficiently and positively on wing hinges designed to withstand tremendous stress. These hinges are Fenn made to the rigid specifications of Chance Vought. On them safety depends.

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Years of experience in the design and building of Special Machinery has given the Fenn organization a skill and know-how that may prove helpful to you in the days which lie ahead. We have the plants and facilities for handling almost any size and kind of special machinery job and we welcome inquiries from those who are looking for a dependable source.

PLANNING NOW FOR 1944 PRODUCTION

When the time comes for reconversion to peace time production, Fenn engineers, toolmakers and machinists will be ready to serve you. It is not too early to think of planning now.

THE FENN MANUFACTURING CO.
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ployee comes under the Plan after five years of continuous service (the five years then being counted in on the pension) at the age of 65. Employees in the armed services are given leaves of absence and lose nothing in the Pension Plan if they return to employment with the company within six months after discharge from war duty.

●

● *The Jones and Laughlin Steel Corp., which operated at 102 per cent of capacity in 1943, announced a total of 598 new production records during that year at its Pittsburgh, Aliquippa, McKeesport and Cleveland works.*

●

● In a report to stockholders, Arthur G. McKee & Co. pointed out that while the dollar volume of new construction contracts taken during 1943 was considerably under that of 1942, during the latter half of the year there was a large volume of contract work involving foreign delivery of materials and construction in foreign countries. Furthermore, there are a number of investigative and consulting contracts on hand for both domestic and foreign clients looking to post-war plans for reconstruction of plants or plant changes to meet post-war requirements.

●

● With production and sales reaching new high levels, output of industrial storage batteries totaled an estimated $66,000,000 in 1943, an increase of 10 per cent over the preceding year. While working almost 100 per cent on war projects, the industry's facilities are practically the same as in peacetime. When war needs diminish, production for civilian purposes can be resumed almost immediately and the "reconversion problem" is absent. With orders on hand for some months yet and with the deferred needs of various industries that are accumulating, the heavy duty industrial storage battery industry is assured of another active year that may surpass 1943.

●

● Stanley J. Harley, controller of the tool and gage division of the Ministry of Supply for the British Empire, recently conferred with industrial leaders in the United States. While in Dayton, Ohio, for a meeting with Louis Polk, president of the Sheffield Corp., Harley stated he hoped his visit would lead to a more interchangeable system for gages and kindred measuring devices from an international standpoint. He made it clear that conversations are only in the preliminary state with the groundwork being laid for a more definite and detailed program after the war.

●

● The problem of supplying ammunition for oddly calibered guns of 5 ships of our Allies has been solved, according to the Rheem Mfg. Co. One of Rheem's Chicago plants working under the direction of Naval Ordnance, is turning out thousands of 152 mm. drawn brass shell cases for the French battleship Richelieu. The cases are 3 ft. 7 in. long and weigh about 40 lb., contrasted with the 38-in. length and 28 lb. weight of our own 6-in. cases. The Richelieu is the only type of ship to use 152 mm. cases.

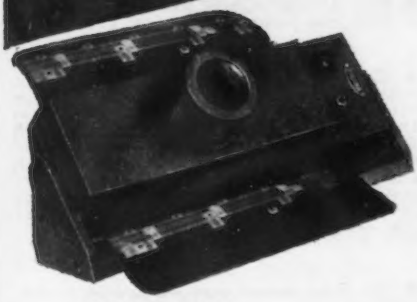
●

● *Employees of Foote Bros. Gear & Machine Corp., Chicago, reached their goal of 1,000,000 high precision aircraft gears produced in 1943, on Dec. 30, an increase of 53.3 per cent over 1942 production. At a short and simple ceremony the mil-*

In this new *Picker Magnifying Illuminator* the industrial radiographer will find a practical instrument for the magnification inspection and study of critical film areas.

for the critical study of industrial radiographs

A magnifying factor of 2½X provides ample power for minute study of spot weld radiographs, or those exhibiting porosity, shrinkage cracks, gas inclusions, and similar faults. Picker Bulletin 1143 gives details, specifications, prices.



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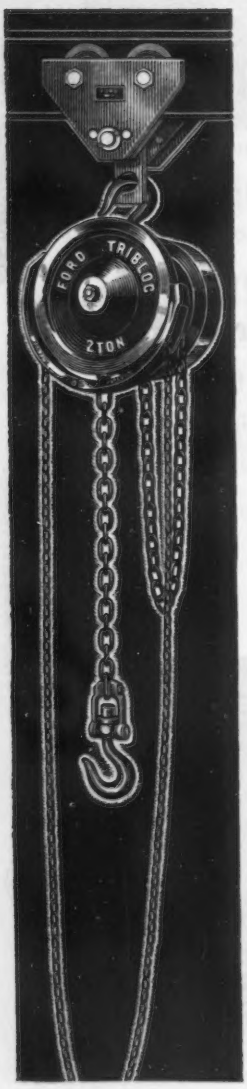
WITH YOUR PLANTS DOWN!



Your *first* job is to win the war. But in time of war—prepare for peace. Because peace brings a huge back-log of orders for peacetime products—and the demand for immediate delivery. Don't let peace catch you with your plants down.

FORD TRIBLOCS can be of tremendous help in meeting tomorrow's production demand. They are fast in operation—they are sturdy—they are on the job ready for instant use.

TRIBLOCS save money for their users, because of their first low cost, and because of their low maintenance expense.

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NEWS OF INDUSTRY

lionth gear was presented to the executives of the company by Miss Lois Rodman, gear inspector. These gears are made for the Pratt and Whitney aircraft engine which powers such famous American warplanes as the Liberator, Hellcat, Corsair and P-47.

•

• Eighteen Milwaukee men in supervisory capacities at various plants are being sent to school with all expenses paid by their bosses connected with Allis-Chalmers, Nordberg, Ampco Metal, Chain Belt and Harnischfeger. For two weeks at the Illinois Institute of Technology in Chicago they will study management for industrial supervisors. The idea originated with Harry Rogers, works manager at Nordberg.

•

• Chain Belt Co., Milwaukee, reports lower earnings for the fiscal year ending Oct 31 despite a sharp gain in sales to a new record high, $37,049,000 against $19,373,000 for the previous period. Earnings for 1943 were $863,625 or $1.77 a share against $912,600 or $1.87 a share in the previous year.

•

• Seven empty flag-draped chairs at the head of the banquet table featured the 50th anniversary celebration of the Optenberg Iron Works, Sheboygan, Wis., held in the Grand Hotel there. M. H. Busse, president of the firm, was master of ceremonies that also honored five employees who had been with the company for 25 years.

•

• The most attractive prospects in the post war foreign field will be for the export of American industrial "know-how," according to Arthur J. Brandt, president of National Tool Co., Cleveland.

•

• Bell Aircraft Corp., Buffalo, announces it built one helicopter during 1943.

•

• Despite greater supplies of synthetic rubber this nation enters 1944 with its rubber dilemma still acute, according to Dr. R. P. Dinsmore, Goodyear Tire & Rubber Co. The nation's natural rubber stockpile is diminishing fast, he said, and the nation faces the necessity to make conversions and, at the same time, to improve the product of the nation's new synthetic rubber plants.

•

• The nation has an untapped pool of 31,000,000 part-time workers, who should be utilized to alleviate manpower shortages, Paul V. McNutt, Chairman of the War Manpower Commission, said today. The WMC chairman divides the 31,000,000 potential part-time workers into three groups: Eight million students over 14 years of age—many of these are able to carry a part-time job in addition to their school work; more than 5,000,000 non-working women between 20 and 55 years of age and who are without children—most of these can accept full-time employment but are not able to work more than part-time in addition to maintaining their home; almost 18,000,000 workers in trade, service and government—some of whom are able to work a few additional hours a day on a second job.

•

• A statement by Under-Secretary of War Patterson on contract renegotiation reveals that the War Department will have completed business concerning almost all 1942 war contracts subject to renegotiation by the end of January.

•

• A recent Bureau of Labor Statistics report estimated that 300 strikes involved 500,000 workers and caused 2,825,000 man-days of idleness in November.

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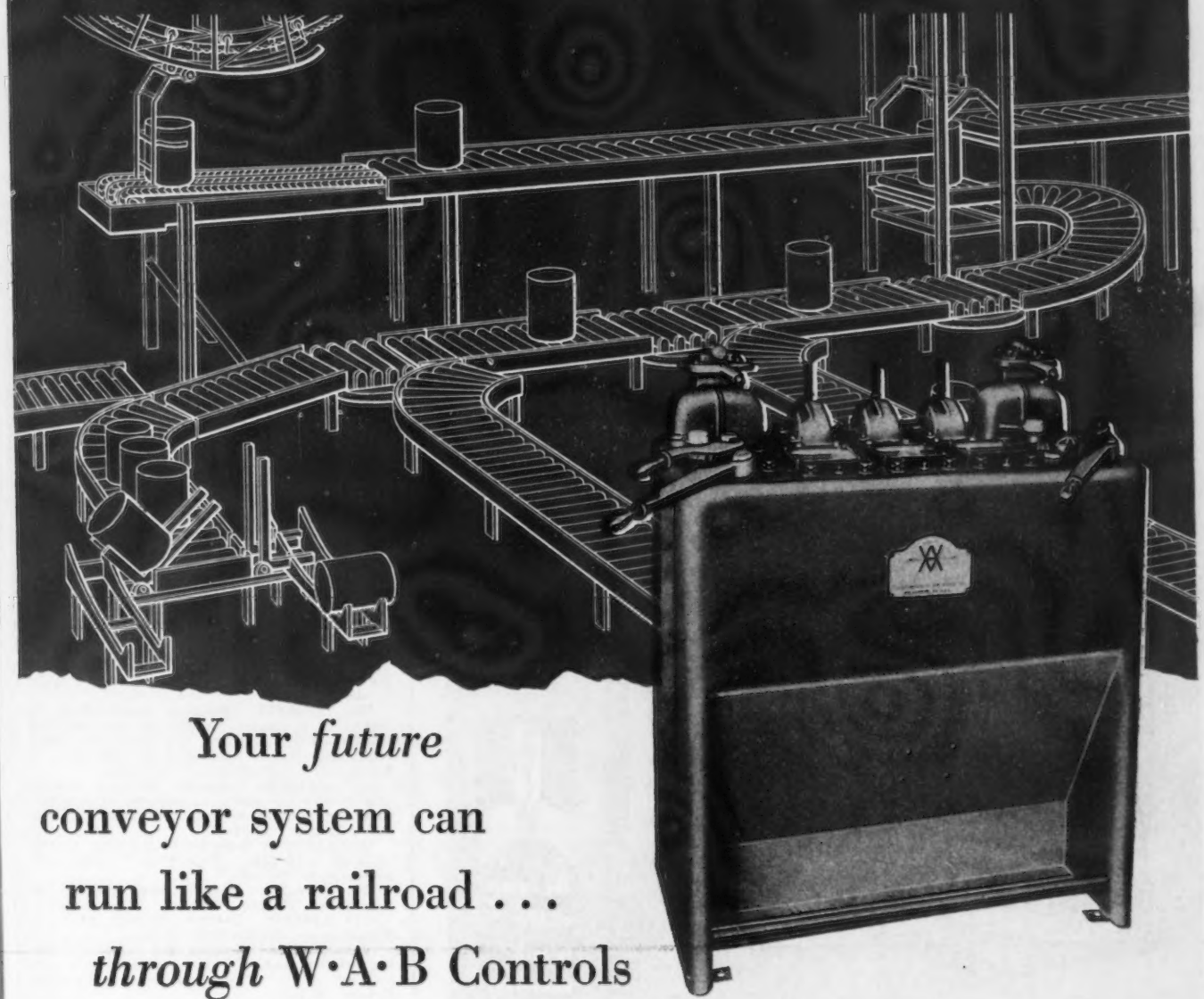

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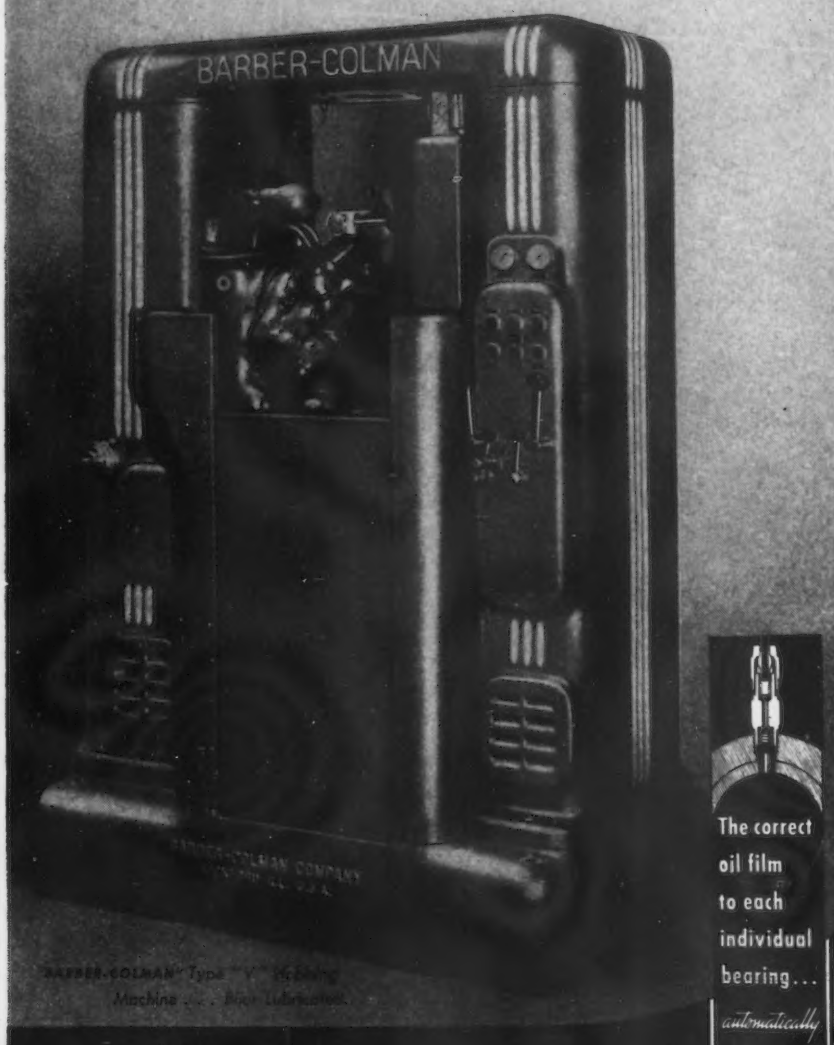

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AUTOMATICALLY *Correct* LUBRICATION

Electrical Gadgets Featured in Eleventh Seized Patent List

• • • Below is the eleventh list of seized patents available to firms which obtain a license from the Alien Property Custodian. The current series began in this magazine Nov. 4, page 95, at which time complete, up-to-date information was published about the rules and procedures. Seized patent applications were listed July 8, also in the news section of this magazine.

In the items below, the sub-class number appears first, followed by the patent number, description, inventor's name and nation, and the date the patent was issued. The patent description in full may be obtained from the government as outlined in the Nov. 4 issue.

Class 219, Continued

(19) 2,173,263. Heating device for windshields of motor vehicles. R. Nier, Germany. 9-19-39.

(19) 2,223,034. Device for heat treating tablets of resinous molding compositions previous to the hot pressing of these compositions. A. Fuchs, Germany. 11-26-40.

(20) 1,742,406. Automatic control for electric steam boilers. G. Mascarini, Italy. 1-7-30.

(20) 2,104,563. Temperature regulation arrangement for the stabilization of temperature within a box-like container. G. Kurlbaum, Germany. 1-4-38.

(20) 2,229,261. Electrically heated hot water reservoir especially adapted for home use. T. Stiebel, Germany. 1-21-41.

(22) 2,313,492. Electric heating apparatus for all applications. J. Lobstein, France. 3-9-43.

(25) 1,740,658. Pressing iron which by means of a simple handle can be converted into another apparatus, e.g., into a cooking appliance, drying appliance or the like. B. Kraupner, Czechoslovakia. 12-24-29.

(25) 2,140,756. Support forming current intake with automatic adjustment of temperature for electric heating apparatus. J. Lobstein, France. 12-20-38.

(34) 2,161,793. Reflector-heater with sheathed electric heating elements. C. Beaucolin, Luxemburg. 6-13-39.

(35) 1,765,247. Electric meat roaster. J. Seegmuller, France. 6-17-30.

(35) 2,043,601. Electric cooking oven. J. Windemuller, Netherlands. 6-9-36.

(36) 2,125,912. Methods and means for fusing articles made of substances having a high melting point. H. George, and G. Delpech, France. 8-9-38.

(37) 1,930,880. Electrical heating apparatus. O. Lokke, Norway. 10-17-33.

(37) 1,992,143. Resistance for electric heating devices. E. Challet, France. 2-19-35.

(37) 2,178,049. Electrical heating apparatus of the storage type. A. Mouton and A. Huet, Belgium. 10-31-39.

(37) 2,250,357. Electric range characterized by the fact that the spring system is lodged below the plate proper and in the space normally reserved for an earthenware part of parts from which the connecting prongs emerge. E. Challet, France. 7-22-41.

(38) 1,728,097. Radiator for water circulation to be used in connection with a condensing apparatus. J. Besson, France. 9-10-29.

(40) 1,706,146. Regulating device for electrode boilers. S. Davidsen, Norway. 3-19-29.

(40) 2,263,549. Electrical heating of liquid baths. Yvan Peyches, France. 11-18-41.

(41) 2,097,981. Immersion heater for salt baths. A. Karcher, Germany. 11-2-37.

(43) 1,776,304. Electric cooking device. R. Vannier, France. 9-23-30.

(43) 2,093,939. Electrical heater for cooking purposes of the type furnished on the outer walls, and more particularly on the bottom with ribs or other projections serving to increase the heat-transfer area. A. Strack, France. 9-21-37.

(47) 1,891,699. Automatic machine heating by induction. F. Viry, France. 12-20-32.

(32) 1,898,418. Electric gas lighter for operating with a weak current. L. Zwilling, Germany. 2-21-33.

(32) 1,946,434. Incandescent body for electric cigar lighter. H. Bach, Germany. 2-6-34.

(32) 2,092,218. Portable electric lamp equipped with an igniter for use in igniting a gas burner, or for like purpose. K. Kitsuda, Japan. 9-7-37.

(34) 1,720,334. Electric heater in which the

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PROSOLV B Cleans physically and chemically . . . strips tin in Bullard-Dunn Process.

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Not clean enough in today's wartime zinc electroplating unless it includes *both physical and chemical cleanliness.*

Zinc plating, like cadmium or copper, will not adhere over traces of rust or scale. So – when work is cleaned for zinc plating—oxides, mill scale and corrosion products must be removed – as well as grease and dirt.

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PROSOLV B goes to work in the cleaning tank like a fine precision tool. Its accurate, powerful action penetrates and removes grease and carbon smut, rust and scale. The resulting metal surfaces are physically and chemically immaculate . . . ready for a perfect plating job. PROSOLV B also is formulated to double as a cleaner and a stripping compound in Bullard-Dunn electro-pickling installations.

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NEWS OF INDUSTRY

heating elements extend longitudinally through a series of heat radiating fins. W. Langensiepen, Germany. 7-9-29.

(34) **2,165,970.** Electric heating system operating by heat radiation. B. Jaspers, Germany. 7-11-39.

(35) **1,633,290.** Cooking stove with thermoelectric storage. S. Sacerdote, Italy. 6-21-27.

(35) **1,637,659.** Thermoelectric oven. S. Sacerdote, Italy. 8-2-27.

(35) **1,707,318.** Electrical oven adapted for use in cooking, sterilizing and the like. R. Reinhold, Germany. 4-2-29.

(35) **1,974,743.** Electric muffle furnace. O. Junker, Germany. 9-25-34.

(35) **2,015,775.** Electrically heated sterilizing and cooling apparatus adapted to be used as an ice box. M. Abraham, Germany. 10-1-35.

(35) **2,049,481.** Symmetrical vertical roaster with air-cooled drip pan. A. Walterspiel, Germany. 8-4-36.

(35) **2,078,840.** Vaportight exteriorly heated electric baking oven. F. Dorl and A. Schnitzler, Germany. 4-27-37.

(35) **2,101,967.** Roasting, toasting, grilling and cooking apparatus. A. Walterspiel, Germany. 12-14-37.

(35) **2,112,731.** Drying boxes and incubators which are automatically regulated. H. Bruning and O. Schuller, Germany. 3-29-38.

(35) **2,266,735.** Glow discharge oven or furnace and more particularly pertains to the cathode structure of such apparatus. B. Berghaus and W. Burkhardt, Germany. 12-23-41.

(37) **1,666,697.** Diathermic apparatus. G. Grossmann, Germany. 4-17-28.

(37) **1,669,005.** Process of tempering and straightening saw blades, plane-knives, paper cutters and similar relatively thin tools by the simultaneous application of pressure and heat, and apparatus for performing this process. P. Hustadt and K. Hustadt, Germany. 5-8-28.

(37) **1,703,640.** Electric heating element and method of manufacturing same. A. Schmidt-Predari, Germany. 2-26-29.

(37) **1,831,889.** Electrically heated cooking appliance such as a hot plate, pan or the like. T. Skutta, Austria. 11-17-31.

(37) **1,879,212.** Apparatus for cooking or frying. A. Hainlen, Germany. 9-27-32.

(37) **1,897,197.** Heating plate provided with channels containing electrical resistances and mercury or a similar substances. F. Jolas, Germany. 2-14-33.

(37) **1,998,764.** Electric hot plate of low temperature, conduction type. F. Jordan and P. Schneider, Germany. 4-23-35.

(37) **2,255,209.** Method of manufacturing grooved electric heating plate. K. Fischer, Germany. 9-9-41.

(38) **1,637,006.** Fresh-air heater for internal combustion engines. A. Nolzen, Germany. 7-26-27.

(38) **1,651,644.** Thermo-electric apparatus intended for heating fluid masses. A. Torriani, Italy. 12-6-27.

(38) **1,729,810.** Electric heating arrangement for heating the cooling water of combustion engines. K. Witzel, Germany. 10-1-29.

(38) **1,903,898.** Heat exchange device in which heat developed in electrical resistances in a set of compartments shall be conveyed to the place where it is to be used by fluid passing through compartments alternating with those of the said set. G. Kranzlein and R. Samesreuther, Germany. 4-18-33.

(38) **1,969,282.** Method of and apparatus for storing and utilizing heat. G. Szikla, P. Merse and P. von Vago, Hungary. 8-7-34.

(38) **2,021,525.** Electrical preheaters for carburetors. R. Steinhart, Austria, and A. Hunter, Germany. 11-19-35.

(38) **2,051,657.** Electrically heated water reservoir. T. Stiebel, Germany. 8-18-36.

(38) **2,051,658.** Electrically heated hot water reservoir. T. Stiebel, Germany. 8-18-36.

(38) **2,101,267.** Humidifier for storing and conditioning sheets of reprinting paper used in the lithographic art. E. Nestler, Germany. 12-7-37.

(39) **1,634,704.** Electric water heater in which a coil wound on an insulating body and through which the current passes is mounted in a double walled hollow cylinder of thin sheet metal which is in contact on both sides with the water to be heated. H. Brand, Germany. 7-5-27.

(39) **1,704,021.** Electric circulating heater. W. Schott, Germany. 3-5-29.

(39) **1,854,880.** Electric liquid heater in which the liquid is heated while it flows through the heater. H. Berthold, Germany. 4-19-32.

(39) **1,908,114.** Electrical heater for circulating water, the control of the current and water supply being conjointly and automatically effected. C. Cante, Germany. 5-9-33.

(39) **1,908,559.** Radiator provided with a fan for circulating the air and rapidly de-

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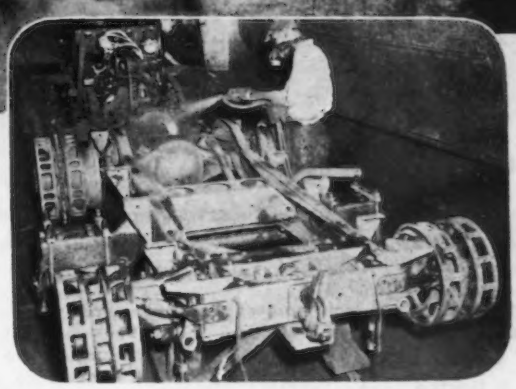

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livering the same into the room to be heated. E. Roser, Germany. 5-9-33.

(39) 1,977,151. Electric fire lighting apparatus more particularly for domestic ovens or ranges. W. Schottky, Germany. 10-16-34.

(39) 1,980,199. Water faucet having provision for supplying hot water. H. Grundler, Germany. 11-13-34.

(39) 2,036,117. Electric heater for liquids. C. Cante, Germany. 3-31-36.

(39) 2,043,002. Apparatus for neutralizing noxious organisms. W. Lechler, Germany. 6-2-36.

(39) 2,046,008. Electric heating installation operated by an intermittent electric current and adapted for a hot water heating system. W. von Sauer, Germany. 6-30-36.

(40) 1,636,788. Electric steam boiler. E. Schleck, Germany. 7-26-27.

(40) 1,683,050. Electric resistance for electrically-heated boilers. W. Penzold, Germany. 9-4-28.

(41) 1,771,918. Device for heating a mass of molten metal or alloy within a ladle. A. Fry, Germany. 7-29-30.

(41) 2,254,330. Electric immersion heater having an electric heating element mounted and electrically insulated in the hollow wall of a cylindrical carrier. T. Stiebe, Germany. 9-2-41.

(43) 1,699,610. Electric heating and cooking appliance. E. del Riccio, Italy. 1-22-29.

(43) 1,857,781. Electrically heatable kitchen utensil, especially such, in which the heating is effected with the aid of a heating-device which is placed from above upon a vessel. B. Hanzyer and R. Behm, Germany. 5-10-32.

(43) 1,904,205. Electric heating and cooking appliance. E. del Riccio, Germany. 4-18-33.

(43) 2,006,059. Device for heating a vessel electrically. D. Rudorff, Germany. 6-25-35.

(44) 1,715,444. Vessel for heating purposes. T. Bader, Germany. 6-4-29.

(44) 2,054,714. Cooking vessel for cooking equipment. E. Reich, Hungary. 9-15-36.

(45) 1,686,865. Therapeutic apparatus for generating and then locally or generally applying radiating light and heat to the human body. A. Klotz, Germany. 10-9-28.

(46) 1,758,213. Electric heating apparatus in which the heating coil is embedded in a di-electrical material. J. Bartik, Austria.

(46) 1,957,401. Mattress and heating means therefor. F. Wiedenmann, Germany. 5-1-34.

(46) 2,012,631. Electrically heated cushion. H. Kindermann and G. Kindermann, Germany. 8-27-35.

(47) 1,918,209. Induction furnace of the coreless type. H. Laub, Germany. 7-11-33.

(47) 1,918,637. Electric heater for circulating fluids. E. Fendt and C. Schorg, Germany. 7-18-33.

(47) 1,924,680. Coil for induction furnace. W. Esmarch, Germany. 8-29-33.

(47) 1,931,607. Electrical induction heating device of the kind in which an electric conductor is surrounded by a solid iron body to produce heat by the eddy currents induced in the iron by alternating currents flowing through said conductor. P. Halasz, Hungary. 10-24-33.

(47) 1,992,515. Apparatus for the preparation of foodstuff. F. Uhlmann, Germany. 2-26-35.

(47) 2,182,341. Device for heating selected metal parts of a radio tube by high frequency induction. F. Hulster, Germany. 12-5-39.

(3) 2,017,310. Machine for forging hollow metal blanks from tubular blanks. E. Giacchino, Belgium. 10-15-35.

(3) 2,107,831. Machine for the manufacture of ribbed piping. L. Morseth, Norway. 2-8-38.

(4) 1,622,792. Machine for electric welding, soldering and the like. J. Languepin, France. 3-29-27.

(4) 1,651,779. Device for assembling two-piece ball-bearing cages by spot welding. L. Rouanet, France. 12-6-27.

(4) 1,935,343. Machine for resistance electric welding. J. Achard, France. 11-14-33.

(4) 1,988,537. Electric welding machine. L. Breguet, France. 1-22-35.

(4) 2,079,042. Machine for the electric welding of the side members of vehicle frames. L. Saives, France. 5-4-37.

(4) 2,183,219. Device for electric welding of annular joints. H. Hollesen, Denmark. 12-12-39.

(4) 2,297,473. Portable welding appliance adapted for producing a series of spot welds and for traveling along a current-conductive work support. G. Heim, Germany. 9-29-42.

(4) 2,305,774. Electric resistance spot welding tongs. G. Hagedorn, Germany. 12-22-42.

(6) 1,808,122. Apparatus for welding by a continuous operation tube blanks formed out of a folded up strip of metal. F. Sonnichsen, F. Frisch and H. Nicolaysen, Norway. 6-2-31.

(6) 2,136,059. Machine for the electric weld-

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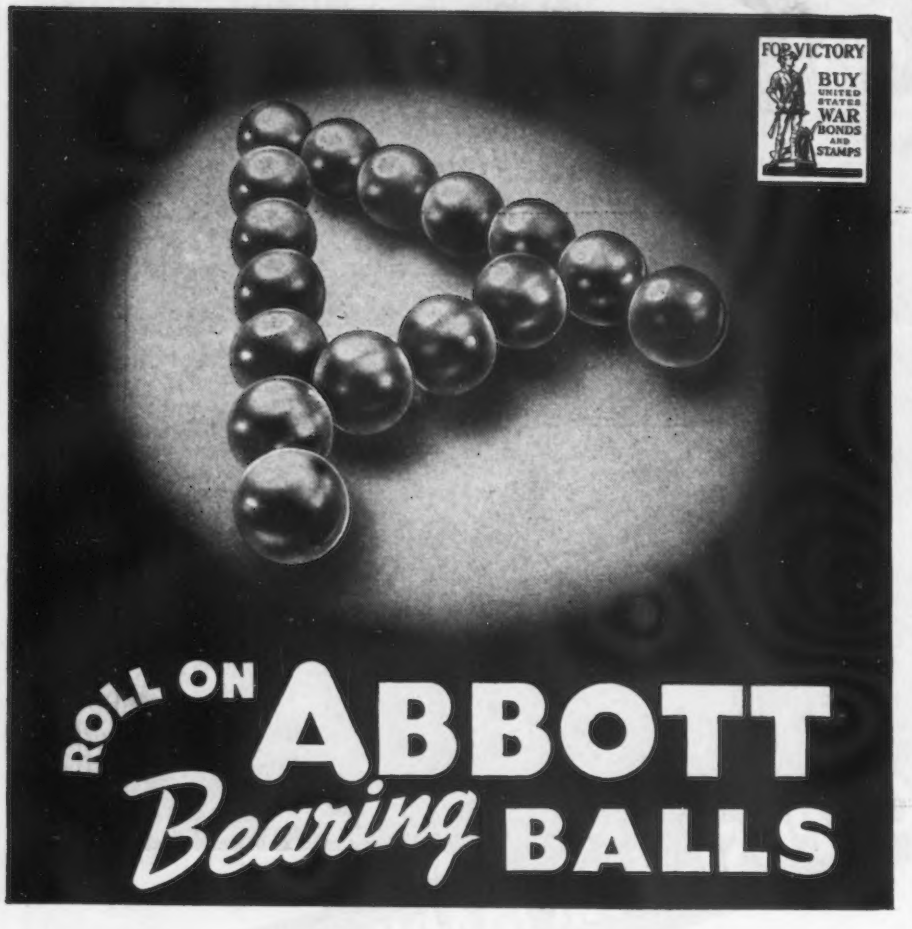

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ing of tubes. D. Sciaky, France. 11-8-38.

(8) **1,635,208.** Electric-arc welding apparatus. J. Ezendam, Netherlands. 7-12-27.

(8) **1,684,317.** Alternating current arc welding apparatus. J. Harms, Netherlands. 9-11-28.

(8) **1,754,116.** Electrode suitable for arc welding. F. Meunier, Belgium. 4-8-30.

(8) **1,788,310.** Stick for electric arc welding and cutting which comprises two bars laid side by side and having their inner faces separated from each other by insulating material. M. Lebrun and J. Brillie, France. 1-6-31.

(8) **1,841,214.** Holder for welding electrodes. L. Saives, France. 1-12-32.

(8) **1,888,453.** Saline coating and process of making the same. F. De Pape, Belgium. 11-22-32.

(8) **1,904,112.** Device for the control of electric arc welding machines. J. Achard, France. 4-18-33.

(8) **1,911,886.** Process for the manufacture of fusible electrodes for electric arc welding of aluminum and the like having a saline coating. F. De Paper, Belgium. 5-30-33.

(8) **1,920,148.** Fusible electrode for electric welding. D. Lagrande and F. De Paper, Belgium. 7-25-33.

(8) **1,936,010.** Process of manufacturing saline coatings for the electric arc welding of aluminum-silicon alloys and the like. F. de Paper, Belgium. 11-21-33.

(8) **1,997,234.** Method of supplying current and apparatus for arc welding. R. Schmerber, Belgium. 4-9-35.

(8) **2,023,818.** Coated steel electrode for arc welding. F. Muller, Germany. 12-10-35.

(8) **2,033,730.** Electrode for arc welding. F. Muller, Germany. 3-10-36.

(8) **2,068,883.** Direct current welding apparatus. H. Klinkhamer, Netherlands. 1-26-37.

(8) **2,074,276.** Apparatus for feeding an arc welding circuit from a three-phase source of alternating current. R. Schmerber, Belgium. 3-16-37.

(8) **2,089,101.** Coating for arc welding electrodes. A. Roux, France. 8-3-37.

(8) **2,239,577.** Process for terminating the flow of arc welding current. R. Sereckx, Belgium. 4-22-41.

(8) **2,272,024.** Apparatus for butt welding metal sheets. L. Saives, France. 2-3-42.

(10) **2,067,342.** Method for making electrically welded chain links. F. Rauwenhoff, Netherlands. 1-12-37.

(10) **2,167,554.** Process for the electric welding of tubes. D. Sciaky, France. 7-25-39.

(10) **2,299,483.** Process of building up chromium and chromium alloys and for preparing electrodes therefor. H. Lubbe and E. Kruppa, Germany. 10-20-42.

(11) **1,749,700.** Apparatus for the continuous thermal treatment of metallic bodies. M. Fourment, France. 3-4-30.

(11) **2,248,280.** Machine for heating metal bars and tubes, in particular steel bars and tubes of all grades, by the use of the Joule effect produced by the direct passage through said members of an electric current which is led thereto by electrodes. H. Nobiron, France. 7-8-41.

(12) **1,654,910.** Process for treating articles in metallic baths. N. Barbier, France. 1-3-28.

(13) **1,975,436.** Method of heating by induction and furnace therefor. V. Sorrel and L. Lafont, France. 10-2-34.

(13) **1,975,438.** Magnetic muffle or other body and method of varying the magnetic transformation thereof. V. Sorrel, France. 10-2-34.

(19) **1,677,032.** Electrical heating and cooking apparatus. J. Kaffer, Dutch East Indies. 7-10-28.

(19) **1,706,208.** Electric heating element for radiating heating fires in which the resistance wire is carried by a plurality of incombustible little blocks. J. Blik, Netherlands. 3-19-29.

(19) **1,889,406.** Automatic vending machine adapted to deliver goods in heated condition. S. Goldschmidt, Denmark. 11-29-32.

(19) **2,061,105.** Method and device for reenforcing articles and structures made from concrete and the like. B. Ruml, Czechoslovakia. 11-17-36.

(19) **2,110,660.** Heating thermal insulation. R. Dozcekal, Austria. 3-8-38.

(19) **2,119,680.** Method and means for the manufacture of electrical resistances. B. Long, France. 6-7-38.

(19) **2,163,993.** Device for the vulcanization of rubber. R. Dufour and H. Leduc, France. 6-27-39.

(20) **1,861,288.** Thermostatic control. L. Weill, France. 5-31-32.

(21) **2,018,147.** Heatable safety razor. E. Pirwitz, Latvia. 10-22-35.

(This Feature Will Be Continued in an Early Issue.)

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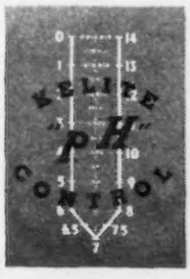

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Union Agents Blamed For Wage Violations

Cleveland

• • • **In recent weeks** a large number of complaints have arisen from employers who have relied upon the help of business agents of local unions to secure skilled union labor, that they have been induced or misled by certain business agents into paying a rate in excess of the established union scale, resulting in violations of the Wage Stabilization Act of Oct. 2, 1942, and the executive orders and regulations issued pursuant to it, which are the foundation of the War Labor Board's wage stabilization program.

These complaints fall into several categories, the most common of which are as follows: (1) That the business agent represented to the employers that men were not available at the established union scale rate, but that they could be obtained if the employer would pay a rate in excess of the scale. (2) That the business agents refused to furnish men unless the employer paid a rate in excess of the established union scale. (3) That the business agent misrepresented the union scale as being higher than it actually was, thus causing the employer to innocently pay the higher illegal rate. The out-of-town employer is particularly susceptible to this sort of falsification.

The employers who charge that they are subjected to these high pressure tactics and this unscrupulous treatment at the hands of such business agents argue that they are thereby forced to violate the Wage Stabilization Act, knowingly or otherwise, or else default on contracts for lack of labor and be mulcted in liquidated damages for the breach.

The Regional War Labor Board of Region 5 (Ohio, West Virginia and Kentucky) has recently had to cite employers in the above situations for violation of the Wage Stabilization Policy of the board and has applied civil sanctions which resulted in substantial financial loss to these employers. These employers now argue that they are being unjustly treated in that they and they alone are subjected to penalties when the unions, through the medium of their business agents and local representatives, have encouraged, induced or entrapped the employers into paying violative rates.

If the charges made by such employers are true, there would seem to be some merit to their contention of discrimination from an enforcement standpoint except for one fact, namely that the business agents or union representatives who may be guilty of the conduct attributed to them by the employers may be subjected to criminal prosecution under the so-called "conspiracy statute" of the penal code of the United States.

Title 18, Section 88 of the U. S. Criminal Code reads as follows: "If two or more persons conspire either to commit any offense against the United States, or to defraud the United States in any manner or for any purpose, and one or more of such parties do any act to effect the object of the conspiracy each of the parties to such conspiracy shall be fined not more than $10,000 or imprisoned not more than two years, or both."

It is the opinion of the board that any business agent indulging in the practices referred to by the employers may be charged with conspiring to commit an offense against the United States, to wit, violation of the Wage Stabilization Act of Oct. 2, 1942. It is conceivable that such agents may also be charged with conspiring to defraud the United States.

Chile's Coal Believed Good Basis for Chemical Industry

• • • **Chile's coal** only partially developed, offers important possibilities for a chemical industry. This is the belief of C. C. Concannon, chief of the Chemical unit of the U. S. Bureau of Foreign and Domestic Commerce, who has been loaned to Chile for a year to aid in chemical development. He expects to make Chile's coal one of his chief studies.

The largest coal producer in Latin America, Chile has reserves estimated at somewhat over 3,000,000,000 tons. Production has been around 2,000,000 tons a year.

Mr. Concannon plans to look into distillation of the coal, out of which might come many consumer products as well as chemicals needed industrially. He also will look into possible use of the coal to make industrial products like the cresols and cresylic acid, which could be useful in Chile's mining industries.

For the first three months of 1943, Chile produced 530,000 tons of coal, a gain of 25,000 over the like 1942 period. Heavier demand in Chile, as in other countries to the South, has resulted from increased wartime needs, and from the necessity to substitute coal for petroleum fuels normally imported.

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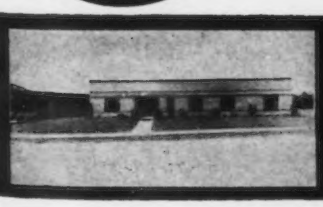

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IN THE WAR

Strenes today is being used for draw pots, draw pot inserts, draw rings for draw bench operation, for progressing upsetting dies—all in shell manufacture. Glad to identify all such users and many others.

AFTER THE WAR

After the war, refrigerator, stove, metal casket, grave vault, farm implement and other manufacturers will resume with Strenes metal forming and drawing dies. Many of the automobile, truck and tractor builders are extensive users, for body, fender and hood dies. Will name them to interested inquirers.

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Contracts Awarded by DPC and War Dept.

• • • **Defense Plant Corp.**, RFC subsidiary, has authorized the following contracts:

Minerva Oil Co., St. Louis, to provide additional equipment at a plant in Hardin County, Ill., at a cost in excess of $55,000, making a total commitment of more than $425,000.

American Chain & Cable Co., Inc., York, Pa., to provide equipment at a plant in York County, Pa., at a cost in excess of $60,000.

The acquisition of additional machinery and equipment for installation at a plant in Cuyahoga County, Ohio, at a cost in excess of $2,000,000, making a total commitment of more than $7,000,000.

Consolidated Vultee Aircraft Corp., Nashville, Tenn., to provide additional equipment at a plant in Los Angeles County, Cal., at a cost in excess of $300,000, making a total commitment of more than $700,000.

Hills McCanna Co., Chicago, to provide additional equipment at a plant in Cook County, Ill., at a cost in excess of $45,000, making a total commitment of more than $240,000.

Mathieson Alkali Works, Inc., New York, to provide additional facilities at a plant in Calcasieu Parish, La., at a cost in excess of $900,000, making a total commitment of more than $51,000,000.

Packard Motor Car Co., Detroit, to provide additional facilities at a plant in Lucas County, Ohio, at a cost in excess of $1,000,000, making a total commitment of more than $7,500,000.

Clinton Products Co., Clinton, Iowa, to provide additional facilities at a plant in Clinton County, Iowa, at a cost in excess of $270,000.

Glencoe Distillery Co., Louisville, Ky., to provide additional equipment at a plant in Jefferson County, Ky., at a cost in excess of $30,000, making a total commitment of more than $45,000.

The War Department announced Jan. 7:

1. Authorization for construction of one runway, 150 ft. x 3500 ft., and four taxiways at Randolph Field, Texas. The authorized expenditure is $583,150. Work is to be supervised by the San Antonio district office of the Corps of Engineers.

2. Award of contract to Thompson-Starrett Co., Inc., New York, for construction of Fox Hills Cantonment at Stapleton, Staten Island. Estimated amount of contract is $1,003,795. Work to be supervised by the New York district office of the Corps of Engineers.

3. Award of contract to Brinson, Cone & Manly, Tampa, Fla., for clearing, grubbing, excavation, pavement removal, stabilization, etc., at Buckingham Army Air Field, Fort Myers, Fla. Amount of contract is $804,249. Work will be supervised by the Jacksonville district office of the Corps of Engineers.

4. Award of contract to Zoss Construction Co., Hollywood, Cal., for construction of additional warehouses at the AAF Supply Depot, Los Angeles. Amount of contract is $474,001. Work will be supervised by the Los Angeles district office of the Corps of Engineers.

Patent Interchange Speeds British-American Production

• • • **The little-known** British-American Patent Interchange Agreement, two years old on Jan. 1, 1944, has spurred the "battle of production." The U. S. Army and Navy today surveyed the results this agreement has brought about. Under the arrangement, there has been a free flow of patent rights and scientific and technical information. Aircraft, radio and ordnance particularly have benefited by this united effort.

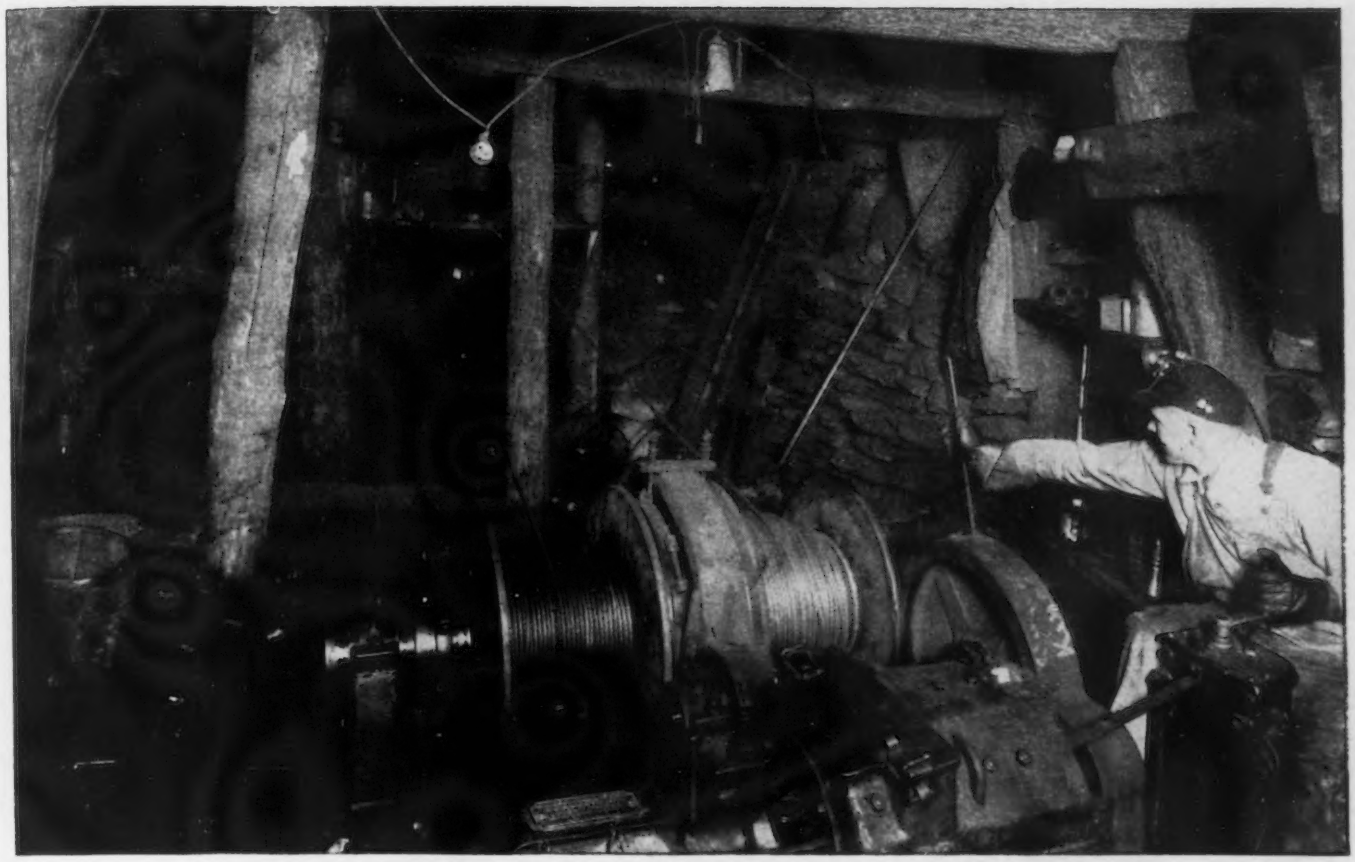
The program involves highly confidential equipment that is a major factor in the forthcoming victory. Government contractors, under the plan, have received absolutely free, in a great number of cases, patented and unpatented ideas of real value to the prosecution of the war. The agreement works both ways. American manufacturers are making war goods licensed under British-owned U. S. patents, and British concerns are manufacturing war products under American-owned British patents.

Officials point out that under the agreement, which runs for the war's duration, there is a wide opportunity for additional American manufacturers to avail themselves of free licenses to utilize British-owned inventions, including those patented in the United States, to aid them in their war production. The agreement is confined to manufacturing products required in winning the war. When the war is over, the patent rights will revert to their respective owners. Property interests in the post-war use of all kinds of industrial information are being properly safeguarded under provisions of the Lend-Lease Act.

Among the things being manufactured on both sides of the Atlantic, under the agreement, are: A kite, launched with a rocket-pistol, for sending out emergency distress signals; air compressors, range finders, illuminated gun sights, turrets, fuses, incendiary bombs, airborne lifeboats, lathes, bomb releases, catalysts, torpedoes, condenser tubes, warship propellers, periscopes, bearings, and lacquers.

The procedure whereby Government contractors take advantage of the services offered them under the terms of the Patent Interchange Agreement is relatively simple. The contractor files his request through the contracting officer or the technical representative of the service or agency with whom he has made his war contracts. A simple requisition is prepared and forwarded to the British representatives. Inasmuch as the British Government has broad powers under the Patents and Designs Act, the information and licenses can be made available promptly.

The directions and regulations under which such reverse lend-lease aid can be obtained from the United Kingdom and from several of the other Allies by War and Navy Department contractors are set forth in War Department Procurement Regulations, and Navy Procurement Directives.



A WAR MESSAGE...

To The Man Behind The Throttle

Wartime calls for extra deftness in your throttle hand. Not only is it vital to the war effort to get more work out of your machine but at the same time do it with the least wear and tear.

Wire Rope especially must be given every possible care in order to last just as long as it possibly will. The chance of replacing wire rope is apt to continue limited. Great quantities of it still must be produced for our armed forces. As our offensive power gains momentum and invasions increase in number and scope, the greater becomes the tonnage of war materiel which must be hoisted, handled, loaded and unloaded all around the globe.

In the white heat of battle when lives depend upon it, wire rope must take abuse necessitating replacement long before its time. So it is that the important matter of conserving wire rope falls heavily on the throttle hand of users on the home front. To help you save wear and tear on your wire rope and keep it working, Union Wire Rope engineers have prepared and offer five different booklets entitled: *1. Correct Handling of Wire Rope. 2. Lubrication of Wire Rope. 3. Splicing Wire Rope. 4. Socketing Wire Rope.* These give you specialized information. *5. Rope Dope* amplifies on abuses of wire rope and the remedies. All are written in non-technical terms. Put into practice, the information contained in these booklets will help you contribute to the war effort now by conserving wire rope and it should stand you in good stead in safer and more satisfactory wire rope operation post-war. All are FREE for the asking. A penny post card request will bring any or all of the booklets.

DO YOU NEED WIRE?

Manufacturers using high carbon steel wire functionally are invited to investigate the dependable source of supply afforded by our extensive facilities. Our engineers will submit interesting proposals on your requirements.

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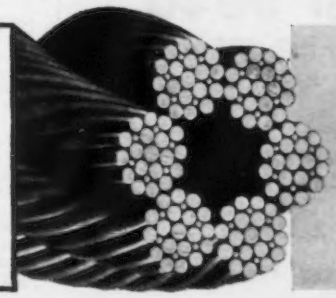
WHEN YOU NEED
PREFORMED
WIRE ROPE
SPECIFY
union-formed



union *Wire Rope*

"THE ULTIMATE IN LOW COST WIRE ROPE"

CAN BE
THROTTLED
without building up pressure

GUSHER
COOLANT PUMPS

. . . and less power is consumed when Gusher Coolant Pumps are either partially or totally throttled. Easy adaptability for quick change-overs. No packing glands to leak, consume power or require adjustment. Learn about other advantages of Gusher Coolant Pumps. There's a model and type for your needs. Write for new complete catalogue.

Model 9040

Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed 1/4 h.p. motor.

THE RUTHMAN MACHINERY CO.
1821 READING ROAD CINCINNATI 2, OHIO
LARGEST EXCLUSIVE MANUFACTURERS OF COOLANT PUMPS

Among the Week's Trade Notes

Oliver Iron & Steel Corp., Pittsburgh, has formed an industrial fasteners division, to handle all matters pertaining to the sale of products in the industrial, transportation, and jobbing fields, which will include bolts, nuts, rivets and railway accessories. James G. Graham is general manager and Edward M. Welty assistant general manager of sales.

•

South Chester Terminal & Warehousing Co., Chester, Pa., has changed its name to Chester Tidewater Terminal, Inc.

•

McCarty Co., industrial advertising counsellor, has opened offices in the Koppers Building, Pittsburgh 19. The offices will be under the management of R. S. Reed, Jr.

•

Robert H. Clark Co., Los Angeles, announces the completion of its new plant at 9330 Santa Monica Boulevard, Beverly Hills, Cal. The plant will house manufacturing and service departments, tool development and research laboratories, and executive and administrative offices.

•

St. Louis Spring Co., Moog Piston Ring Co., Moog Coil Action Parts Co., St. Louis, will now be known as Moog Industries, Inc. There is no change in management.

•

Continental Can Co. has acquired virtually all the capital stock of the Bond Mfg. Corp., maker of bottle caps, for $4,500,000 cash. The property will be operated as a subsidiary of Continental Can.

•

Russell Mfg. Co., Middletown, Conn., announces that orders for machinery belting have been received from the Belgian Congo, Birmingham, England, Haiti, Puerto Rico and the Dominican Republic.

•

Meehanite Metal Corp., New Rochelle, N. Y., announces that arrangements have been made with African Malleable Foundries, Ltd., Benoni, Transvaal, South Africa, who are going into the manufacture of Meehanite castings.

•

National Supply Co., Pittsburgh, which recently arranged for a $20,000,000 Victory Termination loan at the rate of 2½ per cent with a ⅜ per cent commitment fee, announced that it has paid off half of the outstanding balance of its $6,000,000 2⅝ per cent ten year term loan due serially 1942 to 1952, with the Manufacturers Trust Co., New York.

•

T. C. Weiser, Griffin Wheel Co., Chelsea, Mass., was elected president, and M. A. Hosmer, Hunt-Spiller Mfg. Corp., South Boston, vice-president of the New England Foundrymen's Association at the 48th annual meeting in Boston, Jan. 12.

•

Arthur W. Gibby, East Boston, Mass., was reelected treasurer, and Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, secretary. The executive committee is now composed of the following: M. A. Hosmer, Hunt-Spiller Mfg. Corp., South Boston; B. W. Hagerman, Rice-Barton Corp., Worcester; D. L. Parker, General Electric Co., Lynn; Arthur F. Dockey, H & B American Machine Co., Pawtucket, R. I.; Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; and Charles A. Reed, Rogers-Brown-Lavino Co., Cambridge.

•

Youngstown Sheet & Tube Co. plants made the following new production records during November: Brier Hill round mill produced 29,665 tons as compared with August, 1943, record of 26,994 tons; Campbell Works No. 1 butt weld furnace set 8 and 24-hr. production records; Campbell Works rod and wire mills, straighten and cut department, set a new 24-hr. record.

★ ★ ★ ★

A 4 STAR PERFORMANCE

that may be of great interest to you

Naturally we are grateful for these star awards, which with the flag, total five "E" awards to Pollak. Each star added to our Army-Navy "E" flag symbolizes an additional six months of exacting service to our Army and Navy producing smoke screen generators, bomb racks, bomb shackles, fuzes, and other precision devices.

If your postwar plans include the necessity for having a part or all of a product manufactured for you, these awards have a direct significance for your company. It is a definite merit rating for the Pollak Manufacturing Company for doing the kind of job you will want done on your products.

No doubt you appreciate the advantage you will have in postwar business if your products are ready to sell and deliver in record time when the war is over. This demonstrated capacity of the Pollak organization to develop, engineer, and manufacture products correctly designed and efficiently made, in a required volume—and delivered on time—can be a valuable asset to your company.

The very same kind of service and skill which the Army and Navy have recognized can work for you when the war is over. We suggest that you plan with us on the manufacture of your peacetime products now.

POLLAK
PRECISION
PRODUCTS

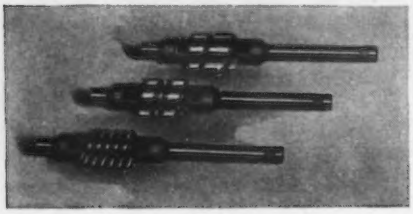
POLLAK MANUFACTURING COMPANY · ARLINGTON, NEW JERSEY

DEVELOPING · DESIGNING · FABRICATING · STAMPING · SPINNING · WELDING · FINISHING · MACHINE WORK

PRECISION PARTS

WORMS

To Bait the Enemy



The worm as turned.

Precision-machined parts for what it takes to destroy the enemy—Ace is turning them out by the thousands. (Ace has an Axis to grind!) These hardened-steel worm-shafts, for example, are part of vital radio equipment. The triple-lead worm-thread is ground right from the solid blank, after hardening. This insures the concentricity between the pitch-diameter of the worm and the bearing-diameter. The bearing-diameter itself is ground to a total tolerance of .0003".

Since the war began, Ace has been supplying America's outstanding manufacturers with small parts and assemblies calling for stamping, machining, heat-treating, or grinding. Ace has provided not only the industry's most modern equipment, but the skill, the background, and the ingenuity to use those machines in new ways to improve results, shorten schedules, and get the work out. Keep Ace up your sleeve for post-war plans. Occasional capacity is available for current work.

Modern equipment . . . modern management.

ACE

TRADE MARK

ACE MANUFACTURING CORPORATION
for Precision Parts

ARMY E NAVY

1203 E. ERIE AVE., PHILADELPHIA 24, PA.

Swedish Sponge Iron

(CONTINUED FROM PAGE 59)

ticed. For temperatures of max. 650 deg. C. (1200 deg. F.) the fan problem therefore can be considered as solved. It would, however, be highly desirable if the fan could be operated at a higher temperature, as this would eliminate the need of cooling the gas before it enters the fan. Operating the fan at the maximum temperature of 800 deg. C. (1470 deg. F.), for which it was actually designed, has not been found advisable, however.

Carburetor Problem Solved

The carburetor problem has been the hardest one to solve, the principal reason being the fact that the gas and the electric arcs do not seem to "get on" together. The gas on entering the carburetor cools the fuel, thereby decreasing its conductivity. The arcs naturally follow the path of least resistance, the result being that in the early carburetor designs the gas and the arcs separated, resulting in poor regeneration of the gas. Further, the arcs damaged the furnace walls and the electrodes became unevenly eroded.

With the present carburetor design the difficulties mentioned above have been eliminated. The gas is well carbureted and can be kept at an even temperature. The temperature of the carburetor walls is low, maximum about 1100 deg. C. (2000 deg. F.) and only mechanical wear is experienced, as evidenced on an inspection made after six months of operation. Electrode breakage has given no trouble in spite of the fact that the electrode mixture used in the Söderberg electrodes has been of inferior quality.

As to the durability of the furnace shaft proper, the following might be mentioned: When the sponge iron furnace was shut down the last time for repairs, the shaft had been in use for three years without relining. It should be noted that during this period of operation much experimenting had taken place, causing abnormal wear of the shaft. Upon inspection of the shaft it was found that the lower part thereof had become covered with a layer of sponge iron. The upper part of the shaft, on the other hand, was mechanically worn and in the preheating zone the brick lining was partly fluxed. As the shaft in spite of the irregular and abnormal operation during the early experiments still was able to stand up for three years without any relining, it is not too much to assume that it will stand five years of normal operation. As the temperature in no part of the shaft ever exceeded 1000 deg. C. and as the fluctuations in temperature are slight, the wear and tear of the shaft should be of little consequence.

After the last repair of the sponge iron furnace it was restarted in November, 1941. In 18 months of operation only the following shutdowns caused by factors pertaining to the sponge iron process proper were experienced. (See table below.)

At certain periods a decrease in the normal output was noted, the reason for this being inferior sinters that crumbled in the shaft. Due to the fact that the sintering plant at Söderfors is of rather a primitive character, particularly in the matter of mixing, charging, etc., it was found impossible to provide regularly sinters of first class quality.

(TO BE CONTINUED NEXT WEEK)

Date	Interruptions No. of days	Reasons for Interruptions
Feb. 11 to 13, 1942	3	Hangings in the gas intake level
Nov. 20 to 27, 1942	8	Dismantling of the fan for the purpose of cleaning and inspection
Jan. 25, 1943	½	Changing bearings in the circulating fan
Total	11½ days in 18 months of operation	

Increased Tin Plate Output Expected in 2nd Quarter, 1944

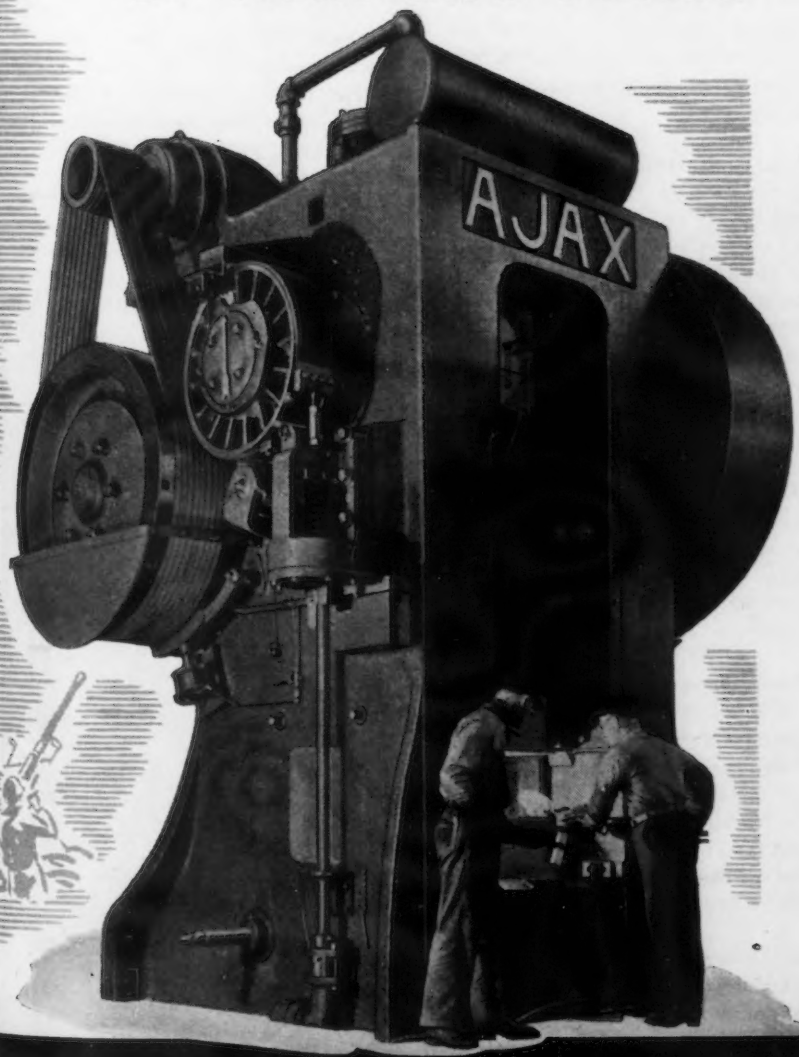
Washington

• • • **While tin and** black plate production during the second quarter of 1944 may be 20 per cent greater than in the first quarter, WPB is not likely to relax any of its controls over these items. The increased output will be utilized in the packing of food products during the coming year and be absorbed in the increased food requirements for essential purposes.

WPB officials stated that second quarter production of tin plate and black plate for 1944 probably would exceed first quarter production by more than 125,000 tons. Total tin and black plate production for the first quarter is to be 627,000 tons, with the second quarter figure expected to be about 750,000 tons.

Industry's Striking Power

for Forging the Products of WAR and PEACE



Today, in forge shops all over the country AJAX Forging Machines and Forging Presses are performing a vital role in the high speed production of material for war, such as parts for ships, guns, tanks, airplanes, bombs and shells—adding their full share to industry's all out effort toward speeding victory. And when that goal has been attained and the requirements for war are curtailed, with merely changing of the dies these same machines and presses will produce, economically at high production rates, accurately forged parts for automobiles, refrigerators, farm implements, railroad cars, and many, many more products to immediately meet the requirements of a new and greater peacetime economy.

Write for Descriptive Bulletins.

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
621 MARQUETTE BUILDING • CHICAGO, ILLINOIS

PERSONALS

• **Raymond E. Bloye** who has been assistant superintendent of the Milwaukee works of the International Harvester Co. has been appointed general superintendent to succeed **V. A. Guebard. Menno Felber,** assistant to Mr. Bloye, will succeed him as assistant superintendent.

• **Harry W. Fortey** has been appointed secretary of the public relations department of the American Hotel Assn., New York. He had been assistant to the president of the De Walt Products Corp., Lancaster, Pa., and in charge of sales promotion, advertising and public relations.

• **Howard L. Stilley,** veteran employee of R. G. LeTourneau, Inc., Peoria, Ill., has been promoted to chief field engineer. He succeeds **Ken F. Park,** resigned to join the Caterpillar Tractor Co.

• **Philip S. Hill** has been promoted to the position of assistant manager, Eastern division of Willamette Hyster Co., Peoria, Ill. He has for the past two years been manager of the Washington, D. C., branch office. **Frank McMillan** has been advanced to manager of the Washington, D. C., office to fill the vacancy left by Mr. Hill.

• **Hugh M. Fenwick,** former assistant to the executive vice-president of Consolidated-Vultee Aircraft Corp. and a close observer of military aviation in the United States and abroad, has joined Curtiss-Wright Corp.

HUGH M. FENWICK joins Curtiss-Wright Corp.

• **Sylvester V. Williams,** former inspection director of the oil field products division at the A. O. Smith Corp., Milwaukee, has been made an executive of the Struthers Wells Corp., Titusville, Pa., where he was employed before joining Smith in 1937.

• **A. Maxwell Jones** has tendered his resignation to Buffalo Bolt Co., North Tonawanda, N. Y., as vice-president in charge of sales. **Charles L. Turner** has been elected to the office of vice-president sales.

• **Fred G. Stebbins** has been appointed manager sales, capacitor section, and **Edward V. Dillon** is assistant manager sales, feeder voltage regulators, in the transformer division of the central station divisions, General Electric Co. Mr. Stebbins succeeds **Charles F. Miller** who will be senior transformer specialist for the New York district. Mr. Dillon's position has just been created.

• **John P. Roche** has been appointed assistant to the president of Oliver Iron & Steel Corp., Pittsburgh, continuing, also, his duties as counsel and assistant secretary. **E. C. Eaglen,** will head their new market research department.

• **George H. Sambrook** was appointed safety director of H. C. Frick Coke Co., and U. S. Coal & Coke Co., Pittsburgh, succeeding **Clyde L. Lutton,** who retired after 26 years' service. Mr. Sambrook became associated with this organization in 1920, and prior to his present appointment was assistant safety director. Mr. Lutton will remain, temporarily, in an advisory capacity.

• **B. C. Gould** has been elected vice-president of Murray Corp. of America, Detroit, and member of the board of directors. Mr. Gould has been operations manager of the corporation since June, 1942.

• **Robert W. Kierker,** manager of sales of Gary Screw & Bolt division, Pittsburgh Screw & Bolt Corp., Chicago, has been appointed general manager of sales. **Gerald J. Garvey,** assistant manager of sales, has been appointed manager of railroad sales. **Bernard C. Ruthy** has been appointed assistant manager of sales.

• **S. O. Bjornberg,** consulting engineer of the Illinois Tool Works, has been appointed a member of the sectional committee on small tools and machine tool elements of the American Standards Association, New York.

• **C. A. Young** has been appointed manager sales, hot rolled products division, Sheffield Steel Corp., Kansas City, Mo. Mr. Young has been with Sheffield ten years.

• **B. O. Bach,** manager of contracts, fabricated steel construction of Bethlehem Steel Co., has been appointed assistant general manager of sales.

• **Raymond E. Fisher,** formerly manager of the American Locomotive Co., Chester, Pa., has been elected president of the Bonney-Floyd Steel Castings Co., Columbus, Ohio.

• **Fred A. Kaiser** has been appointed assistant to **John A. Fry,** president of the Detroit-Michigan Stove Co.

• **James W. Yanda** has recently been made general manager in charge of research chemical development engineering of Chemical Research for Industry, Inc., Cleveland.

• **H. I. Boggs** has been made manager of the Autocar Co.'s branch in Cincinnati. Mr. Boggs is well known to motor truck users throughout the entire Ohio area.

• **Norman Thompson,** former general superintendent of Republic Steel Corp.'s ore mines, Southern division, has been appointed assistant superintendent of the 76th and 34th Street plants of the Rheem Mfg. Co. at Chicago.

• **A. C. Hamilton,** for many years actively connected with industrial manufacturing in the Detroit area, has been appointed Michigan representative of the National Smelting Co., Cleveland.

A. C. HAMILTON, Michigan representative, National Smelting Co., Cleveland

• **R. A. Maxwell** has been appointed in charge of all tire sales except airplane in the combined automotive, aviation and government sales divisions of the B. F. Goodrich Co., Akron, Ohio. Mr. Maxwell has been with the company for 10 years, mainly in truck and bus tire sales.

• **North E. Bartlett** is retiring as vice-president of the Pennsylvania Salt Mfg. Co., Philadelphia. Mr. Bartlett started with the company in 1894.

• **Edward Mackasek** has been appointed development engineer of the Porcelain Enamel Institute of Washington, D. C. He was formerly executive vice-president of the Beaver Enameling Co. of Ellwood City, Pa.

• **David P. Finney** has been appointed assistant general superintendent of Carnegie-Illinois Steel Corp.'s Clairton Works, succeeding **Hobart W. Seyler**, recently named general superintendent of the plant. **James McIntosh** will succeed Mr. Finney as division superintendent in charge of coke plant operations.

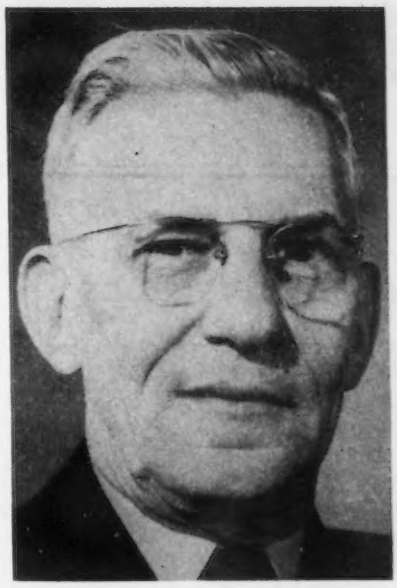
• **Edward C. Hoenicke**, assistant to the general manager, foundry division, Eaton Mfg. Co., Detroit, is consultant to the newly created gray iron castings section of the WPB. Also named to the new section was **A. Douglas Hannah**, senior industrial specialist. He is a director of the Barnett Foundry & Machine Co., Irvington, N. J.

• **W. H. Harter** has been elected a director of Continental Steel Corp., Kokomo, Ind., to fill the vacancy caused by the recent resignation of **W. W. Irwin**. Mr. Harter also is secretary and assistant treasurer of the corporation.

• **T. W. Bowers** has been elected a director of the Buda Co., railway equipment manufacturer, Harvey, Ill.

• **Frank G. Sorensen**, president of United Aircraft Products, Inc., and of American Precision Products, Inc., has been named a director of Pittsburgh Metallurgical Co., Inc., Niagara Falls, N. Y., and Charleston, S. C. Mr. Sorensen also is associated in an executive position with Cincinnati Gear Co.

• **Jerome J. Colby**, former engineer with the Milwaukee ordnance works and later production engineer for the Army Air Corps at Milwaukee, died in a Milwaukee hospital Jan. 1 of pneumonia.



RALPH H. HEBERLING, vice-president, Edward Valve & Mfg. Co., Inc., East Chicago, Ind.

• **Ralph H. Heberling**, for the past two years assistant to the president in charge of manufacturing, has been appointed vice-president of the Edward Valve & Mfg. Co., Inc., East Chicago, Ind.

• **Robert W. Kress**, formerly with the research department of the Follansbee Steel Corp., Pittsburgh, Pa., who joined the special chemicals division of the Pennsylvania Salt Mfg. Co., Philadelphia, last November, has been assigned to the Chicago office of that company.

• **E. J. Anglin** has resigned as vice-president in charge of operations of Weirton Steel Co., a subsidiary of National Steel Corp., but will continue in the employ of the company as general consultant. Mr. Anglin has been succeeded by **J. S. Williamson**, former general superintendent. **E. W. Rieger**, former assistant to the president, has been appointed vice-president in charge of engineering and development work. **W. A. Murphy** has been appointed vice-president and also will continue to serve in the capacity of secretary. **J. J. Munns** was appointed vice-president in charge of quality control, and **C. E. Bayer**, former manager of the steel works department, has been appointed general superintendent. **E. O. Burgham**, former manager of the Weirton Tin Mill, has been appointed assistant general superintendent.

• **Harold W. Buus** has renewed his former position as supervisor of technical operations in the laboratory division of Stearns Magnetic Mfg. Co., Milwaukee.

• **Stuart H. Betsinger** has been made sales manager of Kinney Aluminum Co. Mr. Betsinger, who has been connected with Kinney for over a year as sales engineer, was previously employed by Western Pressure Control Co. and Union Oil of Calif. in various engineering capacities.

• **Allen N. Candee**, mechanical engineer of the Gleason Works, has been appointed a member of the sectional committee on the standardization of gears.

OBITUARY...

• **Garnet W. McKee**, 66, head of Eclipse Fuel Engineering Co., Rockford, Ill., died Jan. 4 at Madison, Wis., following a heart attack. Mr. McKee had headed the Eclipse company, which he founded, for the past 34 years.

• **Arthur B. Mead**, vice-president of Peter A. Frasse & Co., Inc., died after a protracted illness on Dec. 25. He had been connected with the Frasse firm for 30 years, 20 of which were spent managing the company's Philadelphia sales district. Mr. Mead moved to the New York office in 1938, where he was vice-president and a director of the company until his death. He was 55 years old.

• **Irwin E. Lang**, assistant chief engineer of the Pioneer Engineering & Mfg. Co., Detroit, Mich., died suddenly on Dec. 27, at the age of 41.

• **Henry E. Miller**, president of the Chicago Wheel & Mfg. Co., died Jan. 10. He was 80 years old, and one of the oldest grinding wheel manufacturers in the United States. The firm which he headed was founded by him in 1895.

• **John M. Keenan**, 54, formerly associated with Illinois Steel Co., and one of the last so-called foreigners under contract with Tata Iron & Steel Co., Jamshedpur, India, died recently at Kunming, China, following an illness.

• **J. Harry Harley**, auto industry pioneer who was manufacturing superintendent of Chalmers Motor Car Co. from 1910 to 1915, died recently.

• **George W. Botham**, 78 years old, chairman of the board of the Wisconsin Foundry & Machine Co., Madison, died at his home there recently after a long illness. He was a specialist in the manufacture of water supply systems and furnished equipment for many cities in Wisconsin.

MACHINE TOOLS

. . . News and Market Activities

Railroads Buying; Used Market Drops

Chicago

• • • **New machine tool demand** in this area by no means is dormant, although backlogs have dwindled and orders are spotty as to types of equipment. Sales aren't even approaching 1942 and 1943 levels but, belying prophecies made several months ago that new orders would suddenly and completely cease, current sales give rise to talk that 1944 volume may approximate one-third of 1943 for many types of equipment.

Continued tooling up of a certain mammoth Chicago area aircraft engine plant, whose construction was one of the last to be programmed, and inquiries from other plants in the area whose production orders have been revised, along with a handful of entirely new plants, have kept the orders rolling in here in diminished volume, but steadily.

Another supporting factor in the local market has been actual and projected orders from the railroads. During the surge of urgent war plant demand several months ago, many of the roads seized the opportunity to dispose of obsolete shop equipment at attractive prices. Now, for the first time in years, the railroads have the ready cash to modernize their shops.

Conditional inquiries, "if and when" automobile production is resumed, have been reported on the manufacturer level. Apparently some of the more optimistic automobile manufacturers feel that at least limited production may be authorized before the end of this year. Aside from these glimmerings, however, tool demand for the production of civilian products is non-existent. Civilian goods producers seemingly hold the belief that catch-as-catch-can stocks of surplus material will be insufficient for mass production even though production limitations are eased.

This attitude on the part of civilian goods manufacturers has completely knocked the props out from under the erstwhile booming second hand market. Such war plants as are still buying tools now are able to secure early or moderate delivery of new equipment and, having ready cash, shun the second hand mart. OPA ceilings for the most part have become a happy memory, dealers' lists now being circulated offering equipment as much as 50 per cent below permitted maximums. Likening the current market to the days of 1932 and 1933, one large Chicago used equipment dealer stated that his firm had received no inquiries whatsoever for two or three days at a time during recent weeks. The severity of the situation is tempered, however, by the fact that many dealers' stocks have been nearly cleaned out. For the future, there hangs over the trade an estimated 200,000 government owned machine tools, valued at $1 billion, in the Chicago territory.

•

Subcontracting Increasing

Cleveland

• • • **The machine tool business** has had a busy week here producing both an increasing volume of special machines and subcontracting innumerable components for war materiel. Reports would seem to indicate that with the backlog of orders being eaten into rapidly and new standard tool orders declining, subcontracting will continue to grow increasingly. The invasion program has been a recent and urgent stimulus and individual ingenuity has served to fill up many programs which were beginning to thin.

Individual efforts to maintain volume are reflected in the production of the Clark Utilitruck by Cleveland Automatic Machine Co.; a campaign to rebuild old turret lathes on a fixed fee basis by Warner & Swasey Co., and growing parts production of all kinds by many other firms having contract departments.

Undoubtedly the leading problem in the minds of machine tool men is that of the disposition of tools which will become idle when DPC and other war-born plants are permanently thrown out of production. A decision on the part of the government is eagerly awaited not only as to method of disposal but also as to prices.

Machinery makers suggest that the machines be directed into replacement of old machines now in service, thus raising the tool efficiency of the nation's industries to a maximum degree. There is fear that such tools may be termed idle and excess upon the closing of such plants and be channeled through the WPB redistribution branch much the same as idle steel now is being handled. This could be a practical method, tool men say, providing the tools are not permitted to fall into the hands of speculative buyers at near scrap prices.

•

Cutting Tool Group Organized

Detroit

• • • **The Cutting Tool Manufacturers Association** has been incorporated in Delaware as a non-profit corporation, it was announced by W. G. Robbins, chairman of the Board of Directors and president of Carboloy Co., Inc., Detroit. Organizational meetings will shortly be held in other industrial sections of the country. Membership is available to individuals, partnerships, firms or corporations engaged in manufacturing of cutting tools for use with power driven machinery.

Purposes of the association are listed as assistance to the cutting tool industry generally, as well as to federal and local agencies, on such subjects as renegotiation, taxes, contract cancellation and termination, disposal of surplus cutting tools by the armed forces, standardization of cutting tools to permit greater simplification of production equipment and methods, problems arising from cancellation, etc., of pool orders, and post-war disposal of emergency manufacturing facilities.

•

New Tax Bill Being Watched

Cincinnati

• • • **Manufacturers continue** to ponder over renegotiation figures and some are keeping an eye on the new tax bill going through Congress in the hope that some renegotiation relief will be forthcoming before they are required to make final decision on Board reports. Others, of course, have forwarded their checks with corresponding protest letters so that advantage may be taken of any relief subsequently granted. At the same time, the preparation of tax returns also takes on a tentative appearance, since the same tax bill may change these preparations.

MAINE STEEL, INC. *Reports . . .*

"Greatest Time and Money Saver in Die-sinking Machinery in 25 Years!"

"You may remember that about a year ago you sold us a Rotary Head Die-Sinking Machine. We feel that it is time that we told you what we think of it.

The Rotary Head principle has saved us more time and money than any other improvement in Die-Sinking Machinery since Cherrying Attachments were invented more than twenty-five (25) years ago.

The principal reason is that we can sink four (4) impressions complete without moving the work on the table.

This saves three (3) setups out of four (4) when compared to a Rotary Table Machine.

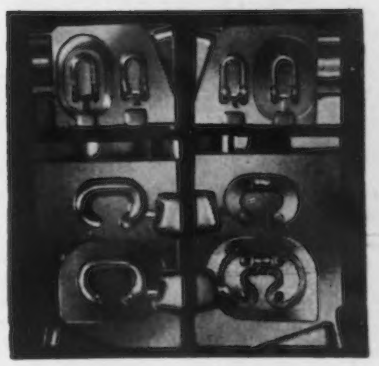
This saving would of course be increased where more than four (4) impressions are needed.

Besides this — the various movements built into this Rotary Head enable us to sink our dies without first laying them out on the Die Blocks.

The machine does its own layout work.

And after a year's experience we can say that these two features have averaged to save us over 30% of our die-sinking time.

Yours very truly,
MAINE STEEL, INC.
A. A. Rines
Foreman—Die Sinking Dept. "



This is typical of the forging dies produced by Maine Steel, Inc. The Milwaukee Rotary Head Miller has saved this firm over 30% in die-sinking time on dies of this type.

Kearney & Trecker's Rotary Head Miller is regarded by the majority of users as the most versatile machine ever designed for die and mold work. Direct — fast — accurate — it reduces initial job preparation and set-up time to the minimum — saves operator's time and assures rapid production of dies and molds. Write for Bulletin No. 1002C for full information on this unusual machine tool.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

NON-FERROUS METALS

. . . News and Market Activities

So. California Aluminum Plants to Stay Open

• • • **Continuance of the** present aluminum industry in southern California was recommended to Washington Jan. 14 by the Los Angeles Area Production Urgency Committee following an extended investigation by a subcommittee composed of military and civilian production experts.

Chairman Louis M. Dreves, in announcing the decision, revealed that the committee at the same time revised employment ceilings at the three Los Angeles area plants involved, permitting recruitment of several hundred additional workers.

The study was taken at the request of WPB's aluminum and magnesium branch in Washington, which is considering a cutback in the industry nationally because output has begun to outstrip current war needs.

"Our local production of extrusions and forgings right now is less than our factories require and we are having to import some from the East," Dreves said. "On some items for aircraft, for example, plants are dependent upon hourly delivery of parts and the time lag is seldom more than 12 hrs. With the pressure now on for more fighter planes, we cannot afford to risk interruptions because of slow transportation from the East."

Finding that "local production of aluminum is not meeting needs for all types of aluminum on the Pacific Coast," the committee held that:

1. Closing of Southland plants would further burden the already overtaxed transportation lines to the West.

2. Southland production operating on electricity generated by waterpower, is not threatened by shortages of fuel as are Eastern Plants dependent upon coal.

3. Closing of the plants would release little manpower to other local war industries because skilled workers imported from Eastern areas show an inclination to return home, rather than transfer to new lines of work.

The urgency committee recommended also that serious efforts be made to step up output of the fabricating or extrusion plant at Phoenix, Ariz., and that a study be made with a view towarl eliminating cross-movement of aluminum pigs, ingots and billets between Eastern points and Los Angeles.

Summary of U. S. Duty Free Copper Statistics Reported by Members of the Copper Institute

In Net Tons

Year	Production		Deliveries to Customers		Refined Stocks† End of Period	Stock Increases or Decreases	
	Crude*	Refined	Domestic**	Export		Blister	Refined
1939	836,074	818,289	814,407	134,152	159,485	17,785	−130,270
1940	992,293	1,033,710	1,001,886	48,537	142,772	−41,417	−16,713
1941	1,016,996	1,065,667	1,545,541	307	75,564	−48,671	−67,208
1942	1,152,344	1,135,708	1,635,236	.....	65,309	16,636	−10,255
1943	1,194,565	1,206,871	1,643,955	.....	51,343	−12,306	−13,466
1943							
Jan.	97,590	97,068	136,007	.....	54,756	522	−10,553
Feb.	92,707	98,203	132,459	.....	51,539	−5,496	−3,217
Mar.	102,329	105,172	146,488	.....	66,189	−2,843	14,650
April	99,300	97,146	150,451	.....	65,829	2,154	−360
May	105,227	99,103	137,739	.....	58,899	6,124	−6,930
June	100,313	102,126	138,713	.....	55,707	−1,813	−3,192
July	100,456	105,589	129,631	.....	55,097	−5,133	−610
Aug.	97,413	100,077	147,135	.....	53,726	−2,664	−1,371
Sept.	98,867	98,333	141,111	.....	45,844	534	−7,882
Oct.	102,589	97,274	129,212	.....	47,148	5,315	1,304
Nov.	99,340	102,136	138,881	.....	52,027	−2,796	4,879
Dec.	98,434	104,644	116,128	.....	51,843	−6,210	−184

* Mine or smelter production on shipments, and custom intake including scrap.
** Beginning March, 1941, includes deliveries of duty paid foreign copper for domestic consumption.
† At refineries, on consignment and in exchange warehouses, but not including consumers' stocks at their plants or warehouses.

Refrigerator Specifications Eased

• • • **WPB has changed** specifications to permit greatly increased use of copper and aluminum strip and tubing in the manufacture of commercial and industrial coil and tube assemblies for refrigeration condensers or coolers. This action, effective Jan. 11, was taken to make field service operations easier and to relieve producers of certain restrictions in the manufacture of coil and tube assemblies.

Relaxation of the specifications covering use of these critical metals will allow the industry an approximate increase per quarter of 300,000 lb. of copper strip, 660,000 lb. of copper tubing, and 200,000 lb. of aluminum strip. There will be a corresponding decrease of 500,000 lb. of steel strip and 400,000 lb. of steel tubing used per quarter as a result of the substitutions.

Since copper and aluminum are easier to handle than steel, the industry, consisting of some 25 companies, estimates that 700,000 man-hours per year will be saved, equal to 30 to 40 per cent of the entire total of industry man-hour operations.

The two amendments, which alter Schedule III and IV of Limitation Order L-126, will permit the following changes in the manufacture of coil or tube assemblies for refrigeration condensers or coolers:

1. Permit the use of non-ferrous metals in the fabrication of coil or tube assemblies for coolers of the finned type only, for coil or tube assemblies to be used in farm milk coolers of the immersion type and for pipe and tubing in water and brine coolers of the shell and tube type.

2. Remove the restrictions on the thickness of fins used in the fabrication of coil or tube assemblies for air cooling.

3. Permit the use of non-ferrous metals in the fabrication of replacement coil or tube assemblies when the assembly is to replace an existing assembly of like metals.

In addition to the relaxations permitted on the manufacturing processes, servicemen or repairmen will be permitted to use copper or copper base alloy pipe or tubing for refrigerant connections.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.32–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.89

SCRAP

. . . News and Market Activities

Scrap Inventories Close to Safety Margin Says Barringer

Cleveland

• • • **Edwin C. Barringer,** president of the Institute of Scrap Iron & Steel, Inc., meeting here Wednesday and Thursday of last week in the Institute's sixteenth annual convention, emphasized the importance of dealers as a means of removing excess and obsolete material from government and contractors' hands for re-cycling into civilian supply and pointed out the conservation of raw materials being effected through the use of scrap.

Mr. Barringer pointed out the continuing need for scrap flow by stating that purchased scrap inventories represented only about a nine weeks' supply, while home scrap supplies had fallen to about two weeks' requirements. Pig iron stocks also were stated as representing only about a 10-day supply. This margin for national safety was declared by Mr. Barringer to be "obviously none too large."

The future supply of scrap was illustrated by the statement that approximately 1¼-billion tons of metal now in use represent potential scrap. The role of the scrap industry as a means of re-cycling excess and obsolete materials into re-usable channels, thus removing it from the hands of the government and contractors' hands, was also stressed.

Julian C. Hammack, general counsel for the Institute of Scrap Iron & Steel, discussed the dealer problem with contract termination. In outlining the situation he said that because dealers supply a basic material their contracts are with sub-contractors and not with the government direct. Hence, termination by the government does not affect them directly except as the customer fails to fulfill scrap contract terms due to terminations of the prime contract requiring the scrap as one of the raw materials. Since scrap contracts are legally valid instruments, their eventual fulfillment is not questioned but extended delivery postponements which could be caused through termination of prime contracts confronts the dealer with possible long periods of slack business without recourse to the government for funds.

The Institute's aim as expressed by Mr. Hammack is that the tie-in of scrap contracts with the prime contracts requiring the use of scrap be established so that scrap dealers too may file compensation claims against terminated contracts mueh the same as would be done by a sub-contractor.

•

PHILADELPHIA — Demand for all open hearth grades increased slightly this week. One mill that halted receipts finds that it is not getting the quantity it expected, while another after similar action is receiving heavier shipments. Cast continues in good demand while low phos is hard to sell. With better weather and increased labor, scrap shipments from the South have improved.

•

NEW YORK—As the demand for open hearth scrap increases, the bottlenecks of labor and transportation appear more acute. All premium grades are slow and because of this situation rather than prepare low phos scrap, the material is added to the open hearth grades and sold as such.

•

BUFFALO — Demand for scrap remained firm this week with all consumers in the market and all items moving in fair quantity. Sales of alloy turnings with premium waived were reported in the trade. The improved situation revived an old sore, the inability of yard operators to obtain adequate labor, particularly during cold weather.

•

CHICAGO—Although district mills that had been out of the market by WPB request now have no purchase restrictions, mill buyers are wary and are buying for immediate requirements only. The purchase holiday plus the short-lived strike in the mills served to cushion and provide better balance for stocks. Lifting of restrictions on use of alloy grades in the open hearth has aroused no particular enthusiasm as a means of consuming excess alloy scrap. Some mills here are being forced to avoid any further alloy additions to scrap charges.

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CINCINNATI — Dealers are putting into practice advice, suggestions and ideas obtained at the recent Cleveland meeting. As a result, dealers are becoming cautious about permitting yard supplies to accumulate and are moving material as fast as it can be prepared. Correspondingly, there has been a modest upturn in demand for old materials and with price relief granted on alloys, the trade generally expect some relief from the heavy glut in this type of scrap. Consumers are accepting materials as shipped, so that by and large the market appears to be in reasonable balance.

•

BOSTON—Yards and brokers report business no better. Because of a lack of light material three of the large yards have stopped operating presses. One important maker of shells for the government has stopped such work and another is scheduled to do so this week and many plants supplying borings, turnings, etc., are producing 50 per cent less than a year ago. Much battlefield scrap available is not particularly desirable, and peddlers find pickings poor. The scrap situation unquestionably is tight.

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NEW ENGLAND — Although yards complain about the labor situation, they consider themselves lucky. One yard with 25 workers on the payroll reports 23 out due to sickness or some other reason, another hiring 12 men had only four this week, and so it goes. However, all say that in a way they are lucky because of the scarcity of scrap. If scrap was flowing into yards in large quantities it would be impossible to handle it with all available help working overtime.

Barringer Reelected For One-Year Term

Cleveland

• • • The election of officers held last Thursday during the sixteenth annual convention of the Institute of Scrap Iron & Steel, Inc., here reinstated Edwin C. Barringer as president for another year and continued his post as executive secretary. The vice-presidency was won by William J. Wolf, Wolf & Co., Hamilton, Ohio; Secretary, Walter Erman, Erman-Howell Co., Chicago. The retiring officers were Everett B. Michaels and Hiram Winternitz who formerly held these posts. Remaining in office were: Treasurer, Samuel G. Keywell; General Counsel, Julian C. Hammack and Comptroller, Thomas F. Kelly.

The board of directors of the institute established two new chapters, one in Indiana and a second in Oregon. All directors-at-large were reelected and two new directors were added. These were William J. Ross, Hyman Michaels Co., Chicago, and Milton K. Mahler, Morrow Steel Co., Detroit.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.00	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
hicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	17.50	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.		12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.; at Memphis, 50c.; Great Lakes ports, $1; New England, $1.25. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$3 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.00	24.00	24.25	24.50
Chicago, Philadelphia Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21 00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED

	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.105
Type 5*	0.135	0.115

*Per lb. of scrap material.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Jan. 18, 1944	Jan. 11, 1944	Dec. 14, 1943	Jan. 19, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Jan. 18, 1944	Jan. 11, 1944	Dec. 14, 1943	Jan. 19, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 157-169.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 18, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Product \ Basing Point	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia[a]
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[3]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[2]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[8]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2. 49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[12]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2 15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[12]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)		(Weirton = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢a	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢g	2.10¢	(Bethlehem = 2.10¢)				2.45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[6]	$5.018a	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.958	7.108	6.85	8.00
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.004	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[2]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

FOUR UDYLITE BARRELS FOR BULK HANDLING OF SMALL PARTS

In one of Udylite's four types of barrels you will find exactly what you need.

Udylite barrels are designed by engineers who *know* the plating and finishing business through years of experience. These barrels have been tested under actual plant conditions — hundreds of them are giving "better than satisfactory," continuous service under today's abnormal strain. They have proved themselves worthy of your consideration and trust.

THE HORIZONTAL PLATING BARREL. Udylite's conventional, rotating cylinder type barrel. Product of years of practical experience in plating. Proved by years of service. Built to your requirements in "Lift arm", "Multiple cylinder" or "Bail" type.

The barrel which built Udylite's reputation for A-1 trouble-free equipment.

THE MULTI-PURPOSE BARREL. A "Jack of all work" for cleaning, drying, plating, rinsing or pickling of small parts. Fast, sturdy and economical. Batch type. Loads and unloads quickly. Capacity one peck or 50 to 70 pounds. Equipped for cyanide or acid plating or for tumbling, pickling, rinsing, etc., as you specify.

THE AUTOMATIC CLEANING AND PLATING MACHINE. A practical, compact unit which cleans, pickles, plates, rinses and dries large quantities of small parts automatically. Can be used for any combination of operations. May be converted to new cycles quickly and inexpensively. No manual handling of parts in process. An ideal unit for war or peacetime quantity production.

THE HANDIPLATER. The handiest little plating outfit in any plant. Plates that double handful of odd parts which are always such a problem. Can be carried anywhere in the plant and plugged into regular light socket. A complete unit in every way.

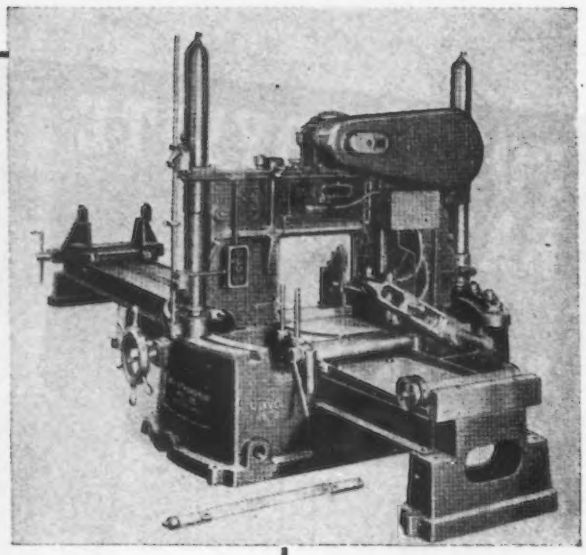
If you need information on bulk handling of small parts write or call Udylite—our experienced engineers are at your service.

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit 11, Mich.

Chicago 12, 1943 Walnut Street
Long Island City 1, N. Y., 11-16 44th Drive
Cleveland 3, 4408 Carnegie Ave.

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

You can STRETCH MANPOWER *by using*

CLARK FORK TRUCKS

CLARK TRUCTRACTOR
DIVISION OF CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN, U.S.A.

A Product of CLARK EQUIPMENT COMPANY

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

•Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	53.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $36.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

Forming, Welding, Fabricating—

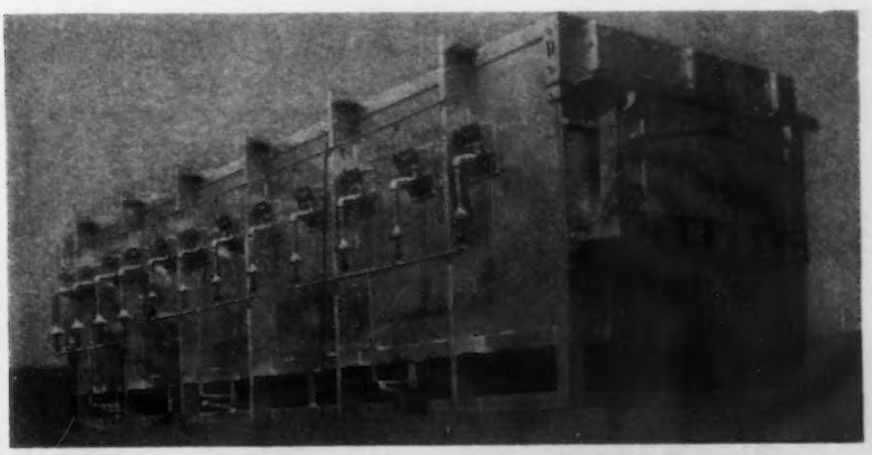
3000 lb. Electro Processing Oven of ¼" steel plate (50" long x 36" inside diameter) shown with rock wool jacket removed . . . fabricated by Brandt for a large cork board plant.

Call BRANDT of Baltimore

for Precision in Heavy Plate and Sheet Steel Work

Here, at your command, is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*



BELLEVUE FURNACES

are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston (3)	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*			*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (5)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass (3)	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (4)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.... *$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company. Effective Feb. 1, 1944, Mystic Iron will be sold without the above OPA price relief grant of $2 per ton.

(4) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(5) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

		Seamless Cold Drawn	Lap Weld, Hot Rolled	Hot Rolled
2 in. o.d.	13 B.W.G.	15.03	13.04	12.33
2½ in. o.d.	12 B.W.G.	20.21	17.54	16.58
3 in. o.d.	12 B.W.G.	22.48	19.50	18.35
3½ in. o.d.	11 B.W.G.	28.37	24.62	23.15
4 in. o.d.	10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
⅝ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

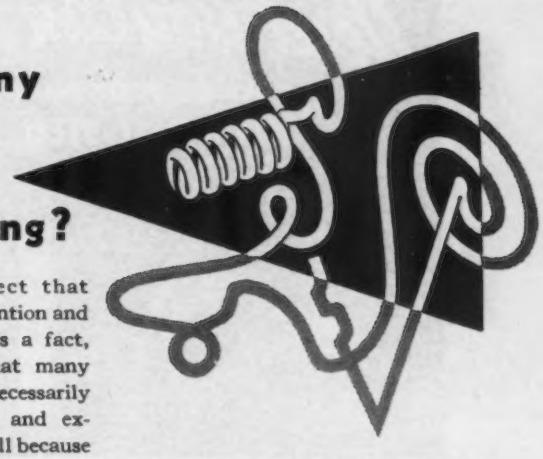
Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	$3.15
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham: spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

How many BENDS in a Spring?



Here's a subject that deserves close attention and investigation. It's a fact, sad but true, that many springs are unnecessarily intricate, difficult and expensive to make, all because of lack of understanding of the ultimate purpose. Ofttimes, a simplified design—or a different type of material can do wonders in the way of reducing costs and "upping" performance. Here's where experience in spring design pays off. Let the springmaker in on your requirements—in the early stages if possible.

A good spring in time saves nine!

DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.
Division of Associated Spring Corporation

Crack Down on Your METAL CLEANING Costs!

Hundreds of manufacturers in the metal working industry actually save more than half of their former metal cleaning costs with Magnus Emulso-Clean . . . Emulso-Dip for cold tank cleaning and Emulso-Spray for use in mechanical washing machines.

Emulso-Clean reduces cleaning labor costs and eases manpower shortages . . . does away with scrubbing, wiping and hand brushing . . . eliminates rejects . . . and steps up production. It promptly and completely emulsifies and suspends dirt, drawing and buffing compounds and other "smut." Provides maximum speed in thoroughly wetting immersed objects. Leaves the work with physically clean surfaces.

Let us help you crack down on your metal cleaning costs. Tell us about your particular problems. Our service representatives and laboratory will be glad to help you solve them, without obligation on your part.

METAL CLEANING HANDBOOK

72-pages, with illustrations, of priceless data on metal cleaning. Gives latest developments, tested methods and machines for cleaning all types of metal objects. Send for your copy of this short-cut to better cleaning today.

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Manufacturers of Industrial Cleaning Materials—Washing, Drying, Pickling Equipment — Metal Drawing Lubricants

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Magnus CLEANERS-METHODS-MACHINES

Did you Know?

Over 50% of furnace wall radiation losses alone can be stopped? **Therm-O-Flake** Insulation is preferred for this work in most steel plants.

Here's why!

Highest insulating value — easy to apply — low maintenance — low cost — high reclamation — sticks tightly to silica or basic brick — permits closer control of fuel-air ratios — reduces cold air infiltration.

Write for literature

Illinois Clay Products Company
JOLIET, ILL.

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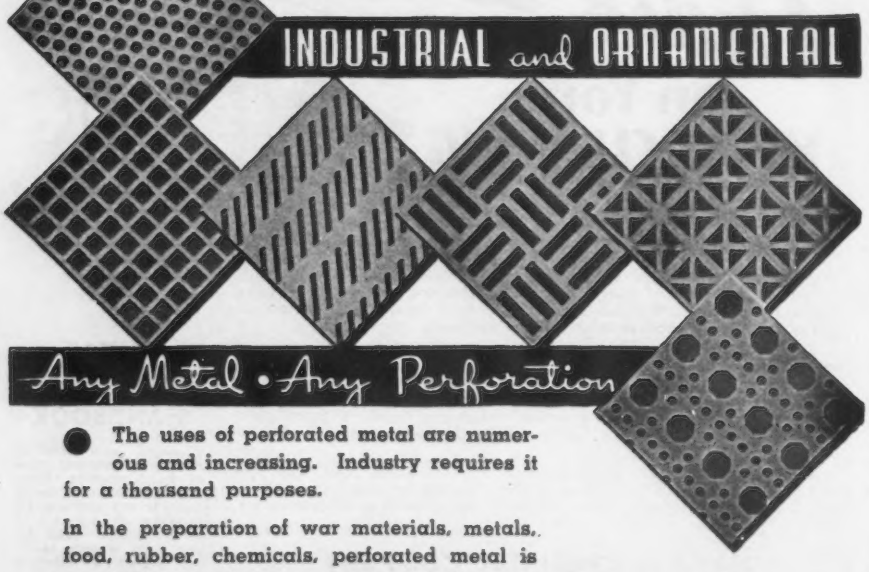
HIGH TEMPERATURE INSULATION
BRICK - BLOCK - COATINGS - CONCRETE - GRANULES

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



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● The uses of perforated metal are numerous and increasing. Industry requires it for a thousand purposes.

In the preparation of war materials, metals, food, rubber, chemicals, perforated metal is required to perform an important role.

The Harrington & King Perforating Co.

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Eastern Office, 114 Liberty Street, New York 6, N. Y.

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	143.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(*Per gross ton, delivered, carloads, bulk*)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(*65-72% Cr, 2% max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

PRICES

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. producer's plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. or more $1.90

Ferrovanadium, 30-35%, contract basis, f.o.b. producer's plant, usual freight allowances, any quantity, per lb. contained vanadium.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy..... $1.20
Ton lots $1.25

Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy ..... 23c.

Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy ..... 40c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb..... 45c.

Bortam, f.o.b. Niagara Falls
Ton lots, per lb. ..... 45c.
Less ton lots, per lb..... 50c.

Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron..... $6.25

Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium ... $2.25
Less ton lots $2.30

Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium $1.23
Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton....$142.50
3%-5% carbon $157.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum ..... 95c.

Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum.. 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo..... 80c.

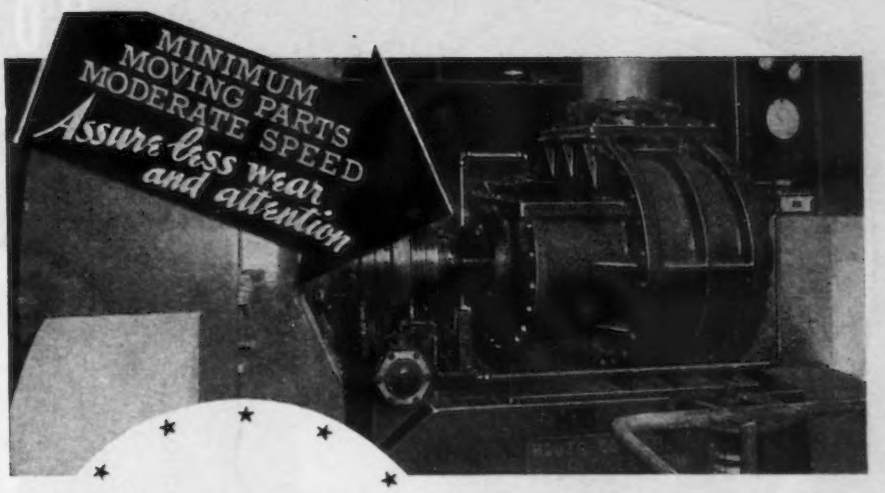
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo..... 80c.

Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy ..... 15c.
Less ton lots ..... 16c.

Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton.....$102.50
Packed $107.50
Less ton lots $112.50

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb. ... 7.50c.
Ton lots ..... 8c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.
- Less ton lots ..... 9.75c.



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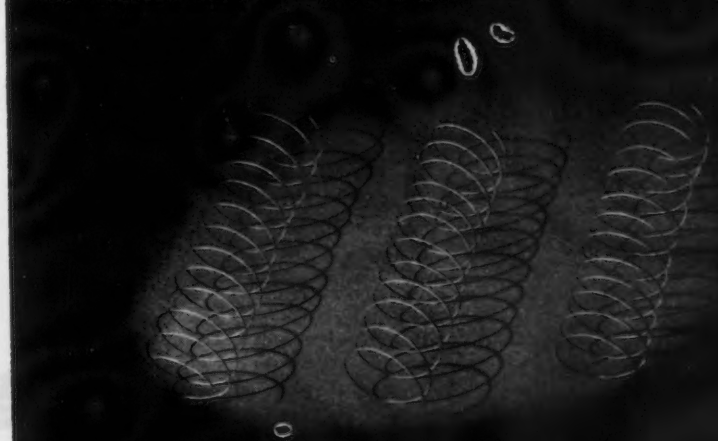

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The IRON AGE

ESTABLISHED 1855

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JAN. 27, 1944

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Cheapness Superlative

DESPITE the old adage, all talk is not cheap. Witness Lincoln's Gettysburg address.

Unfortunately, however, Lincolns are exceptions and cheapness *has* invaded our speech market. But there are three degrees of cheapness: Cheap, cheaper and cheapest.

Cheapest of all talk is that deliberately designed to stir class hatred for the purpose of personal advancement, political or otherwise. This is the most disreputable deuce in the dirty deck of the demagogue.

There are two kinds of demagogues, the promiser and the smearer. But usually the line of demarcation is not sharply drawn. Each sort slops over a bit.

The promising demagogue tells you bedtime stories and promises you the moon—at some future date. The smearing demagogue picks out a minority with small vote power, builds it into a ferocious straw man and then proceeds to tear him apart to the delight of the same sort of rabble that enjoyed watching witches burn.

The smearer never calls his shots. He intentionally mentions no names nor does he bring out specific and therefore refutable evidence. For the latter would put him in the category of a reformer instead of a wholesale slanderer of classes and there are but slim vote pickings in reformation. I doubt if Pegler could be elected dogcatcher although he has sent quite a few mad dogs to the pound.

Chief straw man of the smearing rabble rouser is big business, whatever that may be. It is never specified but the intent seems to be to include most successful bankers, business and industrialists in this category. (Where we would be today if these same people had not put themselves wholeheartedly back of our war effort is, of course, never mentioned.)

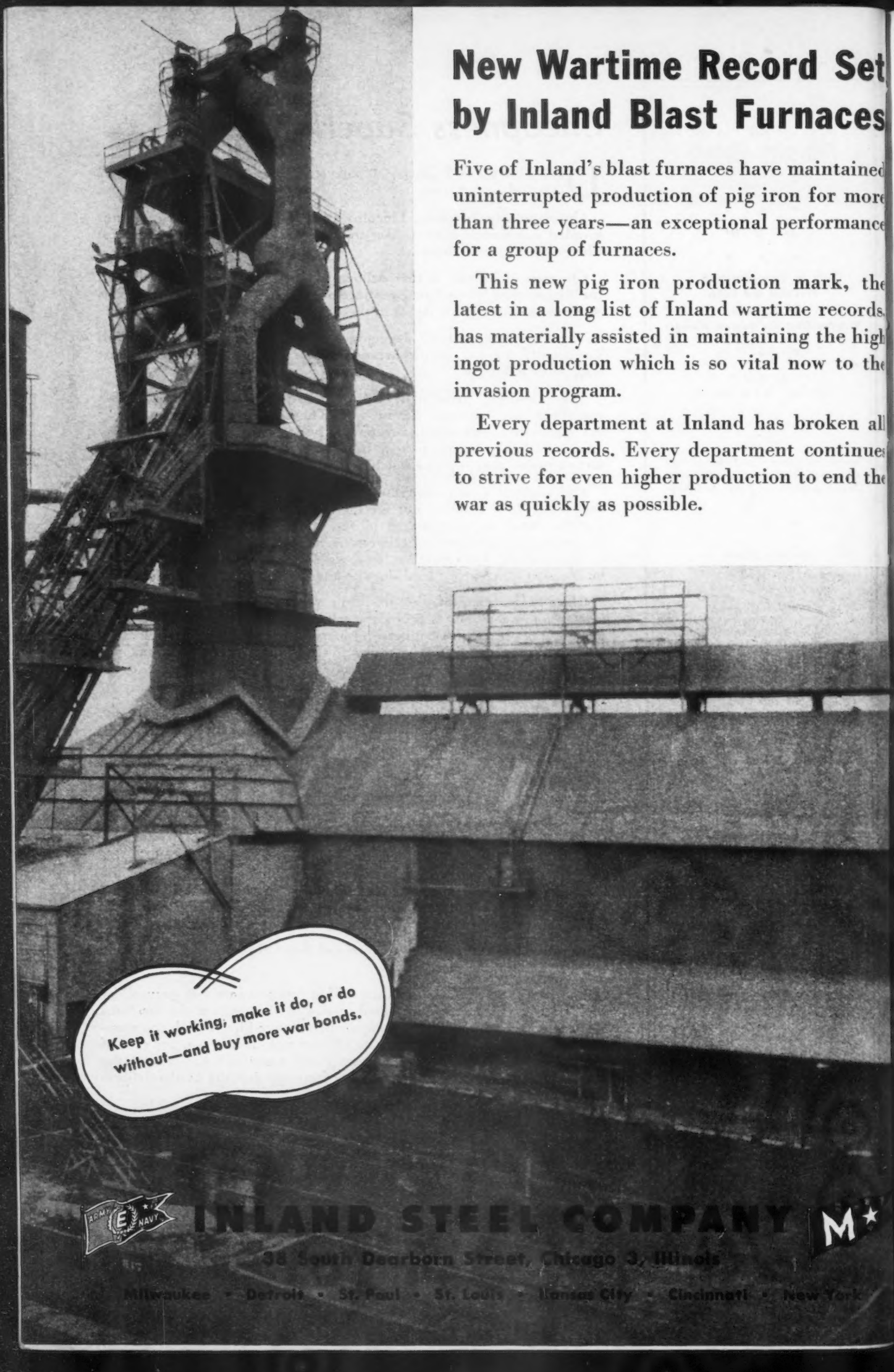
Thus Henry A. Wallace who was so enthusiastically booed into the vice-presidency by the delegates to the Democratic convention of 1940 took time off a few days ago to tell assembled delegates to the CIO Political Action Committee in New York that "big business is divided into two groups, one of which is fostering disunity in the war effort." Some among these groups, he asserts, are anxiously awaiting the opportunity to resume profitable relationships with big German trusts after the war.

Some of these people, according to Wallace, finance anti-Semitic movements. Some organize hatred of the President and discord in the Democratic Party. Others promote isolation in the Republican Party. Certain isolationist politicians have been and will be beneficiaries in their campaigns, of the money of these big business isolationists.

Murder, incest and arson are omitted from these charges, probably by oversight rather than intent.

The implication of this "division of big business into two groups" by Mr. Wallace is that they are equal in size or that at best the insidious element is a considerable percentage. I challenge him to pick the thousand biggest businesses in the United States and classify two per cent of them in this category. And in return I will name 100 per cent of the Vice-Presidents of this country who are fostering disunity by the deliberate spreading of class hatreds.

J. H. VanDeventer



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The IRON AGE
JAN. 27, 1944

NEWS FRONT

► General Motors is starting production on a new very long-range fighter which likely ultimately will be the running mate for the B-29 super-bombers, of which operational squadrons are now about completed. The new fighter is heavy, continuing the recent weight trend of long-range fighters into the area previously occupied by light bombers.

The GM fighter will be powered by a completely new Allison liquid-cooled motor of a power equal to the best of air-cooled motors currently in operational use.

The super-bombers, which will be pounding the enemy by midsummer, will all be of the B-29 design. A somewhat similar craft, the B-32, has apparently fallen by the wayside.

► Older battleships have been rebuilt and new battleships are so designed that serious consideration can be given to the use of their 16-in. guns as anti-aircraft weapons. Incoming fleets of enemy aircraft, plotted by screening ships and radar, will be met at a great distance by salvos of time-fused 16-in. shells capable of clearing out a cubic mile or so of air at a crack.

If attacking planes disperse to avoid such annihilation, they are just so many better set-ups for protecting fighter craft.

► Jet-propelled aircraft are enjoying a great deal of attention from all the magazines and newspapers. All the information presented, however, is from previously published English data, much of it ten or more years out of date.

None of the drawings present data approaching a true picture of the English-American design currently in production, a design far different than the early experimental models.

A mistake was made last week in saying that these jet-propelled planes will not be in operational use for several years. Operational squadrons are actually being built up now, for use later this year. First operational use, because of high rate of climb but short range, will be as interceptors behind Allied lines. This also will keep downed craft from falling into enemy hands.

► First move to invade the automobile industry is Kaiser's incorporation of the Michigan Kaiser Co.

► Efficiency of enemy espionage is very erratic. Whereas published information in Allied countries reaches Germany sometimes in a matter of hours, it is interesting to note that German fighters (to their sorrow) were jumping on the tails of Flying Fortresses for three weeks after full descriptions appeared in the English press of the installation of tail guns (stingers).

► The halogen electrolytic tinning lines (du Pont) are operating at full capacity at the Weirton Steel Corp. One of the Weirton lines is operating at 1050 ft. per min. Each coiler accumulates 25,000 lb. of coated strip.

► While the WPB continues to cancel partially completed steel mill construction projects, there is much discussion regarding the competitive fate of the DPC and privately-financed mills built over the past several years.

Much of this new capacity was built at a cost of $125 to $150 per ton of ingot capacity, as against book values of many existing plants at $35 to $50 per ton of ingot capacity. Come what may, it would appear that there will need be considerable subsidizing or wringing out of water in much of the new capacity to bring its capital structure down to a competitive level.

► If unfair freight rates prevent Pittsburgh mills from reaching consuming markets, Pittsburgh will decline after the war as an important steel center, Benjamin Fairless predicts.

► According to the Swedish paper Affarsvarlden, bomb damage in Germany has resulted in a much easier scrap supply situation for the German iron and steel industry.

► 152 mm. brass shell cases are being made for the French battleship Richelieu. Cases are 3 ft. 7 in. long and weigh about 40 lb. Standard American 6 in. cases are 38 in. long and weigh 28 lb.

► Cutbacks in the Army's projected truck program will probably lift the civilian production program to 200,000. Already earmarked for domestic use are 88,000 trucks.

Procedures For Testing M

By H. INGHAM
Chief Engineer
and K. WILSON
Development Engineer
Metallizing Engineering Co., Inc., Long Island City, N. Y.

o o o

IT is of great importance that standard testing procedures be developed and accepted by the metallizing industry so that consistent results can be predicted and obtained by all users, and so that results can be compared on a uniform basis throughout the country. As there are at present quite a number of different methods of bonding sprayed metal, it is obvious that more should be known about the difference in bond strength between them so that the right selection can be made for the job. Furthermore, accurate bond tests will contribute greatly to the control of any given bonding method.

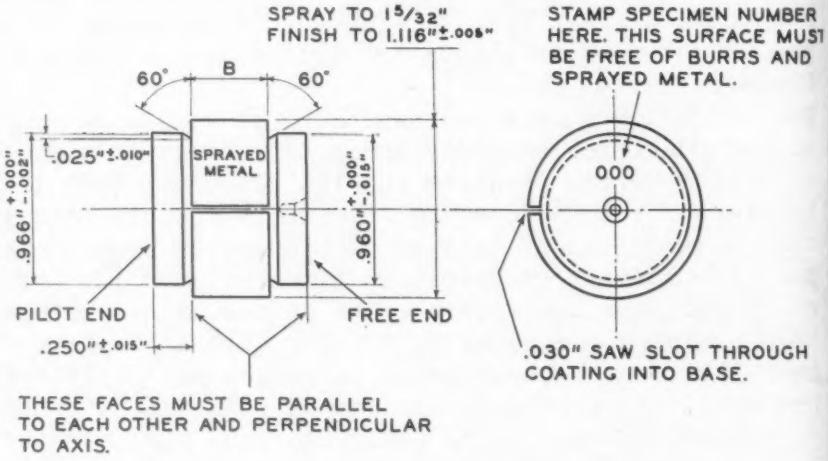
With this objective in mind, these test specimens and procedures are being offered to the metallizing industry in the hope that they will eventually be accepted as standard, either as originally presented, or with any modifications that may be deemed advisable. For these test procedures to fulfill their objective, they must first prove an accurate means for comparison of different methods of bonding. Secondly, they must provide accurate values in pounds per square inch for each bonding method and for each metal used.

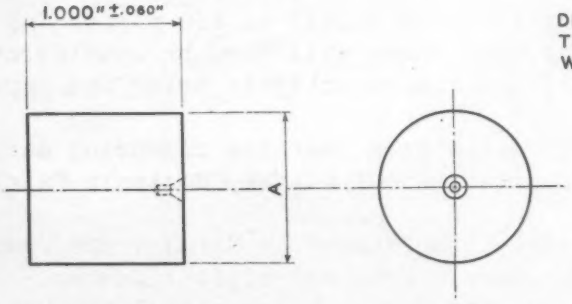
The nature of the failure of the bond between sprayed metal and base metal is somewhat complex. The most common failures occur either on flat or nearly flat surfaces, or shafts which have been cut with a keyway. In both cases most failures occur first by a shearing of the bond due to a shrinking of the sprayed metal layer. This shear action is not necessarily sufficient to cause complete failure, but may simply weaken the bond. After the bond is weakened, the final failure is a failure of the bond in tension as the sprayed metal layer is lifted off either by the curling action resulting from shrinkage or by actual mechanical means. This would depend upon the service encountered. Because this type of failure caused by the shrinkage of the metal is the most common, the strength of the bond in shear is most important. However, as both shear and tension affect the bond strength, methods for testing both have been developed.

Shear Test Specimen

The various proportions of the standard shear test specimen were decided upon after considerable experimentation. It is important that the thickness of the sprayed coating and the bonded area of the sprayed coating be so proportioned that all of the failure takes place at the bond area. If too great a bond area is presented, some of the sprayed metal may fail in compression during test. It is obvious that even the slightest failure of the sprayed metal layer will produce inconsistent results in the bond test values.

The standard bond test shear specimen is shown in Figs. 1 and 2, together with all dimensions and tolerances. It was decided to make the specimen cylindrical because this shape lends itself best to the application of all bonding methods, including those obtained by various methods of machining. The base metal is selected in the form of a bar approximately 1 in. in diameter. This is machined first throughout its length to the diameter listed in Fig. 1. The





DIMENSION "B" IS .500" ±.002" EXCEPT WHERE CAPACITY OF TEST MACHINE WILL BE EXCEEDED. IN THIS CASE USE "B" WHICH IS .333" ±.002".

DIAMETER "A" BEFORE PREPARATION FOR SPRAYING:
FOR METCO AND OTHER MACHINING METHODS .966" ±.002"
FOR BLAST .960" ±.002"
FOR FUSE-BOND .950" ±.002"

ABOVE
FIG. 2—Completed specimen, sprayed, machined and slotted.

o o o

LEFT
FIG. 1—Specimen blank before spraying and machining.

Metallizing Bond . . .

. . . In an effort to standardize testing methods for the adherence strength of sprayed metals, the authors have worked out two procedures described in this article. One is a test for shear strength, the other for tensile strength, since both shear and tension affect bond strength. These tests are useful for controlling quality of surface preparation in production and in working out procedures on new metals and coatings.

length of the specimen is given as 1 in., but this may be varied depending upon the method to be used to hold the piece for machining. The pieces may be made longer and held between centers, but it is recommended that a tapered hole be made in one end of the specimen and that it be mounted in the lathe on a tapered arbor. This method seems best adapted to removal and replacement of the piece for accurate repositioning. In any case, provision must be made for finish machining after spraying in such a way that the free end (where the numbers are stamped) of the specimen and the edges of the sprayed band can be faced off parallel to each other and perpendicular to the axis of the piece. It is also essential that the finish machining be concentric with the base.

is also important to approximate the same temperature conditions as would be expected in the actual job of the class being tested. As most actual jobs are much larger than the test specimen and are normally kept quite cool, it has been found desirable to direct a blast of cooling air at the free end of the specimen while it is being sprayed, in order to stimulate the usual temperature prevailing on an actual job.

After spraying to 1 5/32 in. in diameter over the entire prepared area, the specimen is machined to the dimensions given in Fig. 2. Care should be exercised to see that the finished machined surfaces are concentric and square with the base.

After machining, a slot is sawed completely through the sprayed coating into the base material. The purpose of this saw slot is to eliminate any bond between the coating and the base which might result from shrinkage of the coating, and thus obtain a condition such as would exist either on a flat surface, or on an interrupted cylindrical surface.

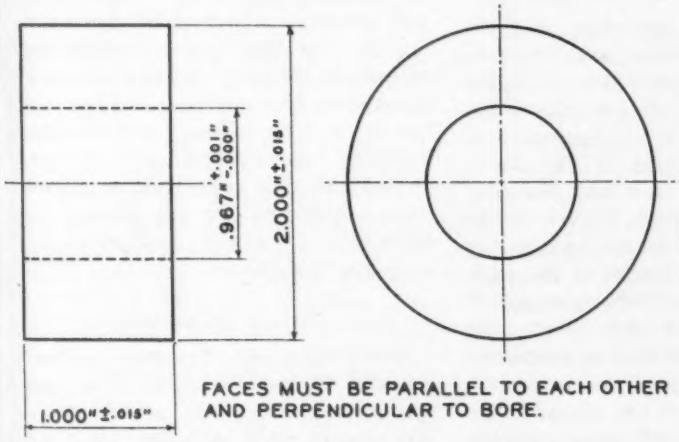


FIG. 3—Die block used in shear testing of sprayed metal bond.

Testing Shear Strength

A shear die block is prepared in accordance with Fig. 3. Only one die block is required as there is little wear on this block, and it will test a great many specimens. The complete specimen is placed in the die block with the free end up and the pilot end in the die. The assembly is placed on the lower platen of a compression testing machine and the load applied to the numbered end of the specimen as shown in Fig. 4.

Occasionally pieces of the coating

The specimen is prepared for bonding sprayed metal by the method being tested, throughout its *entire length*. Great care should be exercised to see that both preparation and all spraying conditions are under strict control and approximate the conditions which it is desired to test. This control should include wire speed, gas and air pressure of the gun, rotational speed of the specimen while being sprayed (taking into account surface speed), distance between the gun and the work, etc. It

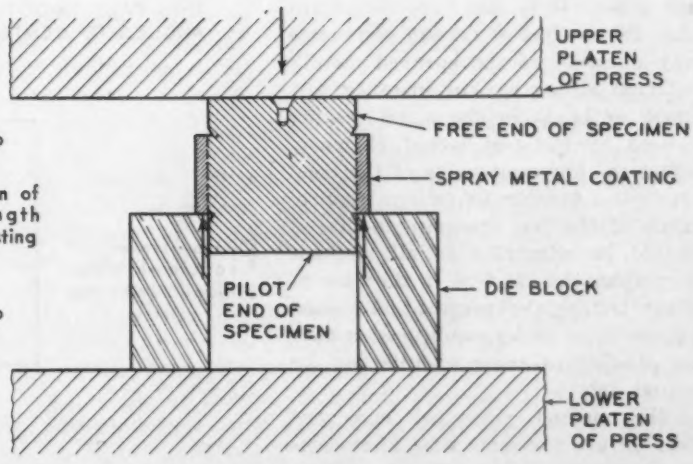


FIG. 4—Section of shear strength specimen in testing machine.

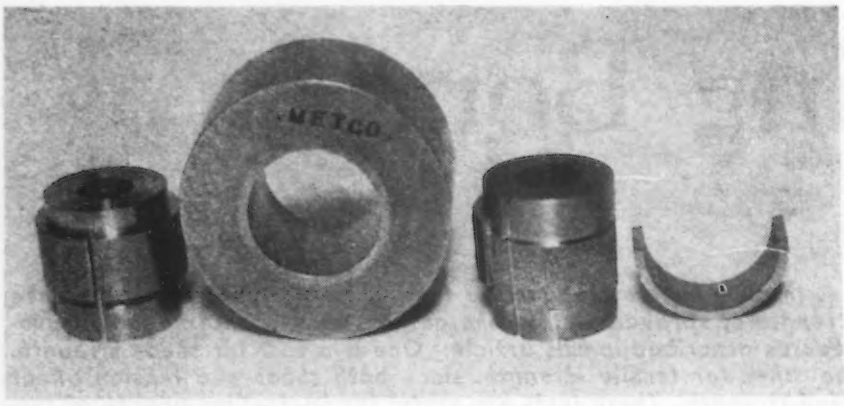


FIG. 5—Shear test specimens before and after breaking. Shown in center is die block used in test.

will break and fly off when the bond is broken. For this reason, a guard should be provided in front of the press.

The length of the sprayed coating *B* in Fig. 2 is preferably made equal to 0.500 in. In some cases, such as where grooves are used in the bonding method, this length may result in a bond strength that exceeds the capacity of the testing machine. In this case, the length *B* may be made 0.333 in. and the force necessary to test the specimen will be reduced by one-third. When specimens are constructed with dimension *B* equal to 0.500 in., the bond area is 1.5 sq. in. When *B* equals 0.333 in. the bond area is 1.0 sq. in. Thus, the total load necessary to shear the coating divided by this factor equals the shear strength in p.s.i. for the bond strength of the specimen tested. Fig. 5 shows a shear test specimen before and after breaking.

Tension Testing Procedure

There have been a number of fundamental problems connected with tension testing and bond strength. One problem is that results obtained in laboratory tests should be applicable to surfaces which are of different shapes, such as flat and cylindrical areas. It is also very important that the method of testing eliminates any question of the sprayed metal's internal strength. For instance, any crack or break in the metal coating caused by the test would obviously affect the apparent value of the bond strength. Another important requirement of the test specimen is that it should be adaptable to all methods of preparation, and as in the case of shear testing the preparation should be conducted under conditions as near as possible to those existing on an actual job.

The method presented here has been in use for some time and seems to have satisfactorily met all requirements. The specimen, Fig. 6, consists essentially of a shaft which has been provided with a hole clear through it and perpendicular to its axis. A stud is fitted in this hole, with one end flush with the surface of the shaft. All methods of surface preparation, including rough threading and the METCO method—in which a rotary tool is used, can be applied to this specimen under the same conditions as to a shaft in actual practice.

Preparation of the Blank

Preparation is applied all over the surface of the cylinder and, hence, to the end of the stud. After spraying and bonding, the stud is pulled out of the shaft in a testing machine. With the dimensions of the shaft, coating thickness, and stud diameter properly proportioned, failure of the bond takes place on the end of the stud. There is no chance of the coating itself failing anywhere except at the destruction of the bond. The diameter of the stud has purposely been made quite small in proportion to the curvature of the sprayed surface so that any difference between results obtained with a cylindrical surface and a flat surface can be disregarded for all practical purposes.

Actual dimensions of the tension test blank is shown in Fig. 7, and specimen stud or plug in Fig. 8. Tension test blank should be made of mild steel, and specimen plug made of the base material to be tested. Plug is assembled in the blank, and fastened firmly by a set screw as shown in Fig. 6. Next, the end of the plug is machined or ground to match the cylindrical surface of the blank. The ⅜ in. shoulder on the blank is provided for convenient chucking in a lathe.

With the plug firmly secured in place, the surface of the blank is then prepared for spraying by any desired method. After preparation the plug is taken out of the blank and removed of burrs caused by preparation—thus enabling the plug to slide freely in the hole. Both blank and specimen plug must be kept scrupulously clean. Even finger marks should be washed off with clean carbon tetrachloride. No oil should be used in machining.

Before spraying, the plug should be replaced in the blank in *exactly the same position it was previously.* The spraying mask, illustrated in Fig. 9, is then screwed into the end of the stud at *A*, Fig. 6. This mask will prevent sprayed metal from filling up the hole and covering the threads of the plug. Specimen is then sprayed in a lathe with metal selected for the test. It is important that the spraying operation be closely controlled and that gas pressures, exact wire speed and air cap setting be recorded to permit duplication of spraying conditions.

Testing in Tension

After spraying, the mask is unscrewed from the end of plug, and specimen machined or ground to a diameter of 0.170 in. larger than the diameter before spraying. After ma-

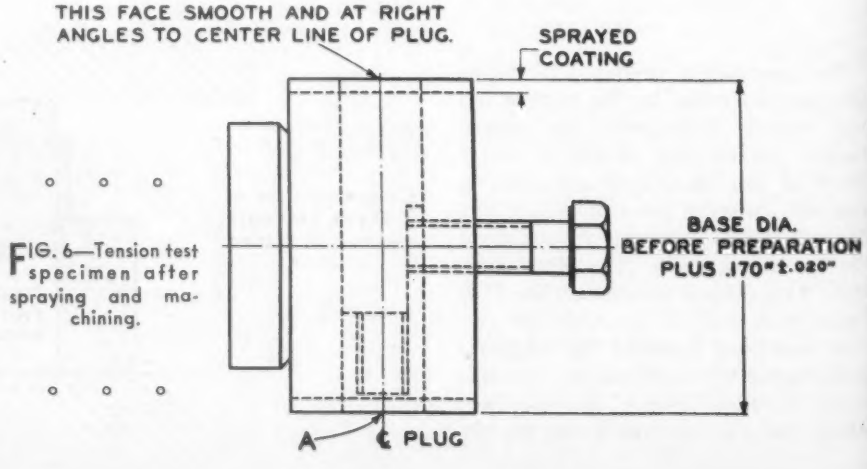


FIG. 6—Tension test specimen after spraying and machining.

chining, any sprayed metal particles around hole *A*, Fig. 6, should be re-removed.

The specimen is then assembled in the test rig as shown in Fig. 10. Figs. 11 and 12 show two parts of the test rig. After screwing the pull bar (Fig. 12) onto the specimen plug, set screw shown in Fig. 6 should be removed. This screw should not be removed earlier as there is danger of damaging the bond when assembling into the rig. Rig is then mounted in a tension testing machine having a capacity of at least 5000 lb. Fig. *B* shows a tension plug after pulling.

As the prepared area of the specimen plug is 0.196 sq. in., breaking load as indicated on the testing machine multiplied by 5.1 will give tensile strength of the bond in pounds per square inch.

While making the test, particular care should be taken to see that:

1. Specimen plug is machined to a good fit in the blank and will slide in the hole without any friction or scraping.
2. Set screw holds plug tight without burring edges of the flat section, and particularly that set screw is removed before plug is pulled in tension machine.
3. Specimen is pulled in a straight line.
4. Plug is not twisted or pulled in handling and machining sprayed specimen, especially when set screw is removed.

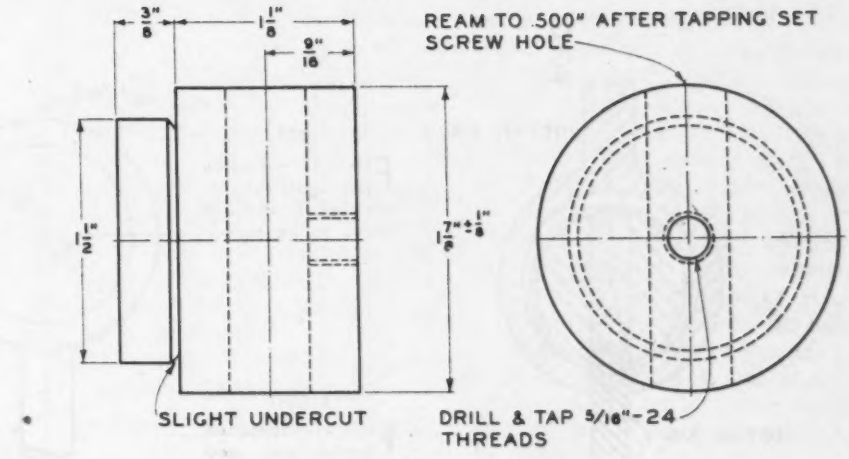
Wide tolerances are given on the diameter of the blank. Blanks may be machined to the upper limit when first used, and then cleaned up and re-used until the lower limit of diameter is reached. This will permit use of the same blank for a number of tests.

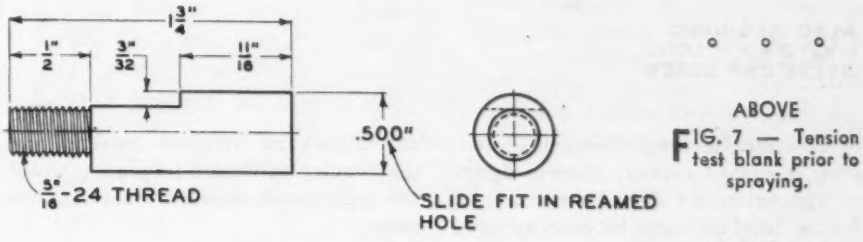
While the tension test specimen described requires considerable machine work, the consistent results obtained with it have justified the design. The ease with which standard methods of surface preparation can be applied is also much in its favor.

Analysis of Bond Failures

The theory of the structure of the bond between the spray metal coat and the base metal is fairly well understood. In ordinary metallizing, done under normal conditions, the bond is almost entirely mechanical in nature. The spray metal particles interlock with the mechanical projections and indentations in the base surface, depending upon the method used for surface preparation. While some slight amount of fusion between particles of spray metal and particles of base metal may take place at isolated spots, the general effect of such welding or fusion is practically insignificant.

There are, however, special uses of metallizing where the bond is not mechanical. Metcolized coatings, for instance, become bonded to the base





ABOVE

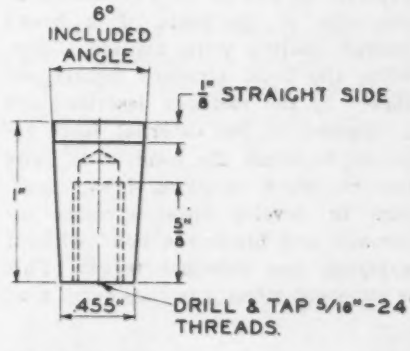
FIG. 7 — Tension test blank prior to spraying.

MATERIAL: AS REQUIRED FOR TEST

FIG. 8—Tension test specimen plug. This is inserted in the blank, Fig. 7, before spraying.

metal by actual alloying. They are applied primarily to protect steel from heat corrosion and the alloying takes place either during a special heat treatment or when subjected to the normal heat applied in the use of the article.

The theory of bond failure is not as well established as the nature of the bond itself. In general, it can be said that bond failure is caused by any stress, either internal with respect to the sprayed metal coatings, or external to it, that pulls the coating from the base by distorting the interlocking projections and particles. It appears that in most bond failures the major part of this stress originates in the sprayed metal itself, due to shrinkage of the layers of sprayed metal as they are applied. If spray metal is applied on a flat surface, each layer tends to shrink as it is applied, causing two effects: First, the coating tends to slide over the base and produce a shearing force at the bond; second, as successive layers are applied, each in turn tends to shrink. These shrinkage forces, acting on each other, cause the coating to tend to curl upward, and thus produce a lifting force or tensile stress at the bond. Of these two, the shearing force seems to be the more important. One theory is that the



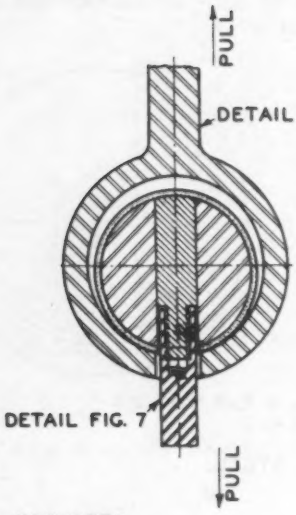
MATERIAL:
STEEL -
HARDEN & POLISH

FIG. 9—Mask for protecting threaded end of tension specimen plug during spraying.

shearing action first distorts the interlocking particles, tending to weaken the bond so that the bond is at least partially destroyed by this shear, permitting the coating to lift relatively easily with a light tensile stress.

Effect of Internal Stresses

This general conclusion is partially confirmed by observing that spray metal bonds very firmly to a very small area and less firmly to a large area. For instance, the method



ALSO REQUIRED
1-5/16"-24 X 1" LONG
STEEL CAP SCREW

LEFT

FIG. 10—Tension test specimen assembled in test rig ready to be pulled.

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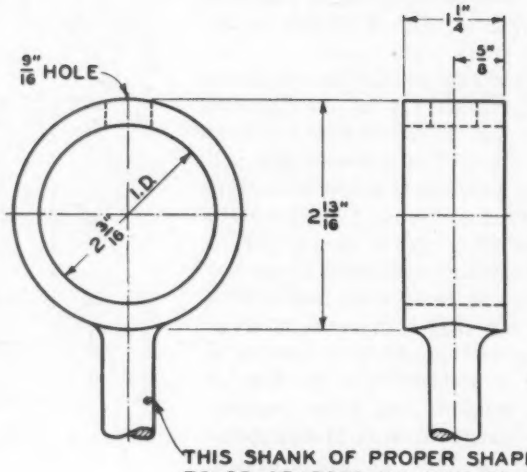
RIGHT

FIG. 11—Specimen anchor ring used in tension test rig.



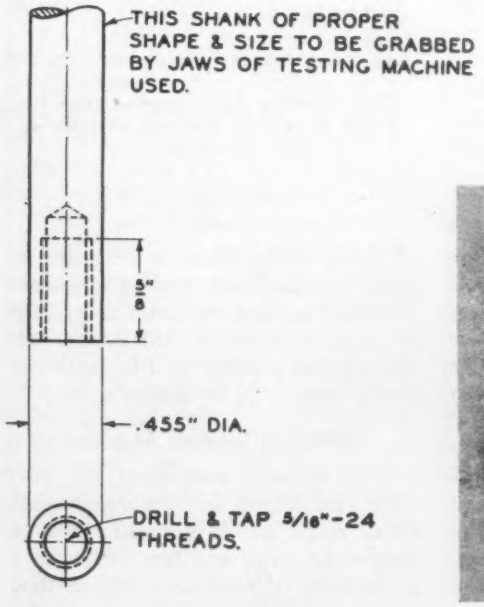
of determining bond strength in tension, described earlier, gives a figure of approximately 3000 lb. per sq. in. for the bond strength between sprayed metcoloy No. 1 and a very heavily grit blasted mild steel base. This strength was measured purposely on a small area of only 0.196 sq. in. This is a high strength, and yet if the same spray were applied to a large plate, the coating would be expected to lift of its own accord at the edge of the plate, if a heavy enough coating were applied. Thus, while the bond strength figures obtained by the methods described are a measure of the external force required to break the bond, it is quite possible when spraying heavy coatings to develop these stresses internally and break the bond without applying any external forces. This is apparent when it is considered that the shrinkage stresses increase as the coating thickness increases, while the unit bond strength remains the same.

Therefore, the important point to consider is that most bond failures are caused by internal stresses in the spray metal. There are very few applications where any appreciable load is applied externally to a spray metal coating to cause it to come loose from the base. Bond strength test values, therefore, should be considered in terms of the likelihood of the coatings coming loose by themselves rather than in terms of the relatively light external loads that can be applied.

Interpretation of Test Data

The measurement of shear strength is most important as most of the internal stress is in shear. However, shear strength alone would not be sufficient. Supposing that the base metal were grooved with deep square-sided grooves and then sprayed. The shear strength crosswise of the grooves would obviously be high and yet a coating having low tensile strength could easily be lifted off. Therefore, at least a minimum of tensile strength is required. This point must be watched in interpreting results, particularly when using grooving methods of preparation. Where such methods have adequate tensile strength, however, they do give high shear values, and for this reason give very satisfactory bonds.

A relatively high bond strength in tension with a relatively low shear strength is not good for most applications, as tensile strength will be largely destroyed by the shear action of the metal. Therefore, the two



LEFT

FIG. 12—Specimen plug pull bar used in tension test rig.

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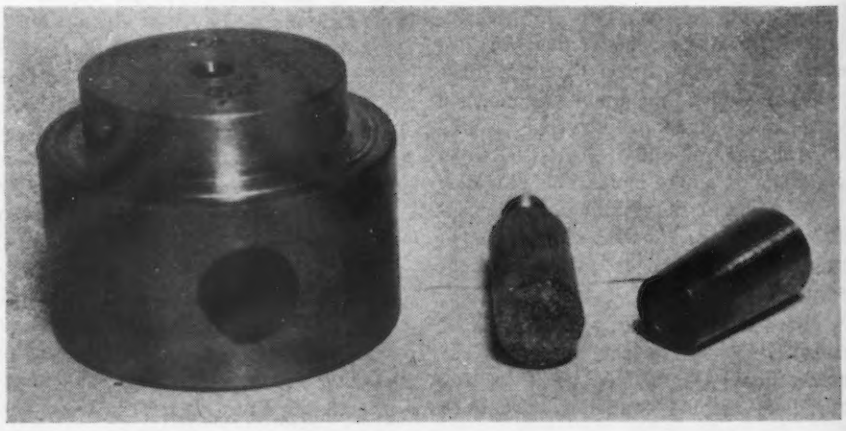
BELOW

FIG. 13—Tension test blank specimen and hardened mask used in spraying.



tests, tension and shear, must be considered together to give a true picture of bond strength on an actual application. The relative values required from these two tests must be decided and interpreted broadly in accordance with the type of application being considered. For instance, a shaft which has no keyways and no force applied to the coating tending to rotate it can be prepared and sprayed satisfactorily with a method which gives relatively low shear strength and tensile strength of the bond. However, it has been found that cracking of coatings on shafts usually result from lack of sufficient bond strength in shear, which permits the metal to slip slightly around the shaft and concentrate all of the shrinkage stress at one point. Thus, where heavy coatings are applied the bond should have a fairly high shear strength to avoid cracking. Where flat surface or shafts with keyways, etc. are sprayed, methods of preparation having as high a shear strength as possible should be used at least at the edges of the flat surface or keyways.

There are so many good methods of producing adequate bond available today, there is really no excuse for not playing safe in obtaining an adequate bond strength in both tension and shear on all jobs.

Serve as Control Criteria

The test results obtained from shear and tension bond tests have two very important uses. One is for comparing values between methods known from experience to be satisfactory and new methods or variations of methods which it is desired to use. The test results have relatively little value in an abstract sense, since the internal forces of the sprayed metal which cause the failure are not known. The other important use is for control of the surface preparation method in the shop by checking an operator technique and on equipment and supplies used. The test for bond, for instance, is the only adequate means of testing the effectiveness of blasting grit.

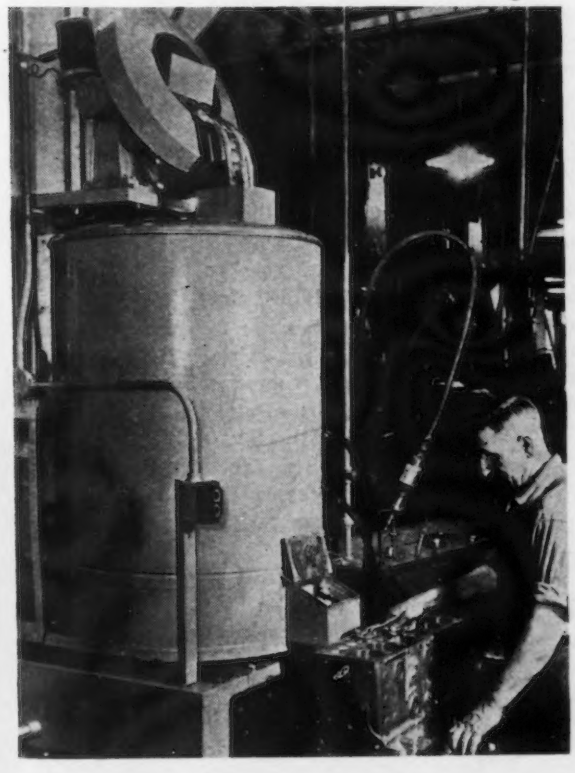
In conclusion, it should be pointed out that good bond strengths are easy to obtain and are desirable, if not always required, for all heavy coatings on machine element work. Therefore, the main use of bond tests is to help in obtaining and maintaining good bond strengths by the proper selection and control of bonding methods. Future articles will be published giving values of bond strengths for different metals and different methods of surface preparation.

Subzero Unit on the Assembly Line

AUTOMATIC feeding of steel valve inserts through a standard Deepfreeze unit is being accomplished by the Dodge Div. of Chrysler Corp. at its main plant in Detroit. Progress of the inserts through the cold chamber, which is held at minus 120 deg. F, precedes their shrink fitting into motor cylinder blocks.

The steel alloy rings, about 1⅞ in. o. d. by 5/16 in. thick, are poured into a hopper just above the cylinder of the freezing unit. The hopper revolves under electric control and distributes the inserts downwards to two tracks which feed into the top of the freezing unit. The rings traverse a winding downward course through tracks to the bottom and are fed out through a special device which alternates the ejection of the insert from either track. The apparatus permits handling of about 360 valves an hour.

The apparatus is electrically operated, with buttons to start and stop. Temperature is controlled thermostatically, with visual record on an exterior chart.



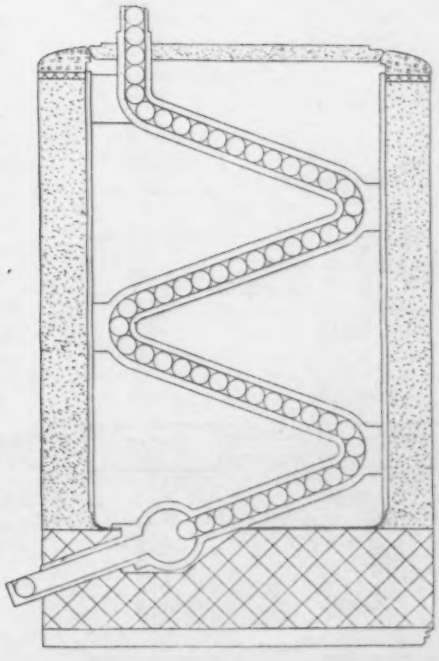
LEFT

THIS is the Deepfreeze installation at Dodge. Valve inserts are tumbled into the tracks at top, and emerge into the box immediately in front of the operator, with progress controlled by a manually operated plunger near the worker's knee.

o o o

RIGHT

THIS diagram shows the path of the valve inserts through the inner chamber of the freezing unit. The special section of the track indicated at bottom feeds the inserts alternately from the two tracks.



▲ ▲ ▲ Heat Treatment and Aging of

By MAX E. TATMAN
Chief Metallurgist
and
RAY A. MILLER
Chief Structural Research Engineer, Consolidated Vultee Aircraft Corp.

DURING the past several months there has been much public interest in the artificial aging of clad 24S aluminum alloy. Most data and specifications previously published indicated that each temper of clad 24S alloy would require an individual aging cycle; however, from a production standpoint, it would be very advantageous to have a single aging cycle for all tempers of 24S aluminum alloy. With this in mind, time-temperature tests at 360 deg., 370 deg. and 380 deg. F. were made on 0.091 and 0.125-in. clad aluminum alloy sheet, with the tempers investigated, their designations, and the process used in each case shown in Table I.

With an increase in the aging temperature, it is necessary to age the various tempers of 24S aluminum alloy for less time in order to obtain the maximum tensile and compressive yield strengths. It should also be noted, however, that with a constant aging temperature, the time required to obtain the maximum yield strength is found to decrease with increasing amounts of cold work.

The following are two extreme examples of the above-mentioned conditions: (1) The 24S-O aluminum alloy specimens, which were solution heat treated and then aged at 360 deg. F., reached a maximum yield after aging for approximately 20 hr.; those specimens which were aged at 370 deg. F. took approximately 12 hr., and those specimens which were aged at 380 deg. F. took approximately 7 hr. at temperature; (2) a maximum yield for the 24S-RT (as-received) aluminum alloy was attained after aging at 360 deg. F. for 9 hr., at 370 deg. F. for 5 hr. and at 380 deg. F. for 3 hr.

The test data obtained for the various tempers aged at 360 deg., 370 deg. and 380 deg. F. indicate that maximum yield strengths may be obtained by a definite aging period at either 365 deg. F. ± 5 deg., or 375 deg. F. ± 5 deg.

A single aging cycle for all of the various tempers of the 24S aluminum alloys investigated would result in one of the following two conditions, depending on the selection of the aging time: (1) If the aging time were selected so that the highly cold worked material were aged for its maximum yield strength, the material with little or no cold work would be under-aged; (2) if the aging time were selected such that the material with little or no cold work were aged so that it would reach its maximum yield strength, the highly cold worked material would be considerably over aged.

Inasmuch as the highly cold worked material will likely be used wherever possible, a single aging cycle in which time and temperature are selected so that the more highly cold worked materials will be aged properly to give their maximum yield strengths, would be the most satisfactory. Such a single aging cycle should be 375 deg. ± 5 deg. F. for 6 hr. ± ½ hr. For design purposes, the mechanical properties shown in Table II can be consistently attained by the above treatment.

It was found that in most instances, for the properly aged material, the compressive yields varied from 1000 to 2000 lb. per sq. in. below the values obtained for the tensile yields.

A ± 5 deg. F. variation is the maximum permissible, while 375 deg. F. ± 5 deg. is at present considered to be the maximum practical aging temperature that should be used in production, because of the difficulty in maintaining corrosion resistance and adequate control of mechanical properties at higher temperatures.

Previous to the aging tests at 360 deg., 370 deg. and 380 deg. F., referred to above, five tempers of 24S were aged at 350 deg. F., with results graphically shown in Fig. 1. The 350 deg. F. temperature has the advantage of ease of control due to longer holding time.

Typical values for the mechanical properties of Alclad 24S-T and 24-RT* when subjected for 7½ hr. to a temperature of 350 deg. F. are shown in Table III. The values shown for Alclad 24S-T are derived from material processed from Alclad 24S-O. When the material is processed from as-received Alclad 24S-T the finished product will have properties approximating aged Alclad 24-RT due to inherent cold work caused by rolling to straighten.

The desired mechanical properties are obtained in 24-RT by the 7½ hr. aging treatment. Longer periods of

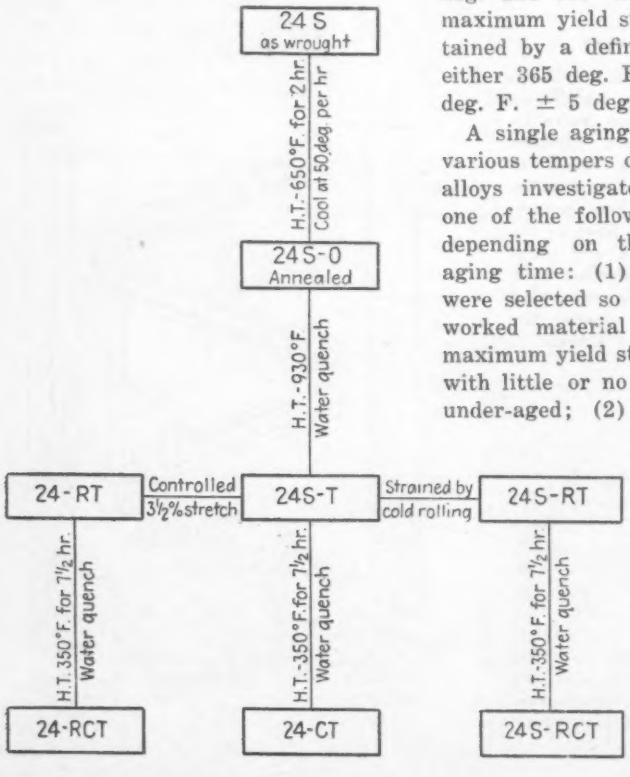


FIG. 1 — Diagrammatic chart of processing of clad 24S aluminum alloys, in tempers tested.

24S Aluminum Alloys

. . . Tests on 24S clad aluminum alloy sheets and 24S extrusions, undertaken by Consolidated Vultee Aircraft Corp., are here summarized. These reports embrace investigations on aging at temperatures from 325 deg. to 400 deg. F.; the effect of plastic deformation on aging characteristics and the degree to which variations in deformation affect aging results; corrosion tests on aged alloys; and the effect of heat on mechanical properties and on color of protective coatings and camouflage finishes. All mechanical properties noted in this paper are taken with the grain of the sheet.

time cause reduction in ductility below the previous arbitrarily accepted value of 7 per cent. Although Alclad 24S-T will develop higher yield strength when aged for longer periods of time, if the 350 deg. aging temperature is used, standardizing the time interval for both types of material while still maintaining the desired ductility necessitates the use of the 7½-hr. aging treatment for production purposes. The processing used in obtaining the various tempers of 24S aluminum alloy is diagrammatically shown in Fig. 2.

**Consolidated designation for material formed in the 24S-O condition, solution heat treat, and stretched to 3½ per cent permanent set.*

Various thicknesses of material have essentially no effect upon the mechanical properties of aged material. Mechanical properties of material quenched in water from 350 deg. F. were found to vary only slightly from air cooled material. However, a slight decrease in yield strength and a corresponding increase in elongation could be noted, and therefore it is advisable to quench in water in order to take advantage of the increased elongation and also to expedite removal of residual salt from the material in case a salt bath is used for the aging operation. No distortion could be noted on large specimens which were quenched in water from 350 deg. F. or from higher aging temperatures investigated.

Material subjected to the 350 deg. F. aging treatment immediately following the stretching operation will develop approximately the same mechanical properties as material which is stored at room temperature, after stretching, for various periods of time prior to the aging treatment. This material may therefore be aged at 350 deg. F. at any time after stretching or at any time after heat treatment.

These 350 deg. aging temperature tests were further supplemented by additional tests of several tempers aged at various temperatures between 325 and 400 deg. F. Results indicated that the mechanical properties of 24S aluminum alloy aged at lower temperatures for long periods of time are approximately equal to the mechanical properties of identical material aged at higher temperatures for much shorter lengths of time. The structural changes are probably the same irrespective of the time-temperature combination used to attain the high strength properties.

The time-temperature combination in the 350 deg. for 7½-hr. specification for the aging of 24S-T and 24-RT was the same for both materials and was based on a minimum elongation of 7 per cent for the 24-RT material. This latter test indicated that an aging temperature of 362½ deg. F. for 11 or 12 hr. would produce optimum mechanical properties in 24S-T. However, due to the fact that the yield strength decreases rapidly due to an 11-hr. aging time at temperatures above 362½ deg. F., it would seem advisable to age 24S-T at a temperature below 362½ deg. The 7½-hr. at 350 deg. aging cycle for 24-RT appears to be satisfactory for obtaining 24-RCT* material with a

TABLE I

Tempers and Processes Used in Aging Tests at 360, 370 and 380 deg. F.

Material Desired, (Army Spec. 11354)	Basic Material	Processing		
		Solution[1] Heat-Treated	Per Cent Permanent Set	Aging Cycles
24S-T80	24S-O	Yes	None	360 deg. F—0 to 20 hr. 370 deg. F—0 to 20 hr. 380 deg. F—0 to 16 hr.
24S-T81 (Low Yield)	24S-O	Yes	1	Same
24S-T81	24S-T (as-received)	No	None	Same
24S-T84	24S-O	Yes	3½	Same
24S-T84	24S-O	Yes	4	Same
24S-T86 (Low Yield)	24S-O	Yes	5	Same
24S-T86	24S-RT (as-received)	No	None	Same

[1] Solution heat treatment was 30 min. at 930 deg. F., followed by a cold water quench.

minimum of 7 per cent elongation. If, however, the minimum permissible elongation were reduced to 6 per cent, much higher strength properties could be consistently produced by a longer aging time or a higher aging temperature or both. An aging cycle of 365 deg. F. for approximately 9 hr. would produce in 24-RT very desirable strength properties with a minimum elongation of about 6½ per cent.

In general, the aging characteristics of 24S-RT are similar to those of 24-RT. The yield strengths were slightly higher in the case of the aged 24S-RT and frequently were in excess of 70,000 lb. per sq. in.

It should be noted that the increase in yield strength due to the aging of 24S alloy at the several aging temperatures was dependent upon the amount of cold work present in the material prior to the aging treatment. The yield strength of 24S-T which contained no cold work was increased to only slightly over 50,000 lb. per sq. in., while the yield of the 24-RT material which had been stretched to 3½ per cent permanent set was increased to nearly 70,000 lb. per sq. in.

The data plotted in Fig. 3 show the results of a limited number of tests in which both the tensile and compressive properties were determined. It should be noted that the tensile yield is much higher than the compressive yield in the case of the unaged cold worked specimens. However, the aging operation tends to bring the tensile and compressive yield together. Any change in tensile yield due to aging is considered to represent a comparable change in compressive yield.

**Consolidated designation for material formed from 24S-O, solution heat treated, stretched 3½ per cent permanent set, and aged for 7½ hrs. at 350 deg. F.*

TABLE II

Typical Mechanical Properties for a Single Aging Cycle (375 deg. F.)

Material[1]	Temperature, Deg. F.	Time, in Hr., at Temperature	Stress = Lb. per Sq. In.			
			Tension			Compression Yield
			Ultimate	Yield	Elongation Per Cent	
24S-T80	375±5	6±½	65,000	48,000	12.0	46,000
Low 24S-T81	375±5	6±½	65,000	57,000	9.0	56,000
High 24S-T81	375±5	6±½	66,000	59,000	8.0	56,000
(3½%) 24S-T84	375±5	6±½	66,000	64,000	7.0	63,000
(4%) 24S-T84	375±5	6±½	67,000	65,000	7.0	64,000
Low 24S-T86	375±5	6±½	70,000	66,000	7.0	65,000
High 24S-T86	375±5	6±½	72,000	67,000	7.0	67,000

[1] Material was 5 per cent clad on each surface.

TABLE III

Typical Values for Physical Properties of Alclad 24S-T and Alclad 24-RT After Aging 7½ Hr. at 350 Deg. F.

Material	Tension		Elongation, Per Cent in 2 In.	Compression		Shear Stress, Lb. per Sq. In.
	Stress, Yield	Lb. per Sq. In. Ultimate		Stress, Yield	Lb. per Sq. In. Ultimate	
Alclad 24S-T	48,000	65,000	14.0	54,000	60,000	40,000
Alclad 24-RT	65,000	68,000	8.0	65,000	68,000	43,000

TABLE IV

Typical Values for Physical Properties of 'As-Received' and Aged (350 Deg. F. for 7½ hr.) 24S-T Extrusions

Material (Extrusions)	Tension		Elongation Per Cent in 2 In.	Compression Stress, Lb. per Sq. In. Yield
	Stress, Yield	Lb. per Sq. In. Ultimate		
As-Received 24S-T	48,000	64,000	16	39,000
Aged 24S-T	56,000	67,000	10	52,000
Aged 24-RT	71,000	74,000	6	66,000

Aging 24S Extrusions

A study of the effect of aging 24S extrusions at 350 deg. F. from 0 to 24 hr. indicated that the tensile and compressive yield strengths of as-received 24S-T extrusions are increased approximately 17 and 33 per cent respectively by aging at 350 deg. F. for 1½ hr. The tensile and compressive yield strengths of 3½ per cent stretched and aged extrusions are increased approximately 46 and 69 per cent respectively as compared to as-received extrusions.

Typical values of as-received and aged 24S-T extrusions are shown in Table IV. The mechanical properties of the extruded sections over ⅜ in. in thickness were higher than the values shown in the table. It appears that optimum mechanical properties in aged as-received 24S-T extrusions are obtained by treating at 350 deg. for 10 to 12 hr. The as-received extrusions, having very little cold work, did not respond to aging nearly as well as those stretched 3½ per cent.

In general there was no evidence of intergranular corrosion on the unaged or aged extrusions; there was however, one spot on the 24-ST, specimen after subjection to an accelerated corrosion medium (sodium chloride and hydrogen peroxide) for 24 hr., indicating that slight intergranual corrosion is possible in the aged 24S extrusions unless a surface finish, such as anodization, primer or paint, is applied.

Stretching Variations

Considerable reference has been made above to the effect of plastic deformation on aging characteristics of 24S aluminum alloy. An investigation, with a 355 deg. F. aging tem-

perature, of the effects of variation in the amount of plastic deformation and of the variation in the time interval between quenching and stretching showed, in conformance with indications from previously mentioned aging tests, that the amount of plastic deformation greatly affects the aging characteristics of 24S material. The greater the amount of plastic deformation given 24S-T, the higher will be its strength properties upon subsequent aging.

The time interval between the quenching and stretching operation has, in general, only a slight effect on the aging characteristics of Alclad 24-RT. If the stretching operation is accomplished between 1 and 24 hr. after the quenching operation, the mechanical properties of the aged 24-RT will not be appreciably affected by the variations in the time interval between quenching and stretching.

The compressive yield strength of aged Alclad 24-RT was found to be slightly lower than the tensile yield, the difference being about 6000 lb. per sq. in. for short aging times and approximately 1000 lb. per sq. in. for longer aging times.

A variation of ½ per cent in the plastic deformation of 24-RT (3½ per cent stretch), upon subsequent aging at 355 deg. F., resulted in variations in the yield strength of as high as 3500 lb. per sq. in. However, after the maximum yield strength was attained, the expected variations would be only about 1200 lb. per sq. in. Inasmuch as higher yields are desirable and since there are several variables which may at times be additive, it is advisable to establish as close a tolerance on the amount of plastic deformation as it possible from a production standpoint.

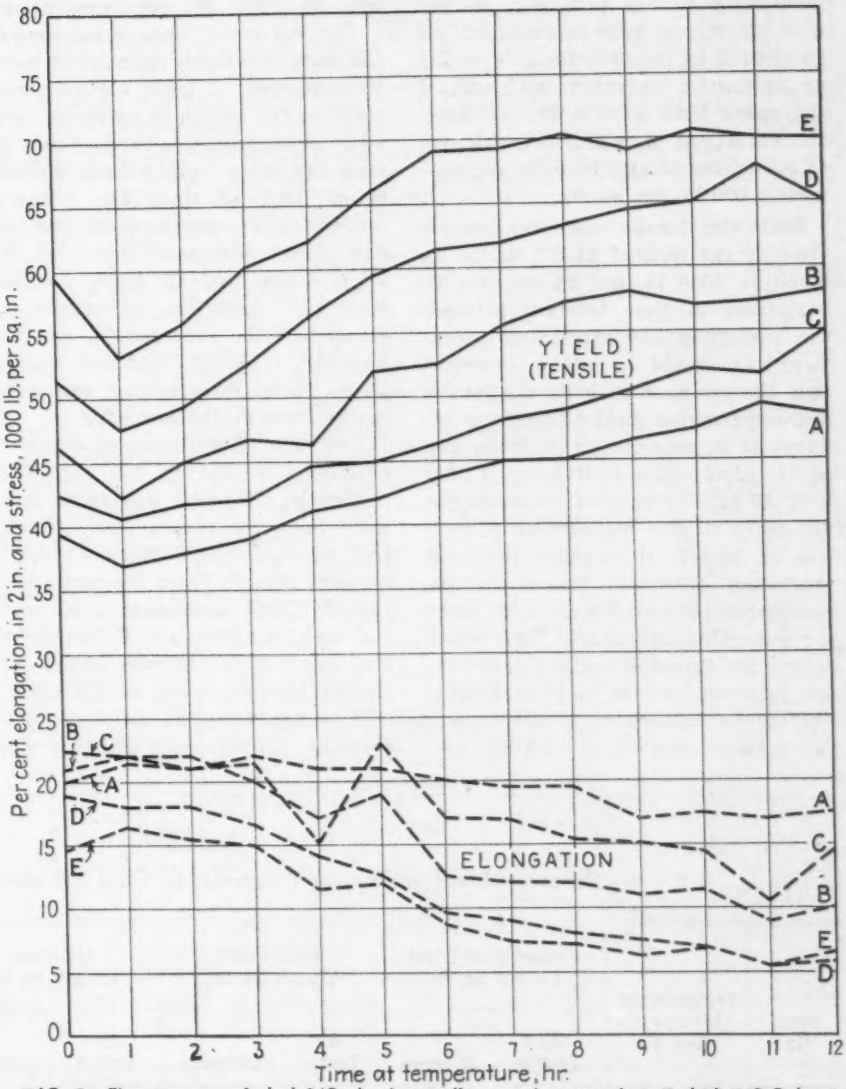


FIG. 2—Five tempers of clad 24S aluminum alloy aged at 350 deg. F. (A) 24S-O heat treated; (B) 24S-T as-received; (C) 24S-T re-heat treated; (D) 24S-O heat treated and stretched 3½ per cent; (E) 24S-RT as-received. All samples were 0.091-in. sheet.

o o o

TABLE VI
Heat Effect on Coating Color of 24S Aluminum Alloys

Spec. No.	COATING	No. of Coats	Code No.	COLOR AFTER HEATING FOR 5 MIN. AT—						
				0 Deg. F.	300 Deg. F.	350 Deg. F.	400 Deg. F.	450 Deg. F.	500 Deg. F.	550 Deg. F.
1	Anodize	30 min.	.....	Gray	Gray	Gray	Gray	Lt. rose cast	Rose cast	Rose
2	Anodize	30 min.								
	$ZnCrO_4$ Primer	1	P-27B-2	Yellow	Yellow	Yellow	Tan cast	Tan	Light brown	Brown
3	$ZnCrO_4$ Primer	1	P-27B-2	Yellow	Yellow	Yellow	Tan cast	Tan	Light brown	Brown
4	$ZnCrO_4$ primer	2	P-27B-2	Yellow	Yellow	Yellow	Tan cast	Tan	Brown	Black
5	$ZnCrO_4$ primer	1	P-27B-2							
	Aluminum primer	1	.....	Green	Green	Green	Green	Tan cast	Tan	Slate
6	Dulex clear varnish	1	R-A-217	Clear	Clear	Clear	Amber cast	Light amber	Amber	Dark Amber
7	$ZnCrO_4$ primer	1	P-27B-2							
	Dulex clear varnish	1	R-A-217	Yellow	Yellow	Yellow	Tan cast	Tan	Brown	Dark brown
8	M-485 light gray	2	TL8657	Light gray	Light gray	Light gray	Pearl gray	Cream	Light tan	Tan
9	M-485 blue gray	2	TL8660	Blue	Blue	Blue	Gray cast	Slate blue	Slate	Brown
10	Du Pont dark green	1	71-013	Dark green	Dark green	Dark green	Dark green	Dark green	Dark green	Rust
11	Du Pont sky-gray	1	71-021	Light green	Light green	Light green	Light green	Light tan cast	Tan cast	Tan
12	$ZnCrO_4$ Primer	1	P-27B-2							
	Du Pont sky-gray	1	71-021	Light green	Light green	Light green	Light green	Light tan cast	Tan cast	Tan
13	Du Pont neutral gray	1	71-025	Dark gray	Dark gray	Dark gray	Dark gray	Dark gray	Dark gray	Slate
14	Du Pont olive drab	1	71-028	Olive green	Olive green	Olive green	Olive green	Olive green	Olive green	Brown
15	Du Pont dark earth	1	71-035	Tan	Tan	Tan	Tan	Tan	Tan	Light rust
16	Du Pont extra dark sea-gray	1	71-19324	Dark blue	Dark blue	Dark blue	Dark blue	Dark blue	Slate blue	Slate

Stretching to 3½ per cent, ½ per cent ± 0 per cent permanent set should not be too objectionable as far as production is concerned; and, if the aging time were 9 hr. or more, the variations in yield strength due to stretching should be only approximately 600 lb. per sq. in.

Both the tensile and compressive yield of the unaged 24-RT varies as much as 4000 lb. per sq. in. due to variations in time interval between the quenching and stretching operations. It should be noted, however, that the variance in both the tensile and compressive yield strength is reduced to approximately 2000 lb. per sq. in. after aging at 355 deg. F. for 9 to 12 hr. To further minimize the variances in the mechanical properties of 24-RT, it appears that the stretching operation should be accomplished between 1 and 24 hr. after the quenching operation. This would reduce the expected variations in tensile and compressive yield strengths, due to the differences in time interval between quenching and stretching, to 1200 lb. per square inch.

The corrosion tests accompanying the tests previously mentioned herein were meager. A later, comprehensive study of the effects of aging on corrosion resistance of both clad and unclad 24S alloy (the unclad material being used to show the corrosion tendencies of the core of the clad 24S alloy) indicated that clad 24S alloy, when properly aged, does not have its corrosion resistance decreased in the process. On one test, however, a slight tendency towards stress corrosion cracking was noted in the core at the cut edge.

The rate of diffusion of copper in aluminum at 350 to 400 deg. F. is negligible; therefore this aging treatment does not reduce the corrosion resistance of Alclad 24S alloy due to copper diffusion from the core.

Plain 24ST aluminum alloy material aged at 375 deg. F. is slightly less sensitive to corrosive media than similar material aged at 350 deg. F.

It is believed that stress-corrosion cracking cannot take place in aged 24S aluminum alloy if the attacking medium is prevented from coming in contact with the highly stressed aged 24S alloy. The pure aluminum of the clad serves this purpose.

Heat Effects

The effect of temperatures ranging from 60 to 650 deg. F. on the physical properties of 0.064 in. 24-ST aluminum alloy sheet are summarized in Table V.

It would seem that increasing the temperature up to 650 deg. F. does not affect the modulus of elasticity in tension on specimens tested at room temperature after cooling from the various temperature to which they were subjected. The average value for the modulus of elasticity in tension of the 24-ST sheet subjected to this heating test is 10.5×10^6 lb. per sq. in.

The ultimate strength of the material appears to drop off gradually with an increase in temperature. There is a decided drop in per cent elongation when the material is

TABLE V

Effect of Heat on Physical Properties of Clad 24S Aluminum Alloy Sheets

Spec. No.	Temperature, (Maximum) Deg. F.	Proportional Limit Lb. per Sq. In.		Yield Point Lb. per Sq. In.		Ultimate, Lb. per Sq. In.		Elongation, Per Cent		Tension, Modulus of Elasticity (10^6)	
		As Tested	Average	As Tested	Average	As Tested	Average	As Tested	Average	As Tested	Average
1	As Received	46,000	46,000	54,000	53,500	71,700	71,150	20	20.25	10.5	10.5
2	Room Temp. 60	46,000		53,000		70,600		20.5		10.5	
3	300	41,000	41,500	51,500	51,000	71,000	70,700	18.5	18.75	10.37	10.43
4		42,000		50,500		70,400		19		10.5	
5	350	38,000	37,500	49,000	48,500	68,700	69,800	17.5	18.7	10.5	10.55
6		37,000		48,000		70,900		20		10.6	
7	400	42,000	41,500	48,500	48,050	69,100	68,025	21	19	10.5	10.4
8		41,000		47,600		66,950		17		10.3	
9	450	45,000	47,500	52,500	55,600	64,400	68,250	17	15	10.6	10.55
10		50,000		58,700		72,100		13		10.5	
11	500	50,000	49,000	59,000	58,500	66,400	66,905	10	8.5	10.4	10.45
12		48,000		58,000		67,410		7		10.5	
13	550	44,000	43,500	52,000	52,000	63,900	63,850	7.5	7.75	10.6	10.7
14		43,000		52,000		63,800		8		10.8	
15	600	44,000	43,000	46,500	45,750	59,200	59,000	8	8	10.5	10.55
16		42,000		45,000		58,800		8		10.6	
17	650	27,000	27,000	35,000	34,900	53,800	53,100	7.5	8.25	10.6	10.3
18		27,000		34,800		52,400		9		10.0	

heated much above 400 deg. F.

More recent tests indicate that the comparatively rapid decrease in mechanical properties above 400 deg. F., which take place when the material is heated for 5 min. or more above that temperature, continues until a temperature of 650 to 700 deg. F. is reached (annealing temperature). Thereafter, the material undergoes an increase in mechanical properties until the hardening temperature of 910 to 930 deg. F. is reached. The mechanical properties immediately decrease after the temperature is raised above this level.

Contrary to previous conception, heating 24S-T aluminum alloy at temperatures below 800 deg. F. for 5 min. has no effect upon the ability at the material to resist the corrosive effect of a 20 per cent NaCl salt spray, at 95 deg. F. for 250 hr. Heating at temperatures between 600 and 930 deg. F. for longer periods of time would probably cause a decrease in the corrosion resistance of the material.

The protective coatings used on 24S alloy were found to undergo a definite color change when the material was heated for 5 min. at temperatures above 400 deg. F. Since both mechanical properties and colors of protective coatings undergo a change when heated above 400 deg. F., it is possible to make an estimate of the mechanical properties by determining, from Table VI, the temperature to which the material was heated.

Camouflage finishes, for the most part, do not change in color until the material they are used to coat is heated to a temperature of 550 deg. F. Therefore no correlation may be made between mechanical properties and color unless the material has been heated above this temperature.

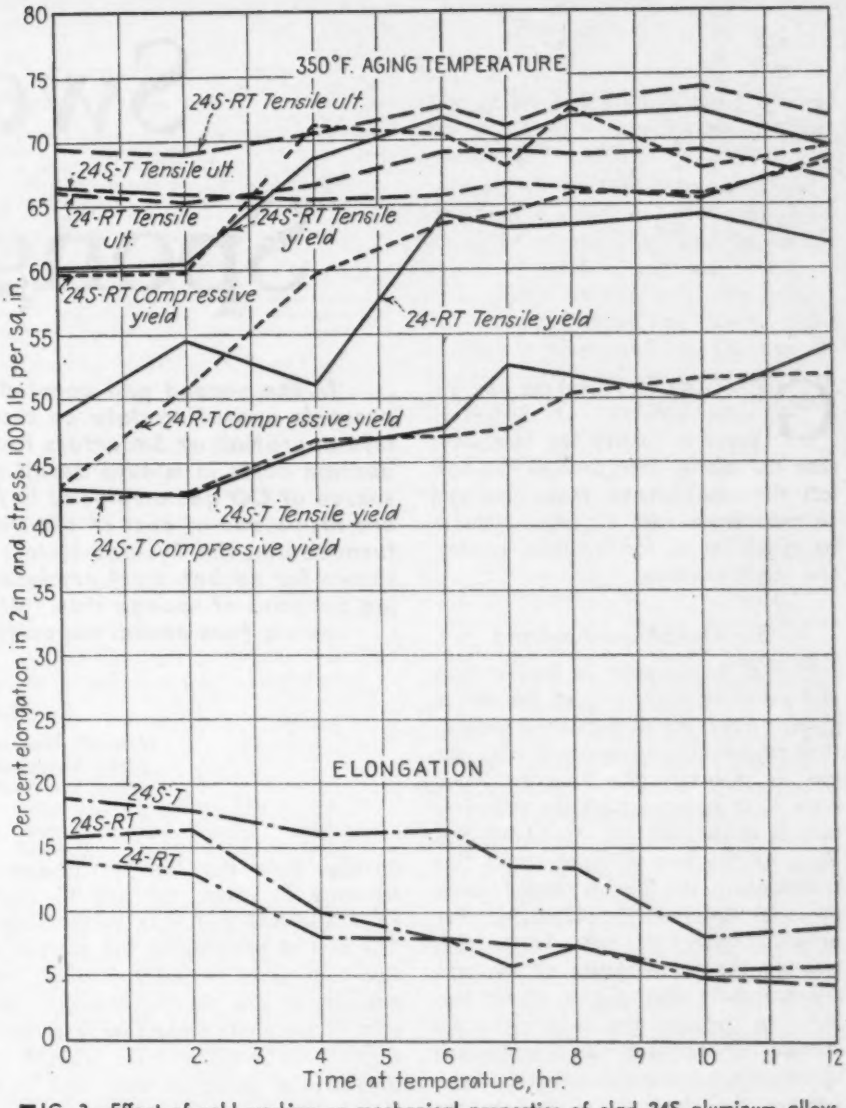


FIG. 3—Effect of cold working on mechanical properties of clad 24S aluminum alloys aged at 350 deg. F.

Fatigue Strength of Nitrided Surfaces

IN an article in *Metal Treatment* by W. E. Bardgett the results of investigations of the effects of case hardness, case depth, degree of cleanness, stress concentration and corrosive influences on the fatigue strength of nitrided specimens of chromium-molybdenum steels are reported.

Because of compressive stresses in the nitrided case, nitriding increases the limiting fatigue stresses. Increasing the tensile strength by heat treatment decreases the effect of the nitrided case in raising the limiting fatigue stress; this increase is very much greater in notched than in plain specimens. The effect on the limiting fatigue strength of increasing the time of nitriding at 1095 deg. F. for 7 to 16 hr., thereby increasing the case depth from 0.0155 to 0.020 in., is negligible but lowering the nitriding temperature to increase the hardness without changing the case depth results in a decrease in the value for the limiting fatigue stress. The stress distribution and intensity of the junction between a nitrided and an unnitrided portion do not appreciably affect the limiting fatigue stress of the unnitrided portion.

Inclusions, even of the size and quantity found in normal, clean steel, appear to have a marked lowering effect on the limiting fatigue strength of nitrided specimens.

Tests on the effect of notches on nitrided steels indicated that: (a) Provided that the stress gradient and/or stress concentration are insufficient to cause failure to commence from the surface of a nitrided specimen, the decrease in limiting fatigue stress with increase in stress concentration will be less than that of an unnitrided stress. (b) If the stress gradient and/or stress concentration are such that failure commences from the surface of the nitrided specimens, the decrease in limiting fatigue stress with increase in stress concentration is greater than that of the unnitrided steel. (c) The occurrence of a fracture from the surface of a nitrided specimen does not necessarily indicate a low limiting fatigue strength; consequently notch sensitivity, as measured by the loss in fatigue strength due to a notch, may be low in a specimen showing fracture starting from the surface.

Swedish Sponge Iron

. . . In the second and concluding part of the article, Mr. Améen presents operating data on the perfected sponge iron furnace put into operation at Soderfors in 1941 and analyzes sponge iron production costs in minute detail with charcoal, wood or coke as the source of CO gas employed in the reduction process. Comparisons are also made of cost of pig iron produced in a shaft type electric furnace and the Tysland-Hole electric furnace. Cost data are also shown for carbon steel produced in the electric furnace with varying portions of sponge iron. Although the present unit is of 10,000 metric tons annual capacity, a 20,000 ton unit is projected.

By EINER AMÉEN

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GENERALLY speaking the results obtained at Söderfors seem to justify the statement that the sponge iron process has now left the experimental stage and can be considered just as dependable in its operation as, for instance, an electric shaft furnace.

Gas Conditions Analyzed

In Fig. 6 a diagram of temperature and pressure conditions of the gas is given. Studying at first the temperature conditions and starting with the gas as it leaves the final reduction zone A, it appears that the temperature is about 950 deg. C. (1740 deg. F). As the fan will not stand this temperature the gas is cooled down to about 650 deg. C. (1200 deg. F.) before it enters the fan. In the carburetor the temperature of the gas reaches about 1000 deg. C. (1830 deg. F.). In the gas flue, leading to the sponge iron furnace, the temperature is somewhat reduced so that the gas reaches the shaft at a temperature of about 975 deg. C. (1785 deg. F.). The reaction $FeO + CO = CO_2 + Fe$, being exothermic and the radiation losses of the shaft being comparatively slight, the temperature in the final reduction zone is only slightly lowered. Occasionally a slight increase in the temperature has been observed with the result that the gas leaving the final reduction zone has a temperature somewhat higher than that of the gas entering below. The temperature of the gas continuing through the prereduction zone drops to about 850 deg. C. (1560 deg. F.) since the reaction $Fe_3O_4 + CO = 3\ FeO + CO_2$ is endothermic.

In the combustion zone the temperature of the gas reaches an average of 1000 deg. C. (1830 deg. F.). In preheating the ore the temperature of the gas finally drops so that the gas leaving the shaft has a temperature slightly above 100 deg. C. (212 deg. F.).

As to the pressure conditions in the shaft, it is shown in Fig. 6 that the gas after leaving the fan has a pressure of about 250 mm. (10 in.) H_2O. In the carburetor and in the final reduction zone the loss in pressure amounts to about 120 and 95 mm. (4.75 and 3.75 in.) H_2O, respectively. The loss of pressure in the prereduction zone is of little importance, the quantity of gas passing through this part of the shaft being comparatively slight. To avoid a back draught a pressure of about 20 mm. (0.8 in.) H_2O is kept in the chimney.

The table below gives an indication of the composition of the gas in the system during normal operation.

As shown by the table the carburation of the gas is satisfactory. The gas entering the shaft contains 2 per cent of CO_2 only. The ratio $\frac{CO_2}{CO + CO_2}$ in the gas entering the carburetor is about 30 per cent, thus equal to the theoretical value. The raction $CO + H_2O \rightleftarrows CO_2 + H_2$ (the usual watergas reaction) is also balanced, as could be expected.

Regarding the composition of the gas just below the combustion zone, it is well to point out that the values are uncertain, due to the fact that there is no fixed boundary separating the combustion zone and the reduction zone. Consequently, it is difficult to obtain an exact analysis of the gas in this zone.

Heat Balance

Based on very careful measurements of all necessary data under the supervision of Mr. Wiberg during a week of normal operation, Table I was established. It will be noted that a certain heat value is put on the combustion gases, due to the fact that occasionally gas passes through the combustion zone without being ignited, as for instance when the air blast has been shut off for the sake of sample taking or measurements. Furthermore, a certain quantity of gas has to be let out without completely using it for the reduction, due to the fact that the degree of oxidation of the sintered ore has been comparatively low. The oxidizing con-

Analysis of the Gas, Per Cent

	Entering the shaft	Entering the carburetor	Before combustion	After combustion
CO	82.5	59.0	34.0	0.0
CO_2	2.0	25.5	50.5	16.5
H_2	13.0	8.5	7.5	0.0
H_2O	0.5	5.0	6.0	2.5
N_2	2.0	2.0	2.0	68.0
O_2	0.0	0.0	0.0	13.0
Total	100.0	100.0	100.0	100.0

ditions in the preheating zone therefore produces excess heat, for which reason less gas is required to be burnt with the consequence that a surplus thereof arises. The losses in cooling water from the carburetor and the fan, together with electrical losses and radiation losses make a total of 310 kg. cal., corresponding to 358 kw. hr. per metric ton of sponge iron. As previously noted, the power consumption should theoretically amount to 675 kw. hr. per metric ton of Fe reduced. In the present case 623 kw. of Fe is reduced per ton of sponge iron and the theoretical power consumption should therefor amount to 420 kw. hr. per metric ton of sponge. As a matter of fact, 750 kw. hr. per metric ton of sponge have actually been used. Calculating in this manner, the radiation and other losses should amount to 750 minus 420 = 330 kw. hr. per metric ton of sponge iron, which closely agrees with the figure of 358 kw. hr., as revealed by the heat balance. In normal operation the losses per hour in the form of radiation, etc., should therefore, if the above figures are used, amount to 325 kw. hr. per hour.

Analysis of Concentrates

In the perfected sponge iron furnace at Söderfors, the ore mostly used has been concentrates from the Vintjärn mine, analyzing about 63 per cent iron. Although it was possible to obtain richer material from the mine, the Fe content was not kept higher than 63 per cent for the reason that richer concentrates would be too fine grained to permit proper sintering in the existing sintering plant. To obtain denser and stronger sinters it was found of advantage to mix the Vintjärn concentrates with about 10 per cent of fines from Dannemora. The ores used analyzed as follows:

Constituents	Vintjarn Concentrates Per Cent	Dannemora Fines Per Cent
FeO	27.20	22.70
Fe_2O_3	60.40	47.80
SiO_2	5.75	10.60
Al_2O_3	1.25	0.57
MnO	0.55	3.15
CaO	0.50	5.15
MgO	2.63	5.95
P_2O_5	0.021	0.009
S	0.008	0.073
Ignition loss	0.00	4.60
	98.309	100.602
Total Fe	63.4	51.2
P	0.009	0.004

In some quarters the argument has been advanced that the Wiberg-Soderfors process could not be adapted in the United States because domestic ores do not compare with the high-grade ores available in Sweden. This is true of many of the Lake Superior ores. On the other hand, over 6,000,000 tons of sintered magnetite concentrates were shipped in 1943 from New York and New Jersey mines containing 64 to 68 per cent Fe (72.4 per cent theoretical for pure magnetite, Fe_3O_4). In this sinter silica is as low as 2 to 3 per cent in the higher Fe analyses; sulphur runs 0.020 to a mere trace, at Mineville. Chateaugay low phosphorus ore now being worked by Republic averages 0.005 per cent P, but phosphorus runs up as high as 0.25 per cent in some of the Port Henry concentrates. Generally, however, it averages 0.030 and under for eastern magnetites. Incidentally, the Brassert-Cape sponge iron plant to be erected by Republic under DPC auspices will operate on Port Henry concentrates containing 68 to 69 per cent Fe but running fairly high in phosphorus. The silica is much lower than the Swedish sinter tabulated above. The Dannemora fields are generally considered Sweden's best ore deposits.—Ed.

After the reconstruction of the furnace it was put in regular operation in 1941 and for 18 months of operation the following average figures were obtained:

Output in 24 hr.	19.5 metric tons Per Metric Ton	21.5 net tons Per Net Ton
Power consumption	860 kw-hr.	780 kw-hr.
Charcoal	10.8 hl.	27.8 bu.
Electrode	2.7 kg.	5.4 lb.

The sponge iron produced had the following approximate composition:

	Per Cent
Metallic iron	about 65
Total Iron	" 77
Degree of reduction	" 85
Gangue	" 19
Carbon	" 0.5—1
Phosphorus	" 0.012
Sulphur	" 0.012

That the furnace was operated in a manner so as to obtain a degree of reduction of about 85 per cent depended on the fact that the power consumption as well as the charcoal consumption was found to increase out of proportion with an increased degree of reduction. (See Fig. 7.)

In the production figures for the whole 18 months' period given above, there is included the increased power consumption caused by re-starting of the furnace after shutdowns that cannot be attributed to the actual sponge iron operation, such as lack of power, etc. During the last six months no such interruptions were experienced, having as a consequence a lower power consumption or an average of 730 kw.hr. per net ton of sponge iron.

In Fig. 8 a diagram is given, showing the power and charcoal consumption with varying rates of production. As shown there is, within the limits of operation, a considerable saving in power and charcoal with an increased production.

If the sponge iron reduced contains 65 per cent metallic iron, the theoretical power consumption would be 440 kw-hr. per metric ton (400 kw-hr. per net ton). If the charcoal has a weight (dry) of 14.5 kg. per hl. (11.2 lb. per bu.) and a carbon content of 87 per cent, the charcoal consumption would amount to 8.5 hl. (21.9 bu. = 245 lb. per net ton). On basis of the theoretical figures, given above, a diagram has been drawn up, Fig. 9, showing the efficiency of the charcoal and the power with different rates of production.

As shown by the diagram the efficiency of the charcoal with a production of 24 metric tons (26.5 net tons) per 24 hr. equals 81 per cent and that of the power 60 per cent. The charcoal consumption, at this rate of production, is very near the theoretical figure and no considerable saving can therefore be expected on this score in a further development of the process. As to the power consumption, it should be possible to effect some saving, although a power consumption of only 740 kw-hr. per metric ton (670 kw-hr. per net ton) has actually been achieved at a production of 24 metric tons in 24 hr. One way to decrease the power consumption with the present installation would be to increase the rate of production, thus reducing the radiation losses, etc. The possibilities for an increased rate of production of the present installation, will be discussed below.

With the dimensions of the shaft given, the rate of production depends on the following factors:

The analysis and temperature of the incoming gas

The speed of the gas circulation

The character of the ore

No considerable improvements in the analysis of the gas can be anticipated as the gas already is well carbureted. Neither is it possible to increase production by increasing the temperature of the gas as this might lead to adhesions of material to the walls of the shaft, thereby causing hangings. By these means it is therefore impossible to increase production to any great extent.

An increase in the speed of the gas circulation, however, would increase production. Such an increase, if it passed a certain limit, would cause a lowering of the CO_2 content of the gas entering the carbureter. This is due to the fact that the ore would not be reduced with sufficient speed to form the 30 per cent CO_2 which theoretically is desirable in the gas. A decrease of the CO_2 in the circulating gas would theoretically be followed by an increased consumption of power and charcoal. (See Fig. 10.) On practical grounds the speed of circulation cannot be increased above a certain limit for two reasons, one being the increase in the head of pressure in

the furnace, the other being that too much dust might be carried along with the gas. With the conditions existing at Söderfors a certain increase in the speed of circulation could be permitted but at present the capacity of the fan is insufficient.

The properties of the ore have a great bearing on the output of the sponge iron furnace. As already mentioned, the quality of the sintered ore leaves a great deal to be desired. A modernizing of the sintering plant is planned, however, thereby improving the conditions.

Upon the completion of the improvements discussed above it should be possible to increase the production from 7000 metric tons (7750 net tons) per annum to about 10,000 metric tons (11,000 net tons) per annum.

By extending the curve in Fig. 8 showing the power consumption to the point corresponding to a production of 27.5 metric tons (30.5 net tons) in 24 hr. (about 10,000 metric tons per annum) one arrives at a figure, for the power consumption, of about 710 kw-hr. per metric tons (642 kw-hr. per net ton) which figure thus would be attainable with the present installation. This does not exhaust, however, the possibilities for a lowering of the power consumption. For local reasons the carburetor is at present placed at a considerable distance from the furnace and this causes unnecessary radiation losses. For the sake of the runner of the circulating fan it has been found necessary to cool the gas to about 650 deg. C. (1200 deg. F.) before it enters the fan. By employing in the runner a heat resistant steel of an improved quality it should be possible to increase the temperature of the gas. In a new installation, designed for an increased production, the radiation losses from the shaft would be less per ton of sponge iron. An estimate is given below of the saving possible in a new installation, producing 20,000 metric tons (22,000 net tons) of sponge iron per annum, it being further assumed that the circulating gas be cooled to 800 deg. C. (1470 deg. F.).

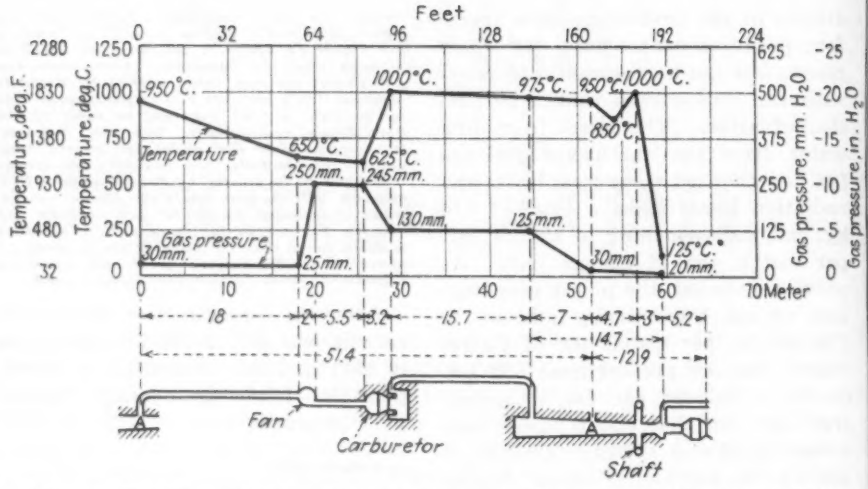


FIG. 6—Conditions of temperature and pressure in the sponge iron furnace at Söderfors. Point A at left and at right are at the final reduction zone.

Table I

Heat Balance for Wiberg-Söderfors Furnace Per kg. sponge iron, containing 73.54 per cent Fe, 0.58 per cent C and with a degree of reduction of 84.5 per cent. Production in 24 hr. = 22.5 metric tons, using a sintered ore with 59.52 per cent Fe and with a degree of oxidation of 86.7 per cent.

Averages from Feb. 16 to Feb. 21, 1943

Supplied	Kg. cal.	Per cent
Calorimetric heat value of 0.01004 hl. = 0.1757 kg. charcoal (15.4 per cent H_2O) at 6641 kg. cal. per kg.	1167	62.4
Calorimetric heat value of 0.00305 kg. electrodes at 800 kg. cal. per kg.	24	1.3
Electric energy to carburetor, 750 kw.-hr.	645	34.5
Electric energy to fan motors, 16 kw.-hr.	14	.7
Sensible heat in the sintered ore at 70 deg. C.	21	1.1
Total	1871	100.0
Distributed		
Reduction of iron oxides	1006	53.7
Sensible heat of sponge iron at 250 deg. C.	48	2.6
Heat value of C in the sponge iron	46	2.5
Sensible heat in charcoal breeze from carburetor at 500 deg. C..	1	.0
Heat value of charcoal breeze from carburetor	22	1.2
Sensible heat in combustion gases from the shaft at 135 deg. C....	44	2.4
Heat of evaporation of H_2O in combustion gases	9	.5
Upper heat value of combustion gases from the shaft	61	3.3
Sensible heat in waste gases at 100 deg. C.	4	.2
Heat of evaporation of H_2O in waste gases	11	.6
Upper heat value of escaped gases	171	9.1
Sensible heat in air + steam from fuel bin at 25 deg. C.	8	.4
Heat of evaporation of H_2O from fuel bin	6	.3
Loss in cooling water from cooling chamber and discharging machinery	124	6.6
Loss in cooling water from carburetor	43	2.3
Loss in cooling water from fan..	5	.3
Radiation losses from shaft	93	5.0
Radiation losses from carburetor..	41	2.2
Radiation losses from gas flue between carburetors and shaft ..	28	1.5
Radiation losses from gas piping and fan	77	4.0
Radiation losses from fuel bin ...	6	.3
Losses in transformers and cables	17	.9
	1871	100.0

Saving by decreased radiation losses from shaft and gas flue ..... about 50 kw-hr. per metric ton
Saving by reduced cooling of the gas before entering the fan ..... about 50 kw-hr. per metric ton

Total about 100 kw-hr. per metric ton

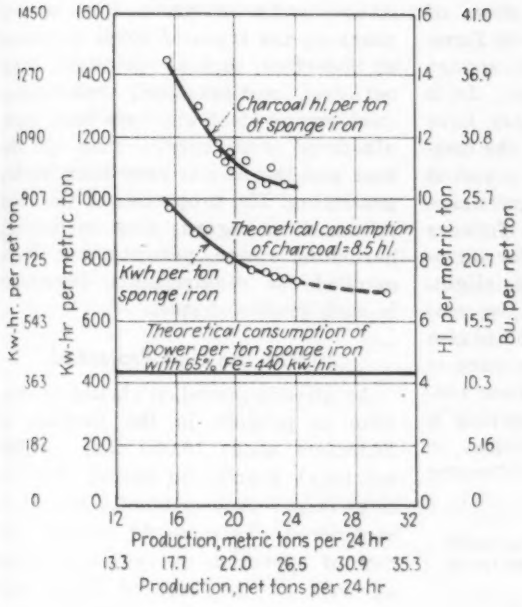
As already stated, the power consumption with the present installation and with a production of 10,000 metric tons per annum amounts to 710 kw-hr. per metric ton (642 kw-hr. per net ton). With a new, improved installation, having a yearly capacity of 20,000 metric tons, it should be possible to lower this figure by 100 kw-hr. per ton, the actual power consumption thus being 610 kw-hr. per metric ton (550 kw-hr. per net ton) of sponge containing 65 per cent metallic iron and having a degree of reduction of 85 per cent.

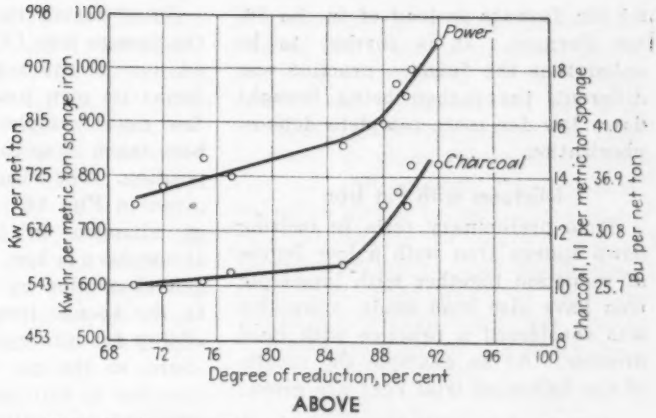
Remelting the Sponge Iron

At Söderfors the remelting of the sponge iron is done in electric arc furnaces, this type of furnace being well adapted for the purpose. Experiments previously made in remelting sponge iron in high frequency furnaces have not proven satisfactory, this being substantiated by trials on a small scale with sponge iron of the Söderfors quality. As no open health furnace was available at Söderfors, melting in that type of furnace has not been tried. In the following, arc furnace melting only, as conducted at Söderfors, will therefore be discussed.

The electric steel furnace, ordinarily used at Söderfors, is Scott connected and provided with two top electrodes and a conducting hearth. The lining is basic. The furnace originally had a capacity of 6.5 metric tons (7.2 net tons) but has recently been rebuilt for a capacity of 10 metric tons.

It is possible to reduce and melt in the electric steel furnace without difficulty a sponge iron with 85 per cent reduction and as already mentioned it has been found uneconomical to operate the sponge iron furnace in a manner to obtain a higher degree of reduction. On the other hand it has not proved profitable to melt an iron sponge having a degree of reduction much lower than 85 per cent.





ABOVE

FIG. 7—Consumption of power and charcoal at different degrees of reduction in Wiberg-Söderfors sponge iron furnace.

LEFT

FIG. 8—Consumption of power and charcoal at different rates of production.

although it is technically possible to handle a 75 per cent material.

Steel Making Practice

When producing a 1 per cent carbon tool steel in the 10-ton furnace, 2.5 tons (2.75 net tons) of mill scrap is charged on the bottom of the furnace. Through an opening in the furnace roof about 4.5 tons (5 net tons) of sponge iron is charged, this being the maximum quantity possible to charge at any one time, the weight by volume of sponge iron being only 1.3. The charging of the sponge iron causes no difficulty as it is possible to charge about 3 tons (3.3 net tons) in about 30 sec.

When the charging is completed the power is put on, causing a great number of small arcs to be formed in the heap of sponge iron. The furnace operates very smoothly and it is not necessary to connect any choke coils. In this respect the conditions are much better than when melting ordinary steel scrap. After 2 hr. of operation an additional quantity of sponge iron, weighing about 3 metric tons, is charged and finally, 1 hr. later, another quantity of about 3 tons. In charging the last two batches of sponge iron the furnace is tilted somewhat so that the slag formed during the melting is forced out through the furnace spout into a slag bucket. The removal of the slag is hereby facilitated. When everything is melted, the remaining slag is completely removed and a new slag is added, the charge being finished under a white slag and with normal additions of deoxidizers. No abnormal wear on the furnace lining has been experienced in melting the regular sponge iron.

Further data are given below and in Fig. 11. Charged:

	Kg.	Lb.
Mill scrap	2,500	5,520
Sponge iron, total Fe 75 per cent, degree of reduction 85 per cent	10,700	23,600
Charcoal	60	132
Received:		
Ingots	10,100	22,270
Loss		3.8 per cent

Time:

	Min.
Patching	50
Charging	40
Melting	225
Slagging and deoxidation	90
	Total 6 hr. 45 min.

Used:	Per Metric Ton	Per Net Ton
Power, kw-hr.	870	790
Graphite electrodes	4 Kg.	8 lb.
Time, min.	40 min.	36

Analysis of product:	Per Cent
C	1.00
Si	0.20
Mn	0.30
P	0.013
S	0.010

Due to the fact that for local reasons the sponge iron used has been rather low in iron, it might be well to point out that the figures given above are by no means ideal. Using higher grade concentrates on the sponge iron furnaces, thereby diminishing the percentage of gangue in the sponge iron, will facilitate considerably the work connected with remelting.

Variations in Slag Volume

In Fig. 12 is shown how the composition of the sponge iron varies with the percentage of iron in the concentrates, assuming that the degree of reduction is kept constant (85 per cent). Another curve in the diagram shows the volume of slag formed in comparison to the volume of iron when melting sponge iron with varying contents of iron. As shown by this curve the volume of slag, when using concentrates with 60 per cent Fe, amounts to not less than 82 per cent of the steel volume. By an increase in iron in the concentrates, the quantity of slag rapidly decreases. With 65 per cent Fe in the concentrates, for example, the volume of slag will be one half of what it is when using 60 per cent Fe concentrates and with 68 per cent Fe in the concentrates only one-quarter part thereof. That this greatly influences the operation of the steel furnace is evident.

As a further illustration Fig. 13 gives data as to power consumption, electrode consumption and production per hour in melting sponge iron produced from concentrates with varying Fe content. The data given were obtained in the 6.5 metric ton furnace earlier in use. Unfortunately the degree of reduction is not exactly the same with the different grades of sponge iron. This difference should not be of great consequence, however, and therefore the curves will show approximately how the contents of Fe in the sponge influence the operating results in the steel furnace. As shown, the results improve greatly with the increase of Fe in the sponge iron. That the figures for the power consumption are higher than those earlier given is due to the fact that the figures refer to results obtained in the

6.5-ton furnace instead of in the 10-ton furnace. It is further to be noted that the furnace practice was different, the carbon being brought down low for more complete dephosphorization.

Mixtures with Pig Iron

Some preliminary tests in melting down sponge iron with a low degree of reduction together with liquid pig iron have also been made, since this was considered a practice with good promise. As an example the results of the following trial heat are given:

Charged:	Kg.	Lb.
Mill scrap	2,400	5,300
Sponge iron, total Fe 71.6 per cent, degree of reduction 71.4 per cent.	7,700	17,000
Liquid pig iron, Carbon, 3.6 per cent	5,200	11,500
Concentrates (dried), Fe 63 per cent	200	440
Received:		
Ingots	12,740	28,100
Loss	about 3 per cent	

Time:	Min.
Patching	60
Charging	30
Melting	165
Slagging and deoxidation	75
Total 5 hr. 30 min.	

Used:	Per Metric Ton	Per Net Ton
Power, kw-hr.	620	560
Electrodes, Söderberg (See note 4, Table II)	5 kg.	10 lb.
Time, min.	26	23.5

Analysis of product:	Per Cent
C	0.60
Si	0.50
Mn	0.70

In the tests conducted with liquid pig iron it developed that more oxygen was needed to oxidize the carbon than would be needed if the carbon was removed in the form of CO only. The explanation is probably that the carbon monoxide rising through the heap of sponge iron in the furnace causes a reduction thereof, whereby CO_2 is formed. This is of great advantage as it permits the use of sponge iron with a still lower degree of reduction than ordinarily could be used, or it would permit the addition of a certain quantity iron ore.

Since during the melting down of the sponge iron CO and CO_2 is formed, one might say that the sponge forms its own protective gas. In a few cases samples of the gas have been taken so as to ascertain the composition. The result of such a test is given in Fig. 14. As the percentage of nitrogen in the steel furnace atmosphere is low, the risk for nitrogen absorption by the steel is slight. In the sponge iron furnace the possibility for nitrogen absorption is also slight, as the gas in that furnace is very low in nitrogen. For these reasons one is justified in expecting a very low percentage of nitrogen in the finished steel. The following values will prove this:

ponge iron	about 0.004 per cent N_2
Finished steel	about 0.008 per cent N_2

Phosphorus Kept Low

Using sponge iron instead of pig iron in the production of steel results in a low percentage of phosphorus in the steel. In the sponge iron process the phosphorus contained in the charcoal will not influence the percentage of phosphorus in the steel, as is the case in the production of pig iron. Assuming a charcoal consumption per metric ton of pig iron to be 24 hl. (62 bu. per net ton) in an electric shaft furnace and 43 hl. (110 bu. per net ton) in a blast furnace and assuming further about 0.015 per cent phosphorus in the charcoal, it follows that about 0.005 and about 0.010 per cent respectively of phosphorus is introduced in the steel by the pig iron. A corresponding decrease in phosphorus is experienced when using sponge iron made from the same ores.

The results obtained at Söderfors have proved the sponge iron to be a very high grade material from a qualitative point of view. For several years all the types of steels produced at Söderfors, such as tool steel, magnet steel, rustless steel, construction steel, spring steel, etc. have been manufactured with sponge iron as the base and the results have been highly gratifying. The properties of the steel produced in regards slag inclusions, hardening range, porosity, etc. have excelled the requirements demanded in such grades of steel.

20,000 Ton Unit Projected

As already stated, it should be possible to produce in the furnace at Söderfors about 10,000 tons (11,000 net tons) yearly. In future installations larger units evidently should be considered. This would reduce the cost of operation as radiation losses as well as the cost of labor and charges for interest and depreciation, etc. per ton of sponge iron would be lower. As regards the maximum size of furnace of this type that can be built, the major problem is to decide how much the size of the shaft can be increased without causing difficulties in the preheating of the charge and without preventing the gas from reaching the center of the shaft in the final reduction zone. One way in which to solve these problems would be to make the shaft of oval section. If the lower part of the shaft is made oval, however, it would be impossible to retain the circular discharging table, which might lead to complications. It should be possible, on the other hand, to let an oval section in the gas intake level change into a circular section in the lower part of the shaft, this making it possible to retain the circular discharging table. Even by retaining a circular section all through

FIG. 9—Efficiency of charcoal and power at different rates of production.

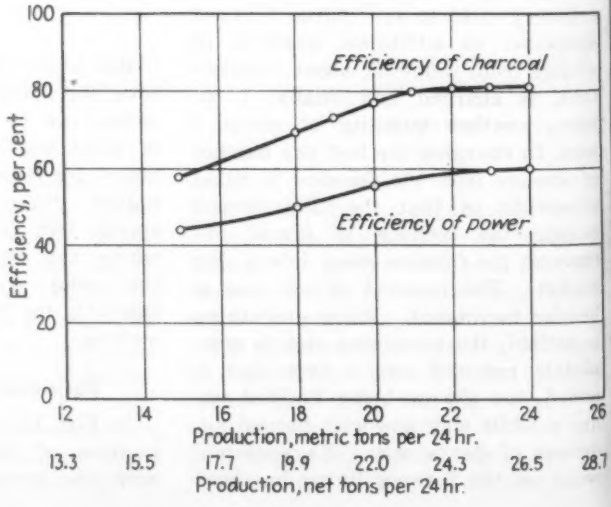
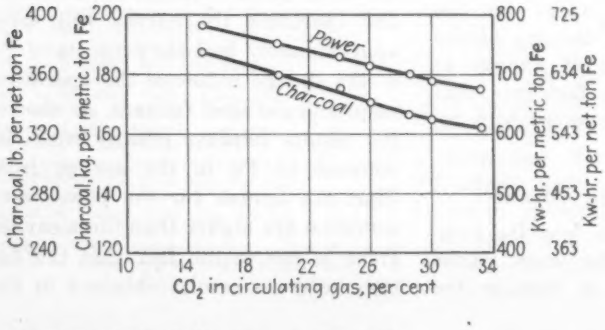


FIG. 10—Consumption of power and charcoal with varying percentages of CO_2 in the circulating gas.



the shaft it should be possible to build larger units but it is difficult to tell when the limit would be reached.

Assuming that a furnace of twice the capacity of the present one, namely with a yearly output of 20,000 metric tons, is to be designed and that this increase is to be accomplished solely by an increase in the cross-section of the shaft, it would be necessary to increase the diameter in the combustion zone from 1200 mm. (47.5 in.) to 1700 mm. (67 in.) and the diameter in the gas intake level from 2000 mm. (79 in.) to 2800 mm. (110 in.). Consequently the radial depth of penetration of the gas must be increased by 250 and 400 mm. respectively. This certainly should not be impossible of attainment. In this connection it is well to point out that even if the degree of reduction should be somewhat lower in the center of the shaft, this would have little influence on the average degree of reduction. Assuming, for instance, that as a result of the increase in the diameter of the shaft as proposed above, the core of material in the central column has a diameter of 800 mm. (31.5 in.), corresponding to the total increase in diameter and that this core has only one-half the degree of reduction as the balance of the material. Considering the volumes involved per unit of height, this would mean that the average degree of reduction would be lowered from 85 per cent to 81.5 per cent, or only 3.5 per cent.

TABLE II

Cost of Production of Sponge Iron (Per Ton Fe in the Sponge) & Pig Iron

	Price in Kronor	SPONGE IRON 20,000 metric tons per year, 85 per cent total Fe						PIG IRON					
		Charcoal		Wood		Coke		Blast-furnace 10,000 tons per year		[1]Electric shaft furnace 15,000 tons per year		[2]Tysland Hole furnace 30,000 tons per year	
		Used	Kronor per ton	Used	Kronor per ton	Used	Kronor per ton	Used	Kronor per ton	Used	Kronor per ton	Used	Kronor per ton
Ores:													
Concentrates	15.00 per ton	1540 kg.	23.10	1540 kg.	23.10	1540 kg.	23.10	1540 kg.	23.10	1540 kg.	23.10	1540 kg.	23.10
Fluxes	10.00 per ton							100 kg.	1.00	100 kg.	1.00	200 kg.	2.00
Cost of sintering	3.00 per ton	2200 kg.	6.60	2200 kg.	6.60	2200 kg.	6.60	1930 kg.	5.80	1930 kg.	5.80	1940 kg.	5.80
Fuel:								(730 kg.)		(410 kg.)			
Charcoal	1.30 per hl.	15.5 hl.	20.15					43 hl.	55.90	24 hl.	31.20		
Coke	30.00 per ton					200 kg.	6.00					200 kg.	6.00
Coke breeze	20.00 per ton											200 kg.	4.00
Lime for sulphur filter	10.00 per ton					50 kg.	.50						
Wood	7.00 per cu. m.			1.7	11.90								
Cost of drying					1.50								
Electric power:													
Carburization or smelting	0.01 per kw-hr.[3]	850 kw-hr	8.50	850 kw-hr.	8.50	850 kw-hr.	8.50			2100 kw-hr.	21.00	2400 kw-hr.	24.00
Motor power, light, etc.	0.025 per kw-hr.	50 kw-hr.	1.25	50 kw-hr.	1.25	50 kw-hr.	1.25	50 kw-hr.	1.25	50 kw-hr.	1.25	50 kw-hr.	1.25
Electrodes, Söderberg type[4]	0.35 per kg.	3.5 kw-hr.	1.25	3.5 kw-hr.	1.25	3.5 kw-hr.	1.25			6 kw-hr.	2.10	10 kw-hr.	3.50
Wages	1.50 per hr.	4 hr.	3.10	4 hr.	3.10	4 hr.	3.10	5 hr.	6.50	6 hr.	5.25	9 hr.	3.95
Sundry material			1.50		1.50		1.50		1.00		1.50		1.50
Repairs and relinings			3.50		3.50		3.50		2.00		4.00		4.00
General expense			3.50		3.50		3.50		3.50		4.00		4.00
Total			72.45		65.70		58.80		100.05		100.20		83.10
Interest and amortization			7.00		7.00		7.00		7.00		7.00		7.00
Total			79.45		72.70		65.80		107.05		107.20		90.10
Credit for gas									3.00		4.00		4.00
Total			Kr. 79.45		Kr. 72.70		Kr. 65.80		Kr. 104.05		Kr. 103.20		Kr. 86.10
	Per metric ton		$19.90		$18.20		$16.50		$26.00		$25.80		$21.50
	Per net ton		$18.00		$16.50		$15.00		$23.60		$23.40		$19.50

[1] The Swedish electric shaft furnace for reduction of pig iron from the ore has a circular crucible in which six electrodes protrude at an angle and upon which is superimposed a shaft similar to a blast furnace but less than half as high. Ore and charcoal are charged in the shaft and are preheated by hot gases. No air is admitted to the charge and the only gases produced are those liberated by reduction of the ore. The Domnarvet Iron & Steel Works of Stora Kopparsberg has four such shaft furnaces producing pig iron.

[2] The Tysland-Hole (Spigervert) pit type electric furnace is of Norwegian design. Three large size electrodes are suspended vertically through the arch and the ore is fed through short shafts surrounding the electrodes. No preheating takes place and the gases produced are utilized in other parts of the works. This furnace uses less power than the shaft furnace but consumes more carbonaceous material, in this case coke. It can be used for making all grades of pig iron. Both types of furnaces are illustrated in the article, "Pacific Coast Steel Industry," THE IRON AGE, March 21, 1940, p. 29. A more complete description of the Tysland furnace is given in the article, "Smelting Iron Ores Electrically," by Herman Cowes, THE IRON AGE, Dec. 3 and Dec. 10, 1942. For complete data on the operating characteristics and costs of the Swedish shaft furnace and the Tysland-Hole Norwegian furnace the reader is referred to the exhaustive report prepared by R. M. Miller for the North Pacific Division, Corps of Engineers, U. S. Army, entitled, "The Feasibility of Establishing an Iron and Steel Industry in the Lower Columbia River Area Using Electric Pig Iron Furnaces," March 1, 1936.

[3] Equivalent to 2.5 mills per kw.-hr. Hydroelectric power at Niagara Falls costs about 5 mills in big blocks. Bonneville Dam power on the Columbia River was estimated at 1 to 1.5 mills per kw.-hr. for the purpose of producing pig iron in that area by the electric shaft furnace of the Tysland-Hole furnace. (See notes 1 and 2.)

[4] Soderberg electrodes are made in this country by the National Carbon Co., unit of Union Carbon & Carbide Corp. Current selling price for the mix is 2.25c. per lb., f.o.b. Niagara Falls, plus 1c. per lb. royalty. Mixing the ingredients at the point of use somewhat reduces the freight charges, making a net cost of materials 2c. per lb. or under.—Ed.

Using a sponge iron with an uneven degree of reduction might be objectionable but from the experience gained at Söderfors, this would be of little consequence if only the average degree of reduction is sufficiently high.

It is difficult to state if the carburetor can be increased to twice the present capacity. Even if this could be accomplished, which is quite possible, it would be impracticable to operate with one carburetor and one fan only. For the sake of safety it would be advisable to have a double set of carburetors and fans so that in case repairs are needed on one set, it still would be possible to operate with the other. Besides it would be easier with two carburetor systems to obtain an even and symmetrical distribution of the gas in the shaft.

From the above remarks it seems as if it should not be impossible with a new furnace installation to reach a production of 20,000 tons (22,000 net tons) per annum. Based on pre-war prices the cost of installation of a furnace of this capacity is estimated to be about Kronor 750.000 ($187,500), including the cost of the building.

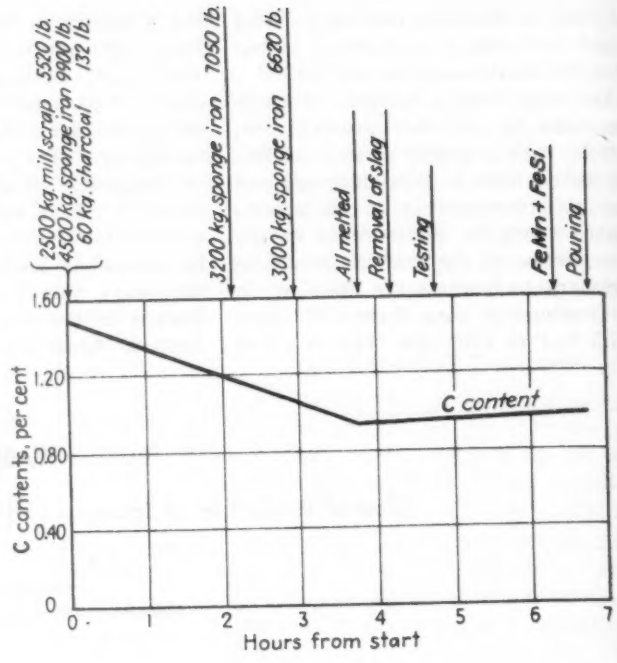
Use of Other Fuels

In operating the furnace at Söderfors, charcoal has chiefly been used in the carburetor as it was considered of primary importance to establish the process with that type of fuel. It was tempting, however, to use wood in place of charcoal, since wood is cheaper than charcoal and easier to procure. In order to ascertain how the addition of wood would influence the operation of the carburetor, wood was added in gradually increasing quantities. It was found that 30 per cent of wood, in chopped up pieces could be added. In adding wood in proportions above 30 per cent, difficulties were experienced due to the moisture contained therein. For this reason it will be necessary to dry the wood and experiments along such lines are being continued.

Running the carburetor with coke in place of charcoal would also cheapen the process. Some preliminary experiments with additions of coke in gradually increasing quantities, have been carried out, until a mixture of 40 per cent coke and 60 per cent charcoal was used. With the addition of coke it was feared that the carburizing would be less satisfactory since it is stated in the handbooks that the carburizing reaction, when using coke is slower than when employing charcoal. In practice it was shown, however, that the percentage of CO_2 in the gas formed when using coke in the carburetor actually decreased somewhat. This is probably due to the higher conductivity of the coke compared with that of charcoal, causing a better and more even heat distribution in the carburetor. Not being designed for operation with coke, the carburetor at Söderfors was not provided with any equipment for sulphur absorption and it was therefore only natural that the sulphur content of the sponge iron would increase by the addition of coke to the carburetor. The contents of sulphur in the sponge iron

RIGHT

FIG. 11 — Progress of carbon reduction in melting of sponge iron in an electric arc steel furnace.



BELOW

FIG. 12 — Relation between the composition of the sponge iron and the Fe content of the concentrates, also the volume and weight of slag.

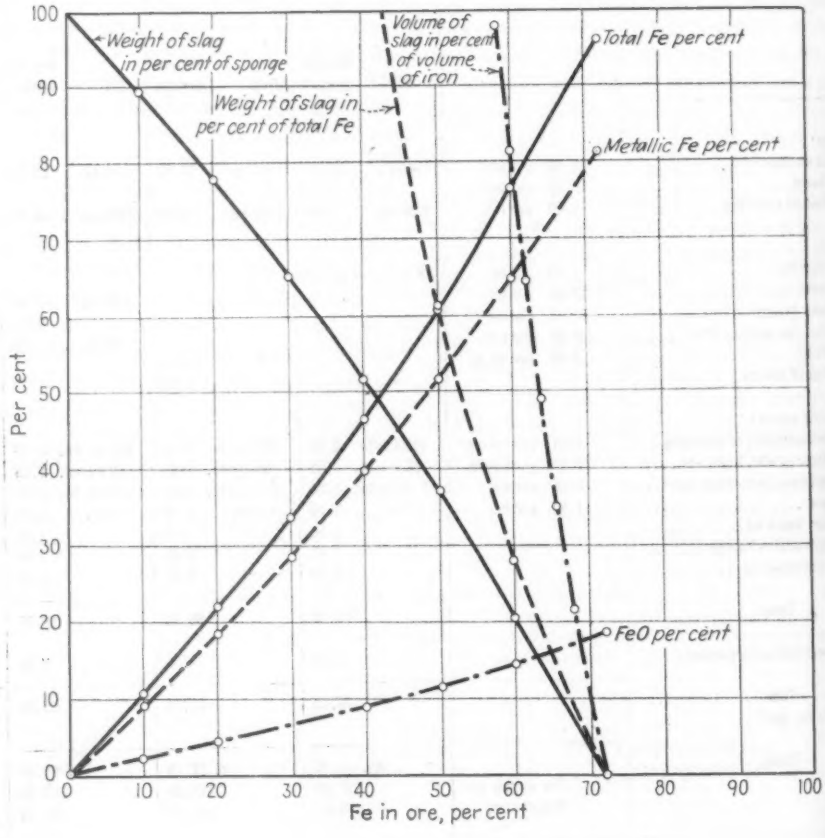


TABLE III

Estimated cost in melting a sponge iron with a degree of reduction of 85% and containing 85% Fe in a 20-ton electric steel furnace.

Time per heat—7 hr.
Production—410 tons weekly = 2.85 metric tons per hr. (3,14 net tons)

	Per Metric Ton	Per Net Ton
Power— 850 kw-hr. per metric ton at Kr. 0.015 (0.375 c.) per unit.	Kr. 12.75	$2.90
Electrodes—6 kg. at Kr. 0.35 per kg	2.10	.48
Wages	2.65	.60
Refractory materials and fluxes	3.50	.80
Tools and sundry material	1.50	.33
Repairs	1.00	.23
General expense	2.00	.46
Interest and depreciation	7.50	1.70
Total cost of conversion	Kr. 33.00	$7.50

Assuming a loss of iron of 4 per cent in melting the sponge, the total cost of the finished liquid steel at the spout would be:

	Per Metric Ton	Per Net Ton
Using sponge made with charcoal	about Kr. 115.50	$26.20
Using sponge made with wood	about Kr. 108.50	24.60
Using sponge made with coke	about Kr. 101.50	23.00

with different additions of coke on the carburetor is given below.

Coke Added in Carburetor Per Cent	Sulphur Content of the Sponge Iron Per Cent
0	0.008
10	0.014
20	0.022
30	0.028
40	0.038

In order to lower the sulphur content in the gas a lime filter will be installed.

Cost of Production

In Table II calculations of the probable cost of production of a plant producing 20,000 metric tons yearly are given. In the cost estimate the figures given are based on the use of charcoal, wood or coke. For comparison the cost of producing charcoal pig iron in a blast furnace and in an electric shaft furnace, as well as of producing coke pig iron in a Tysland-Hole furnace are also given. In all cases the base prices are the same and based on the prices that may be expected after the end of the war. The estimate is figured on the iron contained in the sponge and not on the tonnage of sponge iron. This permits a direct comparison with the pig iron figures. The following data are also assumed:

In all cases the sintered ore used is produced from concentrates containing 65 per cent iron. In the sintering operation it is calculated that 20 per cent of the sinters will be returned when used for producing pig iron, and 30 per cent when used for producing sponge iron, since it is of greater importance to have in the latter case a raw material as free from dust and fines as possible. The sponge iron produced has a degree of reduction of 85 per cent and a total of 85 per cent iron. The volume of the charcoal refers to the capacity by volume of the incoming cars. Due to the more strict requirements on the fuel it is figured on a 15 per cent loss in charcoal breeze when producing sponge iron. In the blast furnace and in the electric furnaces this figure is put at 10 per cent.

As shown in the table the cost of production of iron in the form of sponge iron would be about Kr. 80 per metric ton ($18 per net ton) when using charcoal; about Kr. 73 per metric ton ($16.50 per net ton) when using wood, and about Kr. 66 per metric ton ($15 per net ton) when using coke, against Kr. 104 ($23.50 per net ton) for charcoal pig iron and about Kr. 86 per metric ton ($19.50 per net ton) for coke pig iron produced in the Tysland-Hole electric furnace. When using charcoal in the carburetor, the cost per ton of iron in the form of sponge iron will therefore be about Kr. 24 cheaper than that in the form of charcoal pig iron. In using wood or coke the decrease in cost will be about Kr. 31 and 38 respectively.

Cost of Carbon Steel

In order to establish from an economic point of view the usefulness of sponge iron in the production of steel, it is necessary to carry the calculations further and in Table III the cost of producing a carbon steel in a 20 metric ton (22 net ton) electric steel furnace when using sponge iron as a base is therefore given. The calculation refers to finished, liquid steel in the furnace. Consequently the pouring costs are not included.

In using sponge iron produced with charcoal or wood in the carburetor the cost of the finished steel would be only slightly higher than the cost of charcoal pig iron. In using coke in the carburetor the cost of the steel would be somewhat cheaper than that of the charcoal pig iron. Generally speaking, in using sponge iron it should therefore be possible to save almost the entire cost of converting the charcoal pig iron into finished steel.

Comparing on the other hand steel produced with sponge iron, using coke in the carburetor and pig iron made in the Tysland-Hole electric furnace, the cost of the finished steel would be about Kr. 15 per metric ton more expensive than the pig iron in question. Producing finished steel from coke pig iron with a cost of conversion of Kr. 15 per ton not being out of the ques-

TABLE IV

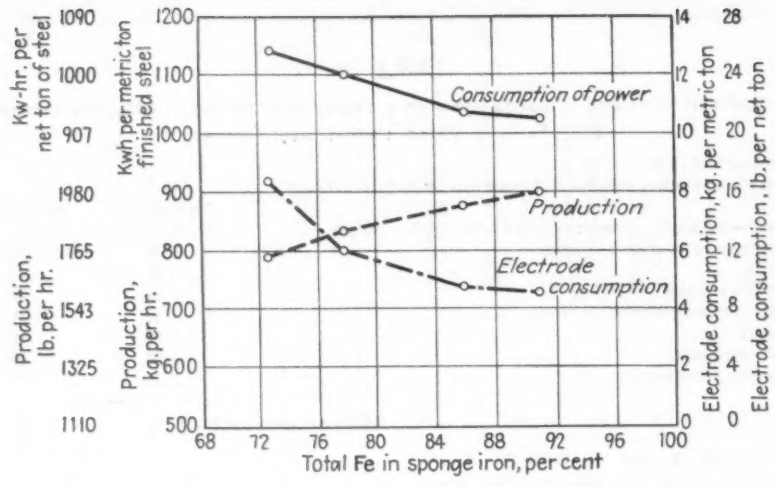
Estimated cost in melting 50% sponge iron with a degree of reduction of 70% + 50% pig iron in a 20 ton electric steel furnace.

Time per heat—5 hr.
Production—570 tons weekly = 4 metric tons per hr.

	Per Metric Ton	Per Net Ton
Power—600 kw-hr. per metric ton at Kr. 0.015 per unit	Kr. 9.00	$2.04
Electrodes—5 kg. at Kr. 0.35 per kg	1.75	.40
Wages	1.90	.43
Refractory materials and fluxes	3.50	.79
Tools and sundry material	1.50	.34
Repairs	1.00	.23
General expense	1.50	.34
Interest and depreciation	5.50	1.25
Total cost of conversion	Kr. 25.65	$5.82
Material charged:		
Pig iron—520 kg. at Kr. 103.20 = Kr. 53.65		
Sponge —520 kg. at Kr. 73.00 = Kr. 38.00	Kr. 91.65	20.78
Grand total	Kr. 117.30	$26.60

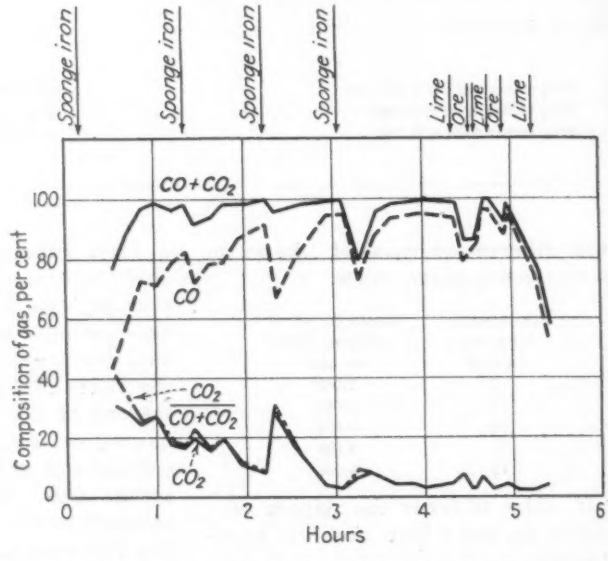
tion, steel produced with sponge iron, using coke in the carburetor, should also be competitive with steel produced from coke iron made in the Tysland-Hole furnace.

In the estimate above the saving in power and time resulting from use of preheated sponge in the electric steel furnaces has not been given any consideration. When the sponge leaves the reduction zone it has a temperature of about 1000 deg. C. (1830 deg. F.) and a sensible heat of about 163 kg. cal. per kg. of iron. Evidently it is impossible to recover all this energy but it should be possible to transfer the sponge to the steel furnaces at a temperature of about 600 deg. C. (1110 deg. F.) and with a sensible heat of 84 kg. cal. per kg., thereby lowering the consumption of power with 100 kw-hr. per metric ton, corresponding to a saving of Kr. 1.50 per metric ton (33c per net ton) with a cost of power of Kr. 0.015 (3.75 mill) per unit. The time of melting will also be shortened somewhat, as already mentioned.



ABOVE

FIG. 13—Variations in production of steel, consumption of power and electrodes with different percentages of iron in the sponge iron.



RIGHT

FIG. 14—Composition of furnace atmosphere during the progressive melting of sponge iron in an electric arc steel furnace.

Other Economic Factors

Even if the calculations indicate that it would be of economical advantage to change from pig iron to sponge iron in the production of high quality steel, it is hardly to be expected that such a change could be accomplished immediately. It would involve considerable investments, besides the question of power supply, the types of iron ores available and other local conditions would have to be investigated. Finally it would be necessary to consider the influence on the character of the steel in changing from one process to another. For this reason the changes would have to be gradual. Should, however, an increase in the tonnage of high quality steel be found necessary, the question of a production of sponge iron must be carefully examined. In this connection, the feasibility of a combined pig iron and sponge iron process has to be considered. What might be gained in this respect in combination with the open hearth process will not be discussed here, as at Söderfors all steel making is done in electric furnaces.

By the use of liquid pig iron and sponge iron in the electric steel furnaces, trials as Söderfors, have shown that the time of melting can be shortened. Further the degree of reduction of the sponge iron can be lowered, this being followed by a lower cost of production. By using 50 per cent pig iron and 50 per cent sponge iron in the charge the degree of reduction of the sponge iron can be lowered to 70 per cent without any material decrease in the average degree of reduction in the steel furnace charge as compared with melting sponge iron of 85 per cent reduction without any pig iron. Lowering the degree of reduction of the sponge iron from 85 to 70 per cent would effect a saving of about Kr. 7 per ton ($1.60 per net ton). Table IV gives a cost estimate when operating with 50 per cent liquid pig iron and 50 per cent sponge iron.

As shown by the estimate, the cost of production with the assumed combination will be only slightly higher than the cost of production when melting 85 per cent reduced sponge iron only.

It is of interest to investigate what would be the national saving in fuel for Sweden in case of a general adoption of the sponge iron process. A calculation of the savings possible if half the present pig iron output is replaced by sponge iron is given below. The figures on charcoal and power consumption in Swedish blast furnaces and electric shaft furnaces are the official figures issued for 1939.

For the sponge iron production it would therefore be necessary to use about 37,000,000 additional units of power than are now used by the electric shaft furnaces, operating on charcoal. This increase in power consumption corresponds to an effect of about 4200 kw. The saving in charcoal would be about 510,000 cu. m. per year. Due regard must be given to the

Type of furnace	Consumed: Charcoal	Consumed: Power	Produced: Metric Tons
Charcoal blast furnaces	1,540,000 cu. m.		303,530
Electric shaft furnaces	140,000 cu. m.	120,000,000 kw-hr.	48,689
	1,680,000 cu. m.	120,000,000 kw-hr.	352,219
To replace with sponge iron one-half of the pig iron produced, about 175,000 metric tons, would require:			
Charcoal		270,000 cu. m.	
Electric power		157,000,000 kw-hr.	

decrease in the blast furnace gas produced which gas must be compensated for by producer gas, involving an increased consumption of mineral coal. The quantity of coal thus required would amount to about 32,000 metric tons.

In computing the above, the following figures are arrived at:

The sponge iron would be used as a base for the production of high quality steel in electric steel furnaces and in acid open hearth furnaces.

If found advisable, the quantity of charcoal saved, viz. 510,000 cu. m. per year, could be used for the production of an additional 330,000 metric tons of sponge iron which would mean a considerable addition to the Swedish steel output without depletion of the forest reserves. The power needed to produce this additional tonnage of sponge iron would amount to about 300 million units of power per annum.

Saving in changing to sponge iron		
Charcoal, 510,000 cu. m. at Kr. 13		Kr. 6,630,000 per year
Deduct:		
Increased consumption of power		
37 mill. kw-hr. at Kr. 0.01 per unit (2.5 mills) Kr. 370,000		
Increased consumption of mineral coal		
32,000 tons at Kr. 30	Kr. 960,000	1,330,000 per year
Total saving		Kr. 5,300,000 per year

In opening the 1930 spring meeting of the Swedish Iron Masters' Association (Jernkontoret) K. F. Göransson, managing director of the Sandviken Steel Works, pointed out that we were about to cross the threshold to the solution of the sponge iron problem. Many problems have had to be solved before reaching this stage but I do not hesitate in stating that the major difficulties are now behind us. To predict the magnitude of the future production of sponge iron is difficult but it is quite certain that it will have an important bearing on future developments of the Swedish steel industry.

DeBurring Aluminum and Light Steel Parts

By G. O. ROWLAND
Osborn Mfg. Co., Cleveland

o o o

THERE are numerous parts in aircraft and motor car production which contain small burrs. Many of these parts have recesses, slots or uneven surfaces and are not only difficult to handle but present problems in production which affect design when hard-to-get-at burrs are only partially removed or else removed in a manner which affects design dimensions.

Hand burring methods often are inadequate on today's production line of precision parts, and it is to the credit of production engineers that modern tools and techniques are available so that these small parts contribute their maximum to the strength and operating efficiency for which they are specified.

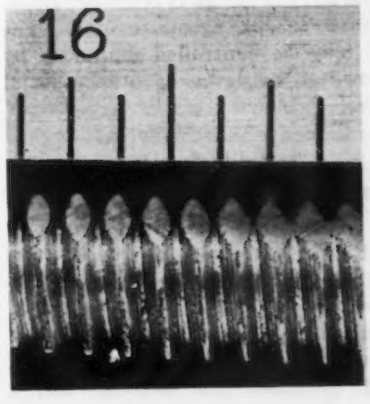
Removing burrs is a surface finishing operation. In view of the important relationship between the fatigue life of a part and its surface finish, a properly finished surface must include the strengthening or elimination of any point where fatigue stress might concentrate. Burrs, whether on the cut edges of a gear tooth or on the edge of any other metal part, constitute a point where fatigue stress will center, and unless they are removed, the fatigue life of the part will be shortened. According to accepted authority, practically all failures that occur in service are fatigue failures. Even minute scratches left by the finishing operation itself have a bearing on fatigue life. In this connection, it has been established that more than 15 per cent increase in fatigue life has been obtained by paralleling the power brushing motion to the direction of the principal stress.

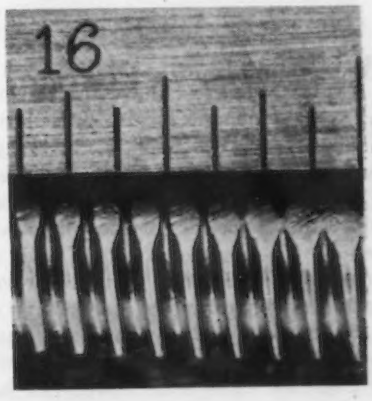
In one aircraft plant, the removal of burrs and sharp edges from an aluminum bearing retainer presented a serious production problem until the proper brush application was suggested, a 6-in. dia. fast cutting tampico wheel used with suitable burring compound and operated at a speed of 2400 to 3000 r.p.m.

Other successful applications of power brushing included such items as small machine steel adjusting screws, wherein brushing wheels removed lead and heat treat scale from the threads in a fraction of the time required by older methods.

Removing burrs from the slots and upper portions of the threads of castellated nuts posed another problem which has been successfully met with power brushing. An 8-in. dia. wheel was filled with 0.0095 in. crimped steel wire and operated at approximately 3000 r.p.m. A simple hand-held fixture consisting of a dowel pin made of hard wood fits the inside diameter of the nuts, upon which the nuts revolved freely from the power of the brushing wheel. The work was first held firmly up to the brush from one side so that the fixture was at an angle of about 20 deg. from the horizontal and about 20 deg. from a line running through the brush face. This operation removed the burrs from one side of each slot in the nut. By holding the fixture at 20 deg. from the horizontal, but in a line running through the plane of the brush with the nut in contact with the brush, the burrs on the top of the slots and the upper threads were cleaned. By repeating these two operations on the opposite side of the brush the entire slot and upper thread are finished. The operation is also adaptable to automatic equipment.

AT the left is shown a photomicrograph of a threaded steel clamp before brush deburring. At right are shown the threads after brushing, with burrs removed.



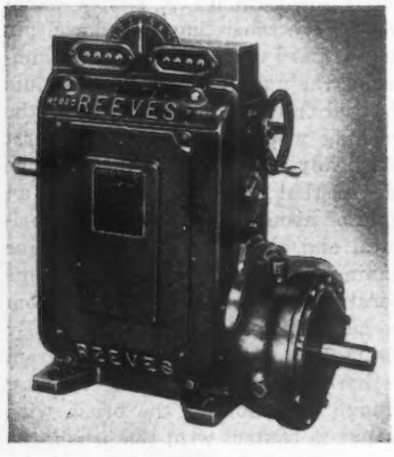


New Equipment . . .

Power Transmission Apparatus

New developments in gear reducers, speed drives, couplings, gear and wheel pullers, motors, transformers, switches and coatings are described in the following pages.

A VARIABLE speed transmission with built-in speed reducer has been developed by *Reeves Pulley Co.*, Columbus, Ind., for accurate speed control and speed reduction combined in one compact completely enclosed unit. It is available in horizontal and vertical designs in a wide range of



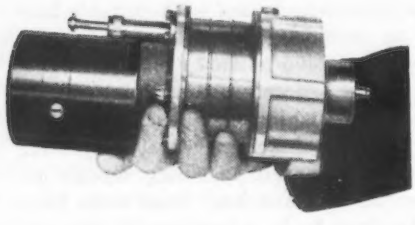
speeds and in capacities from 1 to 7½ hp. Various sizes produce ratios of speed variation from 2:1 through 12:1 and the reduction gears provide ratios up to and including 6.9:1. Speed changes are effected by turning a handwheel, or by mechanical or hydraulic methods.

Speed Test Drive

A COMPACT, self-contained variable speed test drive for testing aircraft tachometers also has been announced by *Link-Belt Co.* A ½-hp. electric motor is integrally mounted on one end. It utilizes the basic Link-Belt V.R.D. speed variator, has an over-all speed ratio of 10:1, and is furnished with four vertical drive shafts for mounting of tachometers, or with special swivel head to permit testing in either horizontal or vertical position. The four drives can be supplied all alike or in any desired combination. The unit permits selection of direction of rotation of each shaft, making it possible to operate two tachometers in one direction and two in the opposite direction and test all simultaneously.

Midget Speed Drive

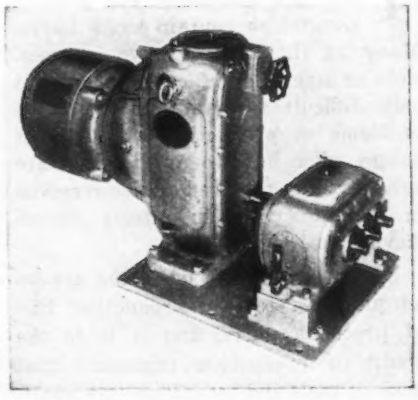
WEIGHING only 8 lb. complete with motor, the Model 15 drive for use with motors of not more than 1/15 hp. has been offered by *Graham Transmissions, Inc.*, 2706 North Teutonia Avenue, Milwaukee 6. Torque ranges from 4 in.-lb. at maximum



forward speed (for 3600 r.p.m. input) to 8 in.-lb. in reverse; or from 1 in.-lb. at maximum forward speed (for 1800 r.p.m. input) to 2 in.-lb. at reverse. Output speed range is from 700 r.p.m. to zero, or if it is desired to reverse the output shaft without reversing the motor, the range is from 400 r.p.m. forward to 400 r.p.m. reverse. The unit may be controlled manually by handwheel, by lever or other special control.

Portable Test Rig

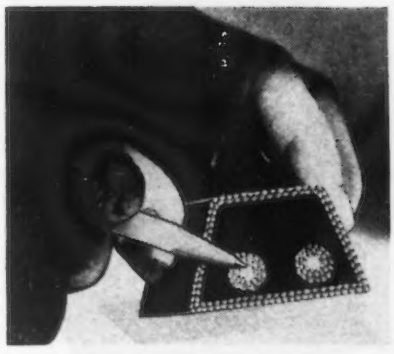
THE LINK BELT CO., Philadelphia 40, has added a new unit to its P.I.V. gear variable speed test rigs. It features a vertically mounted 2-hp. motorized P.I.V. gear of 6:1 overall speed range, connected to a helical gear box having three output shaft extensions for testing, and a fourth extension, on opposite side of box, for connection to a tachometer. The three output shafts in line have speed ranges of 600 to 3600, 300 to 1800 and 150 to 900 r.p.m. respec-



tively. The speed range of shaft extension for tachometer is 150 to 900 r.p.m., and a triple-scale indicator is used for the three speed ranges.

Gearmotors

A NEW line of horizontal parallel shaft type gearmotors which meet speed reduction requirements over a range of 1 to 75 hp. is announced by *Westinghouse Electric & Mfg. Co.*, East Pittsburgh. The use of adaptor castings between motor and mechanical parts allows the use of standard Westinghouse N.E.M.A. frame motors with each type of unit, permitting shifting the assembly between unit types to meet changes in speed requirements. Gears and pinions are lubricated by a positive splash system, and new case design allows oil to circulate freely. The units are compact and foundation stability is improved through heavy exterior ribbing of the housing at each mounting hole.



Wire Reinforced V-Belts

TWO types of wire reinforced V-belts are being built by the *B. F. Goodrich Co.*, Akron, a cable cord construction and a grommet construction which incorporates a wire cord placed in the center of a cotton or rayon grommet. Designed for the most rigorous services, advantages claimed are greater power capacity, increased tensile strength and low stretch. The company emphasizes that only after full engineering details of the equipment on which the belt may be used and operating conditions are studied will it be able to decide whether a wire belt will be practical.

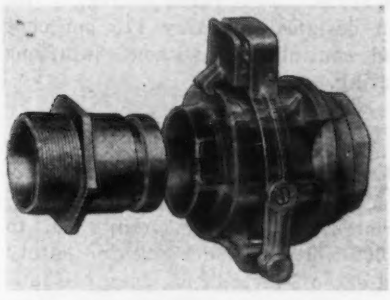
Left-Hand Output Transmissions

LEFT-HAND output models of both the Master (1-5 hp.) and Major (5-10 hp.) transmissions for motorizing cone driven machine tools are announced by *Western Mfg. Co.*, 3400 Scotton Avenue, Detroit. The company offers also three models of Multi-Motor Mount. There is also a Super (up to 30 hp.) transmission which has eight changes of speed in geometric progression of 1.29 with

a total reduction of 6:1, which is used to replace the gear box in large boring mills, radial drills, planers, and engine and turret lathes.

Quick Disconnect Couplings

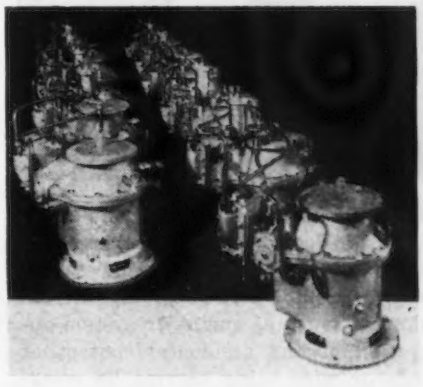
INDUSTRIAL and marine couplings from 2 to 10 in. in size, offered by *E. B. Wiggins Oil Tool Co., Inc.*, 3524 East Olympic Boulevard, Los Angeles, are said to be instantaneously disengaged by releasing a latch and throwing a lever. Connection is made by placing the two ends of the coupling together and raising the lever. The couplings are made in accordance with Federal specifications and the larger sizes are individually tested for pressure and porosity. Sizes ¾ to 2 in. are die cast from Zamak and larger



sizes are machined from brass or aluminum. A special line of couplings includes single and double self-sealing models as well as the open type.

Turbine Reduction Units

A LINE of standardized, completely self-contained, industrial turbine reduction units has been announced by the Cone-Drive Div., *Michigan Tool Co.*, 7171 East McNichols Road, Detroit 12. They are available in 26½ and 37 hp. base ratings, designed to operate on input speeds of 5000 to 6000 r.p.m. Standard ratios range from 3½ to 8 to 1. Self-contained, they are equipped with built-in oil pump and oil cooler, oil



filter and pressure relief valve, pressure-gage, thermometer and oil level gage. The lubrication system is of the force feed type.

Gear and Wheel Pullers

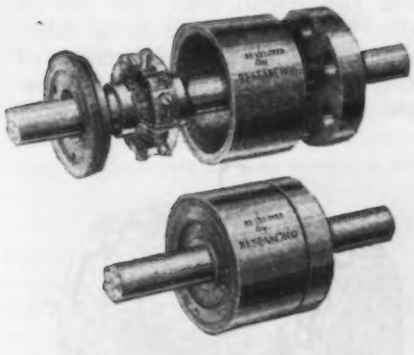
ARMSTRONG-BRAY & CO., 5364 Northwest Highway, Chicago, have announced the addition to their line of Steelgrip Rigid-arm gear and wheel pullers, which will handle a wide range of jobs, covering factory

work, tank, tractor, truck and farm machinery maintenance. They are available in three sizes. The forged steel arms, forcing screw and other parts are heat treated for strength and wear resistance.

Protected Motor

GENERAL purpose, open-rated motors in a new protected design, in sizes from 1½ to 15 hp., are

available from *Century Electric Co.*, 1806 Pine Street, St. Louis 3. Two fans located behind the bearing brackets draw cooling air through the bearing bracket openings, around the bearings, across the windings and to the air passages between the outer surfaces of the magnetic core and the frame, the heated air being expelled through openings at the side and bottom of the frame.



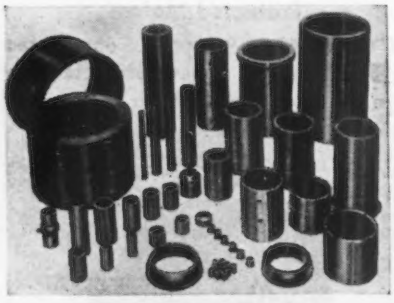
Centrifugal Clutch

A NEW type of automatically engaging and self-disengaging centrifugal clutch, the Torkontrol, has been announced by the *Amalgamated*

Engineering & Research Corp., 100 West Monroe Street, Chicago. A partially filled oil chamber is fitted with a freely rotating hub, which carries a series of movable wedge shaped flyweights. As the hub revolves, these weights fly outwardly and engage the internal rims of the outer case, binding the hub and shell into a functionally solid pulley or coupling. The unit works in either direction and is set to engage or release at a given speed and to slip in case of overload.

Molded Fabric Bearings

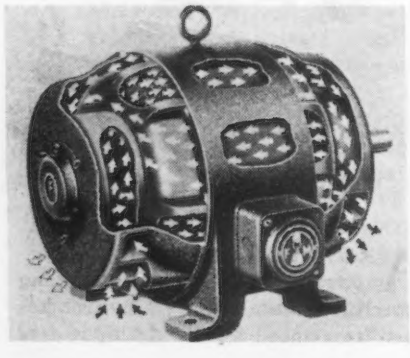
THE oil-lubricated non-metallic molded Lubritex bearings, developed by the *Gatke Corp.*, 228 North LaSalle Street, Chicago, are made of various material combinations to meet



all kinds of service conditions using grease or oil lubrication. It is said they stand up under impact loads that are too great for metal bearings, have much greater wear life and lower friction. They can be furnished in all shapes and sizes.

All-Purpose Motor

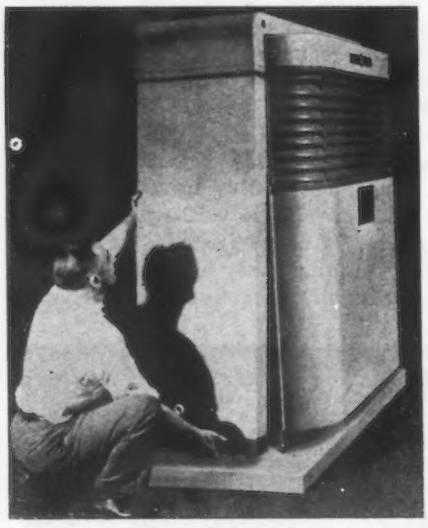
AN all-purpose, continuous-duty, polyphase squirrel-cage induction motor for use in all kinds of industry has been put on the market by *Fairbanks, Morse & Co.*, Chicago. Constructed with the centrifugally-cast F-M Copperspun rotor, the unit is fully protected against flying chips, falling particles, dripping liquids and other industrial motor hazards. Cross-flow ventilation is obtained through



protected inlets and exhausts at each end of the motor. There are no moving external parts, the frame being cast in one piece with rib sections to give added strength without increase in weight. Where space is limited, the conduit can be brought up between the motor feet to the tapped hole in the motor frame and the conduit box cover assembled flush with the frame. It is rated 40 deg. C rise and designed to carry 115 per cent load continuously without injurious heating.

Dry-Type Transformers

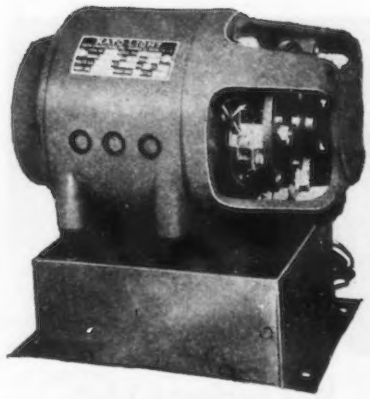
A NEW design of *General Electric* indoor dry-type transformers for primary circuits 601 to 15,000 volts provides greater safety and ease of installation than previous dry-type designs. Horizonally louvered sections on two sides of the case can be removed easily, making the interior accessible for cleaning and tap changing. All live parts are metal enclosed, various portions of the case being separately removable.



The solid sheet-metal top and sides and the deeply pitched louvers protect the unit from hazards which might result with open-screen enclosures, such as sprinkler system operation or the accidental contact of rods or wire being carried by workmen. Length of the transformers is about twice the width so they can be installed in dead spaces between pillars of a building or in out-of-the-way corners on a factory floor.

Rotary Converters

A NEW line of two-pole rotary "Konverters" has been announced by the *Kato Engineering Co.*, Mankato, Minn., in 225 and 350 volt-amperes continuous load capacities at



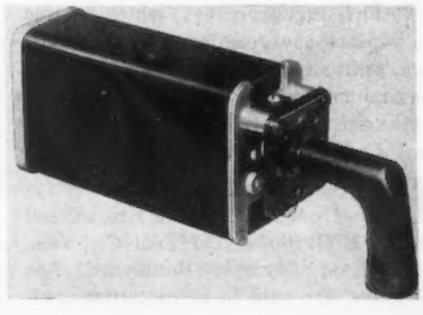
3600 r.p.m. with 40 deg. C. temperature rise. They are available for changing 32, 110 or 220 volts d.c. to standard 110-volts, 60-cycle a.c. Speed governor can be furnished for close frequency control with a variable d.c. input.

Identification Coatings

TO expedite the winding of electrical equipment, the *Sterling Varnish Co.*, Wilson & Fink Streets, Haysville, Pa., has made available the S-184 identifiers, a group of colored identification coatings for tracer wire applications. The wire is run through the varnish or the entire coil of wire dipped in it. It gives a smooth finish and dries quickly, permitting handling in less than 1 min. after application. The coatings can be supplied in any color.

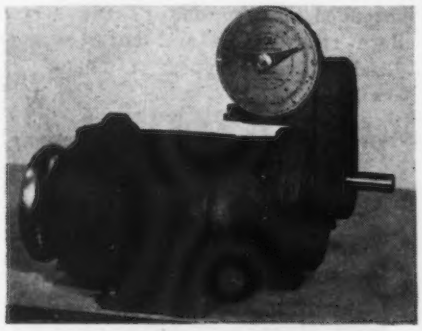
Master Control Switch

A MASTER CONTROL switch for heavy-duty service is announced by the *General Electric Co.*, Schenectady, for use wherever repetitive operations of electrically operated devices run into many thousands per week. It can be mounted on panels varying in thickness from ⅛ to 2 in. It is rated at 600 volts, 200 amp. continuous or 250 amp. for 3 sec. Its interrupting rating is dependent upon the voltage and character of the circuit and upon the number of contacts arranged in series.



A.C. Coil Winders

AVAILABLE either as a bench or pedestal model, in any backgear ratio from 2:1 to 18:1, the No. 1 back-geared a.c. coil winder has been added to the universal series manufactured by *Globe Tool & Engineering Co.*, 428 Davis Avenue, Dayton, Ohio. The winding torque increases with the ratio of the backgear, while the top speed decreases by the same ratio. A floor mounted foot pedal controls the operation of the winder. Motor speeds range from about 10 to 2000 r.p.m. in the 2:1 backgear unit. Wire in sizes from No. 16 to 42 may be wound into coils up to 5 or 6 in. in diameter and 4 in. long. An easily read counter indicates the number of turns accumulated.

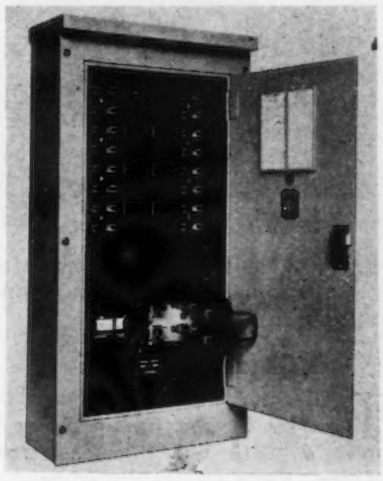


Slip Ring Induction Motor

A PRECISE, quick. easy-to-use method of spotting, or slowly rotating, a 3-phase synchronous motor or slip-ring induction motor has been developed by *Electric Machinery Mfg. Co.*, 1331 Tyler Street, N. E., Minneapolis, Minn. Slow-motion high torque rotation of the motor is provided by using commutated d.c. to supply a slowly revolving 3-phase inching current to the motor. The E-M incher is said to be particularly valuable in steel mills for positioning or rotating rolls for dressing and changing, backing out cobbles and for other purposes.

Marine Type Panel Boards

COMBINATION power and lighting panels for marine use are being manufactured by the *Square D Co.*, 6060 Rivard Street, Detroit 11. The panels are made to meet either low or high shock specifications of the U. S. Navy. The panel illustrated was built to meet low shock requirements and has eight 2-pole, 30-amp. lighting circuits and two 2-pole 60-amp. power circuits. The box is dripproof. The company has also developed the Multi-breaker convertible panel plan for the complete conversion of obsoleted fusible panelboards to circuit breakers with considerable increase in the number of circuits as well as in the capacity of circuits and mains.



Resistor Coil Coating

THE Pemco Corp., Baltimore 24, has announced production of Lectraseel, a vitreous low-loss resistor coating. It is said to be highly resistant to thermal shock and corrosion, and that the co-efficient of expansion and contraction will parallel that of ceramic cores.

Solderless Cable Connectors

FOR welding cable of the flexible type in various sizes without requiring special tools, soldering irons, etc., the *Chicago Tool & Engineering Co.*, 8348 South Chicago Avenue, Chicago 17, has developed the Palmgren solderless cable connectors in sizes ranging from Nos. 1 to 3 inclusive. The solderless connectors are interchangeable with the standard solder type. After insulation is removed, the taper plug is forced into center of cable. Then by screwing nut and body together, it forces taper plug flush with threaded end of nut, making a tight connection with positive conductivity.

Push Button Units

A NEW line of standard-duty push-button units designed for flush or surface mounting on machine tools, welding controls and similar equipment has been announced by the Industrial Control Div., *General Electric Co.*, Schenectady. Available in both pendent and oilproof types, with buttons of various colors and with interchangeable, labelled nameplates for easy identification, the units are made of a smooth, hot-molded, moisture-resisting phenolic compound. The responsive, double-break contacts are of fine-silver and have a steel back projection, protected by rust-resisting plating, welded to the contact supports. The oilproof units are

similar except that they are provided with an especially treated leather ring packing, which serves to wipe the oil from the surfaces from which it might otherwise seep into the mechanism.

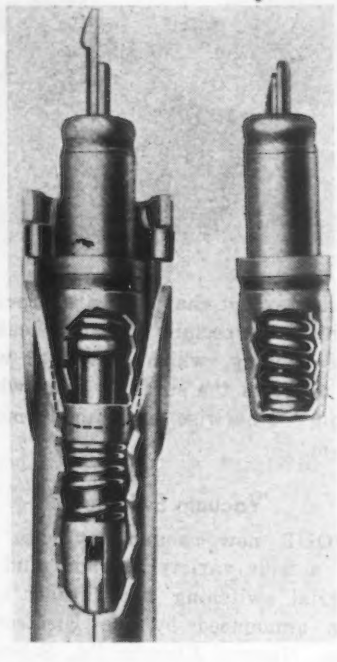
Vacuum Switches

FOUR new vacuum switches for a wide variety of radio and industrial switching applications have been announced by the Electronics Dept., *General Electric Co.*, Schenectady. They can also be adapted to oil or water-immersed operation and are especially applicable where fire and explosion are a constant risk, as in magnesium finishing rooms and similar dust-laden atmospheres. Two of the switches are also designed for high altitude applications. The contacts of the switches are mounted in a vacuum, which gives the switches a high current rating for their size and permits them to handle enough power to operate equipment at greatly reduced voltages. No self-contained coil or other operating mechanism is built into the switches, movement being obtained from the mechanism to be controlled. The contacts close without vibration, making it possible to mount the switches on or near delicate instruments.

Fastening Devices . . .

Airplane Skin Fasteners

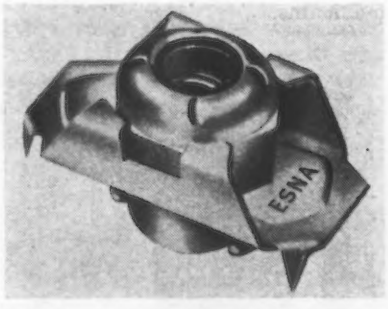
THE addition of a cap to their conventional airplane skin fasteners, which prevents retrograde movement of the spring and fastening element in the event of failure, cuts accident hazards, according to the *Prestole Division* of the Detroit Harvester Co., 5450 West Jefferson, Detroit. Another development is a redesign of the Prestite safety gun so that the plunger which actuates the



fastener extends within the cup, thereby eliminating the possibility of the fastener shooting out of the gun or becoming disengaged due to the improper placing of the fastener in the inserting tool.

Stop Nut for Plywood

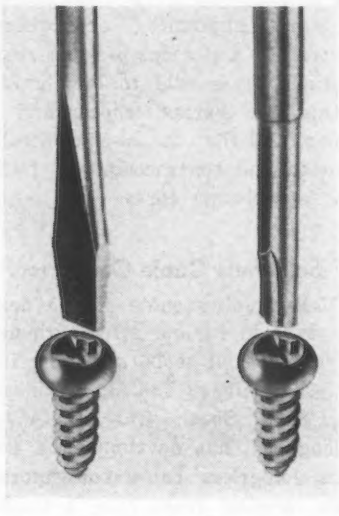
A SELF-LOCKING fastening device for use on plywood construction has been developed by the *Elastic Stop Nut Corp.*, 2321 Vauxhall Road, Union, N. J. A regular elastic stop nut, with the red cellulose locking collar, is used interlocked with a basket that locks into the plywood and holds the nut securely. Four prongs at the corner of the basket sink into the surface of the plywood and two feet inserted in the hole firmly anchor the basket. Spring



fingers at the top clasp the nut after it is seated and hold it firm against axial play.

Clutch Head Screw

THE clutch head screw put on the market by the *United Screw & Bolt Co.*, 2513 W. Cullerton Street, Chicago, has a special shaped head of such form that in an emergency a flat sided screwdriver may be used to



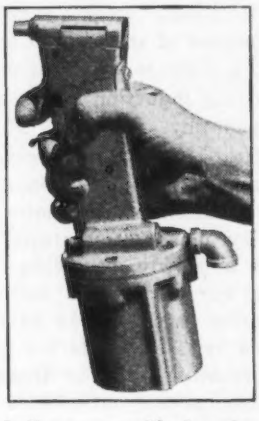
tighten or loosen it. The center pivot assembly bit used with the clutch head screw is self-centering in the head of the screw. Three sizes of center pivot bits cover the popular range of all standard machine screws and thread-forming types.

Blind Rivet

THE development of the Preco, a blind rivet that is applicable in almost any place where riveting is used, has been announced by the *Pacific Railway Equipment Co.*, 960 E. 61st Street, Los Angeles. The rivet is the combination of three parts, a steel cadmium-plated recessed head screw inserted into the hollow stem of a high strength aluminum alloy rivet, and a knurled nut of Dural threaded on the end of the screw. Both rivet sleeve and nut are anodized. Several types of heads are available.

Rivet Gun

FOR the high speed application of cherry blind rivets in double surfaced structures where access to one side of the work is obstructed, the *Cherry Rivet Co.*, 239 Winston Street, Los Angeles, Cal., has designed the G15 gun. It is claimed that rivets can be installed at a rate of 1600 per hr. with this all-pneumatic gun, which will operate in any position. The gun weighs approximately 4¼ lb., and operates on 75 to 100 lb. per sq. in. pressure. Three interchangeable pulling heads handle



either hollow or self-plugging types of rivets.

Threaded Inserts

A DEVICE that remains permanently fixed when inserted in such materials as plastics, fiber, copper, bronze, aluminum, etc., is being offered by the *Marco Co.*, Wilmington, Del. By inserting a hand tool shaped to conform to the taper of the threaded insert, it is expanded, which causes it to mushroom out at the bottom, forming a star-like projection.

PARISH

METAL STAMPINGS

★

MODERN DESIGN AT LOW COST

★

HOUSEHOLD APPLIANCES

New refrigerators, cabinets, bathtubs, stoves, and a wide range of other household necessities will be a joy to the post-war housewife.

Pressed Metal Parts and stampings will make possible unparalleled efficiency, smart beauty, long life,—all those qualities that lower sales resistance in a competitive world.

No other method provides *all* characteristics required,—resistance to elements, ability to take hard knocks in every day use, relative low cost, tensile strength, beauty and so forth. Parish Pressed Steel has completely rounded facilities; engineering cooperation in the drawing board stage, all sizes of presses for most efficient production, welding facilities, painting and finishing departments, and full assembly facilities.

It is not too early to plan your new designs. We are ready to work with you in the preliminary stages.

And as our contribution to post-war progress, we are now equipped to stamp, fabricate, and heat treat aluminum, in addition to steel.

ARMY E NAVY

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Assembly Line . . .

STANLEY H. BRAMS

• Truck program changes are being planned, with Army reducing needs, permitting increases for civilian requirements . . . Michigan Kaiser Co. is incorporated, indicating industrialist's entry in automotive industry.

DETROIT—The 1944 truck program, already under way, is still in the throes of readjustment. Industry people conferred here last weekend at WPB's request over the effect of forthcoming changes.

There is still scheduled for output this year an aggregate of about one million military and commercial vehicles. Of these latter, 81,366 have been earmarked for domestic use, and manufacturing circles say that the total has already been increased to about 88,000. And beyond that, the closed meeting last week produced inferences that the ultimate total for commercial use may run close to 200,000.

Cutbacks from the Army truck projections are now being planned in Washington, where the services are re-examining their inventories and logistics projections to determine where they can reduce their initial requirements. As soon as these military truck cutbacks appear, the commercial allocations will be enlarged.

The Rubber Administration has a stake in the outcome of this planning, too, for military vehicles require heavier tires, with higher proportions of natural crude intermixed with synthetic GR-S rubber, than do their commercial counterparts. Rubber Administration people in Washington appear of the belief that the program as now constituted may be actually a physical impossibility due to the limitations of the dwindling supply of natural crude still on hand.

Cutbacks on military vehicles will make possible the output of more than an equivalent number of civilian units. Reasons for this apparent anachronism lies in spare parts requirements and in duplication of critical components, like axles, bearings and gears. As example of the latter, big military trucks require more driving axles than do commercial jobs; cutback of one 6x6 military truck allows addition of three axles to the commercial program.

A SUBJECT of controversy between WPB and individual truck companies is how any forthcoming commercial output will be apportioned among the various makers. Up to now WPB has scheduled commercial production on the basis of the ability of the various producers to manufacture beyond their military commitments. The truck makers, however, generally advanced the viewpoint at the recent meeting that any further increases in their commercial volume should be on the basis of an historical average, projected from vehicle totals manufactured in a base year, such as 1941. Nearly all manufacturers represented at the Detroit conference backed such a program as a means of stabilizing their relative industry positions in a period when none could fill their share of the demand.

WPB did not comment on this suggestion, merely using the meeting as a fact-finding one. However, the Washington objection to such a proposal—it has been argued previously and at times a bit strenuously—is that the historical basis does not permit greatly amplified production by manufacturers whose other commitments give them margins of available facilities.

In addition to any shifting of production quotas from Army to commercial classifications, the civilian situation could be relieved during the forward period by turnback of military vehicles to general uses. This does not refer to such vehicles as the worn-out jeeps being sold in Chicago, but to new vehicles which have been idle since purchase because of changes in planning or specifications. Some of these are too heavy, too overburdened with driving axles, etc., to make them economical to use commercially. But there are others. For instance, considerable numbers of 6x4 trucks were ordered early in the war, mainly for Lend-Lease account. Many have never been shipped abroad and are still on this continent. The Army could do itself and the country a service by releasing such jobs for civilian requirements.

BESIDES the "always-with-us" problem of tires, bearings are popularly considered the bottleneck in the truck program, as in a great many other programs. It is true that shipments of bearings, ball somewhat more than roller, are running late and constitute a formidable obstacle to maintenance of production. But there are other current shortages as well. Back shop information is that the greatest bottleneck in the truck program today, interestingly enough, is malleable castings, used for such parts as carriers and housings. Producers using steel castings or stampings are filling their requirements without too much difficulty, but those utilizing malleable are currently in deep water.

Meanwhile, the bearing problem itself is being relieved by scaling down of Army spare parts requirements. Original Army ordering of spares in this classification ran from 30 to 50 per cent of original equipment needs, far beyond actual replacement requirements. As proportions of spares are cut, that much more leeway is afforded in the original equipment planning.

Henry J. Kaiser has made what appears to be his first move toward invasion of the automobile industry, with incorporation in Michigan of the Michigan Kaiser Co.

Directors are all Kaiser organization people, headed by Mr. Kaiser, and including E. E. Trefethan, Jr., G. G. Sherwood, Paul S. Marrin and Robert L. Bridges.

THE Michigan Kaiser Co. has taken over the organization and facilities of Probst and Harger, Detroit engineering firm which designed experimental vehicles submitted by the parent Kaiser Co. to the Army Ordnance Dept. in past months. Karl K. Probst, development engineer of this company, it will be recalled, was the designer of the American Bantam jeep, which has been considered the original vehicle in this midget size classification. His interests in past years have run largely toward development of lightweight vehicles, which would seem to chime well with Mr. Kaiser's expressed thinking on a post-war automobile. Trade circles in Detroit report that the new Michigan

THEY FLEW FOR 2 MINUTES . . .

"Boeing 314 Clipper" (Pan-American)

TODAY . . . *We Span the Oceans*

The contrast in performance between now and the first days of airplanes is one way of looking at their amazing progress. But it's *not* the most vital difference. The real difference between today and 1903 is that today we can build 8000 planes a month.

What has brought about this progress? Mass production? The assembly line? Yes, but before these were possible, there had to come STANDARDIZATION — the adoption of standard interchangeable parts which would assemble instantly without "hand fitting." This basic feat with its attending economies has made available to many, in all fields, products that were formerly available only to a few.

The use of *standard Screw Thread forms and sizes* has contributed enormously to this simplification of manufacture. A more universal adoption of these standards can carry their benefits still further in the years immediately ahead.

Standard Threads-
SAVE TIME - SAVE MONEY!

Full utilization of existing accepted sizes, pitches and forms can bring lowered costs to all manufactured products because: (1) it speeds production; (2) it reduces inventory. NOW, when plans for new and better products are taking shape —now is the time for a united effort to bring about greater standardization of threaded parts

Send for booklet "Selecting the Right Tap for the Job" — 18 pages of Facts, Tables, Suggestions

GREENFIELD TAP AND DIE CORPORATION GREENFIELD MASSACHUSETTS

This Is No Bull

Washington

• • • Farmers don't like steel nose rings for bulls, according to WPB. So it has authorized the use of copper for this purpose. WPB estimated that about 240,000 lb. a year of "readily produced type of copper rod will be needed for bull rings." At the same time the board in announcing amendments to Conservation Order M-9-c, prohibited the manufacture of new brass or copper tubing, pipe or fittings for installation in gas and gas distribution systems.

Kaiser Co. already has engineering designs on paper for a lightweight car—a report, incidentally, which is also being attributed currently to a number of automotive firms.

Further developing the speculation over the new project are reports from the west coast that the Kaiser plant at Permanente hopes to produce magnesium at exceedingly low prices—which might make it a nominee for structural and functional parts of a motor car. Conceivably a Kaiser car could incorporate many "car of the future" innovations of this sort, for Mr. Kaiser's projects have never lacked imagineering and a bold approach and the same should hold true for his automotive ventures.

THE Pratt & Whitney engine plant at Ford Motor Co. has produced and delivered to the Army more than 20,000 units since Pearl Harbor. Censorship permitted release of that statement Monday.

Ford's average volume of close to 1000 engines monthly during a period which began with minimum production was largely due to changes in production methods which permitted mass assembly, such as centrifugal casting of cylinder barrels; to conveyorized subassembly, painting and inspection; to development of multiple-purpose tools; and to widespread subcontracting.

The engine produced at Ford is the 2000-horsepower radial job used in the Republic P-47 Thunderbolt, the Martin B-26 bomber, the Curtiss C-46 Commando troop transport and the Vega PV-1 naval patrol plane.

The Ford P & W plant, incidentally, has been the scene of a rather substantial shakeup in the upper management brackets recently. H. J. Robinson, who was superintendent of the Lincoln Motor plant of Ford before the war, has assumed charge, taking over duties previously handled by E. J. Wedge, who lacks a new assignment as yet at Ford. A number of others were included in the shifts which developed shortly after the year-end.

Same Maury Maverick

Washington

• • • "There's no new Maury Maverick," Maury Maverick, Small War Plants Corp. Chairman told THE IRON AGE this week.

"I am for private enterprise; I always have been, and I want to help the small business man as much as I can while I am on the job," he said.

Mr. Maverick had been asked his reaction to critics who predict a hard time for business under his control and had been calling him a "new dealer" and "socialistic."

Before spending two terms in Congress, Mr. Maverick was in the lumber business for 12 years. He has had more than two years' experience at WPB.

SAE Cited by Ordnance for War Engineering Endeavors

Detroit

• • • The Ordnance Distinguished Service Award recently was conferred by the U. S. Army Ordnance Department upon the Society of Automotive Engineers in recognition of outstanding engineering advisory service. First award of its type to be made by Ordnance to any professional society, the presentation came from Major General G. M. Barnes, Chief, Technical Division, Ordnance Department at the SAE War Engineering-Annual Meeting dinner.

Accepting the citation for SAE, President Mac Short and other members adopted a resolution pledging continuation of SAE advisory war engineering service for the duration and post-war development of permanent machinery for uninterrupted SAE service to Army and Navy. More than 500 engineers, representing scores of automotive vehicle and parts manufacturers, now are serving on committees which, under the SAE War Engineering Program, work out Ordnance engineering problems.

The award stated that the presentation was "in recognition of outstanding and meritorious engineering advisory services in war and peace in the design, manufacture, and maintenance of materiel." It was authorized Dec. 28, 1943, and was signed by Major Generals L. H. Campbell, Jr., Chief of Ordnance; G. M. Barnes; and T. J. Hayes, Chief, Industrial Division; and by Brigadier Generals J. S. Hatcher, Chief, Field Service Division, and W. P. Boatwright, Chief, Office, Chief of Ordnance, Detroit.

o o o

Power for Smaller Plants Corp. Proposed

Washington

• • • The Murray (Senate) Small Business Committee will propose a bill next week in which the Smaller War Plants Corp. is given sweeping powers over the reconversion of small business.

The Corporation shall have the "duty to take all possible steps to aid small business production concerns in problems connected with the termination of war contracts, the settlement of claims thereon, and the conversion to peacetime production or other types of war production."

Powers given SWPC are not exceeded by the authority given any other agency over industry during the war and the suggested legislation does not put a period to the length of SWPC's authority.

SWPC's powers may be to:

1. Buy contractors' claims against the government on account of money owed as contract termination charges.
2. Make or guarantee loans against money owed contractors on account of cancellation of contracts by the government.
3. Make or guarantee loans to cover reconversion costs. Identification and appraisal of individual claims won't be a necessary condition for receiving a loan.
4. Purchase, sell or lease machinery, plants or materials released through contract terminations.
5. Advise and help small business concerns on contract termination, including the selection of contracts to be terminated, obtaining authority to continue all or parts of contracts, accounting and record keeping systems.
6. Decentralize its activities.
7. Make rules and regulations.

Announcing

THE CHANGE IN OUR CORPORATE NAME

from

THE LINCOLN PARK TOOL and GAGE COMPANY

to

LINCOLN PARK INDUSTRIES
INCORPORATED

The Management, Personnel and Policies of the Lincoln Park organization remain unchanged

THE MERGER OF

CARBUR, INC.

Manufacturers of Solid Cemented-Carbide Rotary Files and Cutting Tools

with

LINCOLN PARK INDUSTRIES, INC.

The name "Carbur" will continue to identify the tools formerly manufactured by Carbur, Inc. However, future production will be handled as a departmental operation of Lincoln Park Industries, Inc.

☆ A star has been added to our Army-Navy "E" flag. In making this award, Robert P. Patterson, Under Secretary of War, writes, "You have continued to maintain the high standards that you set for yourselves and which won you distinction more than six months ago."

ARMY E NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to LINCOLN PARK TOOL AND GAGE COMPANY
LINCOLN PARK 25, MICHIGAN

Washington . . .

L. W. MOFFETT

• Industry faces big problem of industrial demobilization at end of war . . . Sen. Truman warns of continuing contract cancellations in coming year . . . Absorption into private industry of men released from armed services studied.

WASHINGTON—The problems of industrial demobilization after the war and partial demobilization before the cessation of hostilities are obviously the biggest industry has to face. The ability of industry to provide jobs in a peace time economy will largely determine the future existence of private enterprise.

The enormity of the problem can be realized in view of the prediction of the Bureau of Labor Statistics that $75,000,000,000 worth of war contracts would be outstanding if the war should end tomorrow. The total military output for World War I was slightly more than $17,000,000,000.

Senator Truman, whose committee has done an excellent job of keeping our war program in line, recently said that about $8,000,000,000 in Army and Navy contracts had already been cancelled. Other Washington sources have doubled this figure in their estimates.

Senator Truman said: "This is only the beginning of such cancellations, and almost daily during the coming year you will see newspaper notices of contract cancellations, of plant shutdowns, of elimination of graveyard shifts and of reduction in employees. * * * In some communities there will even be a serious unemployment problem."

Public utterances of General Hershey indicate that demobilization will be slow and that men will be released from the armed services only as fast as they can be absorbed elsewhere. In order to achieve efficient, orderly demobilization Selective Service feels that industry should prepare accurate estimates of their occupational needs. If General Hershey's plans are carried out, then demobilized men will be released as near as possible to their homes or points of induction.

THIS policy will enable industry to know approximately how many jobseekers will be in their area. It is possible that this would aggravate the employment problem in areas which were not heavily industrialized in pre-war years, but became so during the war, and are expected to drop back to a period of stagnation when war orders are cancelled.

By this time, many questions probably have arisen. How many men will be released from the services? Where will they be released? How many men and women will be demobilized from industry? How many will retire from the labor force? How large an Army will the United States maintain after the war? What will be the impact of demobilization on the labor force of pre-war years?

It is impossible to answer these

Demobilization, Related to Pre-War Employment, by States

STATE	Number of persons (in thousands)				Demobilized persons as per cent of 1940 employment
	1940 employment [1]	Demobilized persons			
		Armed forces	Industrial workers	Total	
United States [2]	45,166.0	8,500.0	6,070.0	14,570.0	32.3
Alabama	893.8	172.6	88.6	261.2	29.2
Arizona	150.2	32.3	1.1	33.4	22.2
Arkansas	583.9	118.2	16.0	134.2	23.0
California	2,525.3	482.0	577.6	1,059.6	42.0
Colorado	349.7	70.6	22.4	93.0	26.6
Connecticut	680.5	113.0	218.5	331.5	48.7
Delaware	102.6	17.9	17.3	35.2	34.3
District of Columbia	308.9	50.2	21.7	71.9	23.3
Florida	683.3	125.0	30.3	155.3	22.7
Georgia	1,107.4	196.4	49.6	246.0	22.2
Idaho	158.6	34.0	.2	34.2	21.6
Illinois	2,874.4	523.6	390.2	913.8	31.8
Indiana	1,151.7	214.2	304.3	518.5	45.0
Iowa	862.8	153.8	40.4	194.2	22.5
Kansas	583.8	108.8	111.0	219.8	37.6
Kentucky	847.6	172.6	22.0	194.6	23.0
Louisiana	771.1	152.2	53.1	205.3	26.6
Maine	279.0	49.3	35.0	84.3	30.2
Maryland	690.9	125.0	165.5	290.5	42.0
Massachusetts	1,534.8	266.9	223.2	490.1	31.9
Michigan	1,825.0	350.2	717.7	1,067.9	58.5
Minnesota	931.5	176.8	35.8	212.6	22.8
Mississippi	727.5	131.8	18.2	150.0	20.6
Missouri	1,297.1	232.9	122.2	355.1	27.4
Montana	185.6	36.6	2.2	38.8	20.9
Nebraska	433.4	79.9	18.0	97.9	22.6
Nevada	41.5	8.5	1.5	10.0	24.1
New Hampshire	176.0	29.8	18.4	48.2	27.4
New Jersey	1,569.1	281.4	327.8	609.2	38.8
New Mexico	140.3	33.2	.3	33.5	23.9
New York	4,974.5	913.8	500.1	1,413.9	28.4
North Carolina	1,208.7	225.2	22.6	247.8	20.5
North Dakota	200.4	40.0	.1	40.1	20.0
Ohio	2,345.0	440.3	506.0	946.3	40.4
Oklahoma	658.7	145.4	46.1	191.5	29.1
Oregon	389.8	70.6	58.5	129.1	33.1
Pennsylvania	3,230.2	639.2	579.3	1,218.5	37.7
Rhode Island	264.7	45.9	48.4	94.3	35.6
South Carolina	661.1	115.6	20.0	135.6	20.5
South Dakota	204.5	39.1	.2	39.3	19.2
Tennessee	941.7	181.0	51.2	232.2	24.7
Texas	2,138.4	423.3	140.7	564.0	26.4
Utah	148.9	34.0	19.7	53.7	36.1
Vermont	125.1	21.2	4.8	26.0	20.8
Virginia	933.1	175.1	92.3	267.4	28.7
Washington	607.7	115.6	158.9	274.5	45.2
West Virginia	519.1	119.8	37.0	156.8	30.2
Wisconsin	1,060.8	198.0	134.9	332.9	31.4
Wyoming	86.6	17.8	0	17.8	20.6

1—From 1940 Census of Population.
2—Differences between United States totals and sums of State components are due to rounding of figures.
Source: Bureau of Labor Statistics, Department of Labor.

TOOLS LEAD A DOUBLE LIFE

SUNICUT

increases tool life 100%... improves finish of parts

Tools can't take a holiday . . . not when there are guns to make, and bombers to build, and other war material to produce. But tools were taking holidays . . . far too many . . . for regrinding and resharpening at one of the largest mid-west war plants.

Production quotas were a headache to machine tool operators and foremen because the frequent "time-outs" for tool changes cut down the output. In addition the finish of the parts was not up to par. Many grades and brands of cutting oil were tested and tried, but all failed to correct the condition. So they called a Sun Doctor of Industry — a cutting oil expert — who studied the problem and recommended a change to Sunicut, the transparent, sulphurized oil.

Tools double parts produced for tool grind on many operations before they need changing . . . and the finish of the parts is everything that could be desired. Sunicut succeeded where the others failed.

Output is stepped up in this war plant because the high heat-absorbing and metal wetting properties of Sunicut permitted longer tool life and finer finish. How about investigating the production-boosting possibilities of Sunicut in your plant? A Sun Oil Engineer will be glad to discuss it with you. Write

SUN OIL COMPANY • *Philadelphia 3, Pa.*

Sun Oil Company, Ltd., Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

NELSON HONORED: *Donald M. Nelson was honored at the second anniversary dinner of the establishment of WPB as well as the anniversary of his appointment as chairman of WPB.*

questions accurately, since there are too many intangibles to deal with. However, the Post-War Division of the Bureau of Labor Statistics, with its long experience in maintaining labor data, has made a preliminary study of the subject. A table prepared by the Bureau shows that 32.3 per cent of the 1940 employment, aggregating 45,166,000 persons, would represent the demobilized force.

This graphic illustration of what the various states will have to absorb to attain high level production and employment in the post-war world refers to the number of people demobilized, not unemployed.

THE Division bases this table on three assumptions: (1) the United States will maintain a standing army of 2,500,000 men in the early post-war years; the others in the services will be demobilized as quickly as transportation can be provided, (2) War production will be rapidly curtailed to meet requirements of an army of 2,500,000 men, (3) reconversion will occur rapidly, with no delays due to financial or market problems.

On the other hand, if reconversion is retarded or not permitted to begin as soon as manpower and materials situations warrant, then large unemployment will result. Recently WPB decided to defer large scale civilian production until after the invasion attempt, even though materials and manpower are now available.

But, if after the conquest of Germany is assured, artificial bonds are still maintained on civilian manufacture, then the full responsibility of resulting unemployment will rest on the shoulders of government. On the other hand it is hoped that WPB's new policy of permitting limited civilian production in relatively free labor areas will be extended beyond a few regions now chosen.

Labor also has a vital part in the unemployment picture. If present labor demands for increased wages and refusal to give up the 48 hr week pay are indicative of organized labor's mood, then labor leaders will have to bear much of the responsibility for stalling the economic machine and creating unemployment.

If industry is handcuffed now by excessive wage demands, and the government does not encourage post-war reserves looking to resumption of normal production, then industry will never have the money or power to absorb most of the demobilized labor force.

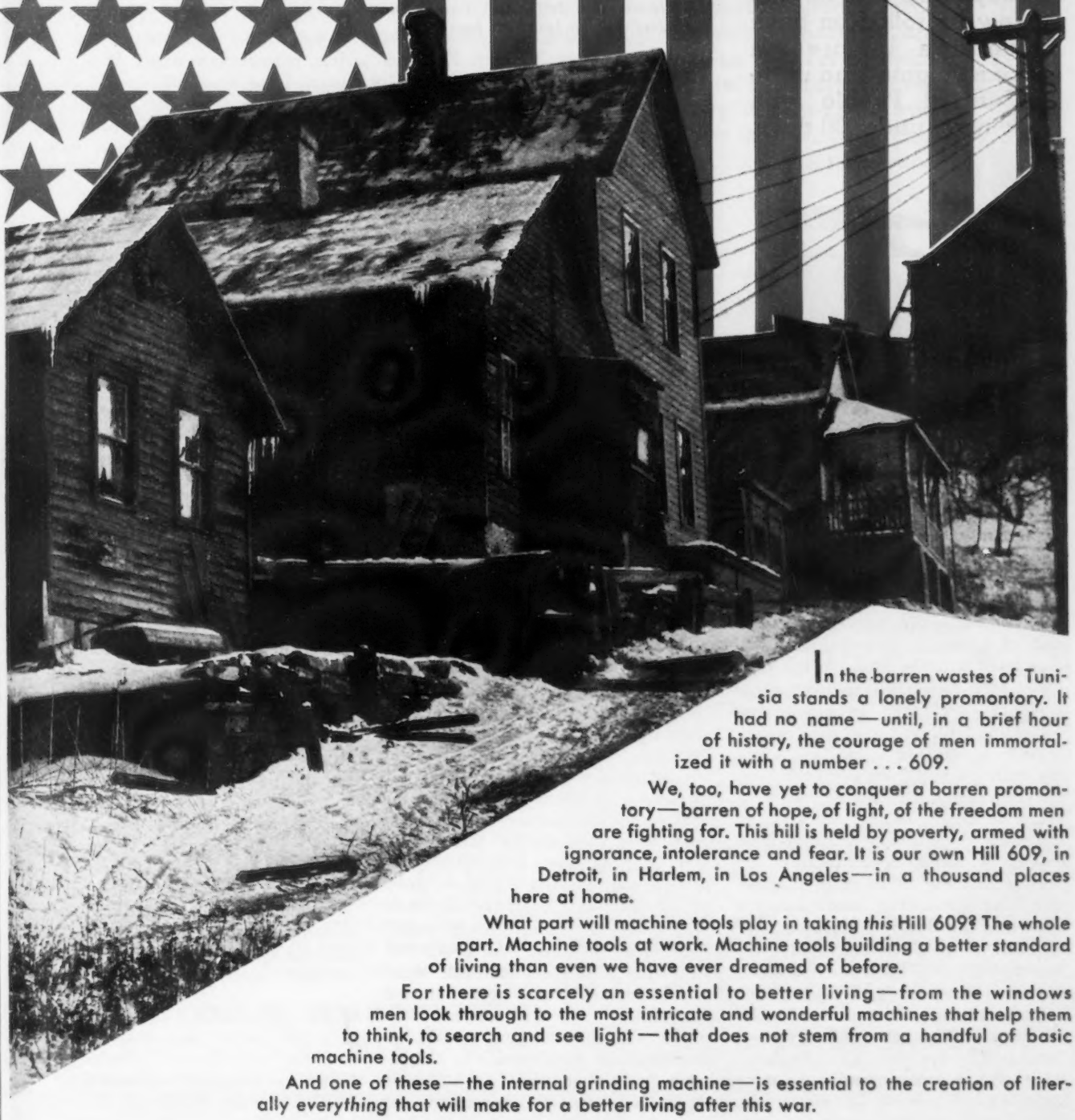
GOING back to the difficulty of the problem as illustrated by the table, the total of 8,500,000 men expected to be released from the services is obtained by subtracting 2,500,000 from 11,000,000, the number of men expected to be in the services at the war's end. The figure of 8,500,000 was allocated according to 1940 state population figures, assuming the majority of the servicemen will return to the states of their origin. Selective Service has already indicated that this is what will be done.

The 6,070,000 figure refers to the minimum number who will be unemployed, at least temporarily, during the reconversion period. The total number demobilized includes only those in the services and manufacturing, not indirect war jobs, government work, and the thousands of other trades that will be effected. Therefore, the problem may be greater than the table indicates.

The relative seriousness of each state's manpower situation after the war is measured by the total number demobilized as compared with the state's pre-war ability to provide jobs.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

What part will machine tools play in helping to take this HILL 609?



In the barren wastes of Tunisia stands a lonely promontory. It had no name—until, in a brief hour of history, the courage of men immortalized it with a number . . . 609.

We, too, have yet to conquer a barren promontory—barren of hope, of light, of the freedom men are fighting for. This hill is held by poverty, armed with ignorance, intolerance and fear. It is our own Hill 609, in Detroit, in Harlem, in Los Angeles—in a thousand places here at home.

What part will machine tools play in taking *this* Hill 609? The whole part. Machine tools at work. Machine tools building a better standard of living than even we have ever dreamed of before.

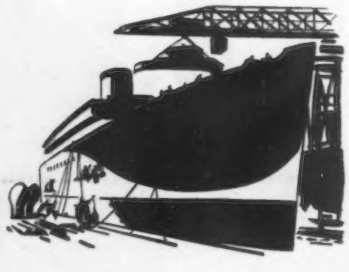
For there is scarcely an essential to better living—from the windows men look through to the most intricate and wonderful machines that help them to think, to search and see light—that does not stem from a handful of basic machine tools.

And one of these—the internal grinding machine—is essential to the creation of literally *everything* that will make for a better living after this war.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

WEST COAST . . . OSGOOD MURDOCK

• Despite home town and competitive clamor for completion of structural facilities at Geneva and Fontana, shapes up to 8-in. can now be rolled on open tonnage in present Coast plants, and up to 15-in. at Pueblo with delivery under 30 days.



SAN FRANCISCO — On Feb. 11 and 12 at Carbon City, the off-the-main-line, 10,000 population capital of the sovereign state of Nevada, Senator Pat McCarran (D. Nev.) will preside over a "hearing" by a sub-committee of the Senate Committee on the Decentralization of Industry, to principally concern itself with the future of the West Coast steel industry. In conspicuous evidence, according to plans now fomenting, will be the State Commissions from California and Utah, meeting with a similar Nevada host Commission, each appointed by the Governor to confer on any question of interstate cooperation. Attorney General R. W. Kenny is chairman of the California commission which includes also four other chief administrative officers of the Governor's cabinet, five members of the State Senate and five representatives of the State Assembly, or lower house.

According to present prospects, the "hearing" might better be termed a "sound-off," for in all likelihood there will be more renditions than auditions. Testimony seems to be wanted principally from proponents of home industry and equal opportunity will be had for all political subdivisions, trust busters and enemies of any octopus, and political office holders with a native passion for the industrial destiny of the Far West (particularly the Southwest) but with a cagey suspicion of Economic facts; axioms of steel production; and cold, detached, realistic analyses of future market possibilities especially if derived from the steel industry.

Report of McCarran Group's first meeting will be found on page 91.

IF the Carson City hearing should get down to particulars at all, its principal gripe is likely to center around the uncompleted structural mills at Geneva, Utah, and Fontana, southern California, each of which has been held up by WPB order and both of which are heartily desired by local interests in each locality. In behalf of the facilities at Fontana, Henry J. Kaiser himself has been at Washington, with the conspicuous sponsorship of Congressman Cecil R. King (D. Cal.), to try to get WPB's consent for $9,000,000 worth of priorities to complete the 29-in. structural mill and merchant bar mill at Fontana. Completed, they would roll 90,000 tons of heavy shapes and 82,000 tons of merchant bars and would balance the 1200-ton capacity blast furnace and six 185-ton open hearths, two of which are not now required to supply the plate mill alone.

At Geneva, the 24-in. structural mill when completed will have a capacity for 200,000 tons annually, a little over 20 per cent of the plant's entire capacity but representing less than 10 per cent of the entire cost. Such a storm has been raised in Utah because of the WPB decision to delay the completion of the structural mill at Geneva, and such pressure is being exerted by the Kaiser interests for permission to complete their structural mill that some analysis of prospective war demand for these products on the West Coast, and substitute supply thereof under present conditions seems justified. At South San Francisco Bethlehem can roll channels, beams and angles up to 6-in. and at Seattle 7 by 4-in. angles, 6-in. beams and 8-in. channels. At Los Angeles, both Bethlehem and Columbia roll 6-in. shapes. At all these plants there is now open tonnage and delivery within 30 days. At Pueblo, Colorado Fuel & Iron Co. rolls beams and channels up to 15 in. and at the present time there is open tonnage of shapes there also, with 30-day delivery.

Now that heavy facilities are complete, including such war plant structures as synthetic rubber and high octane gas plants, the principal demand for structurals is in ship construction, and for the coming year and during the emergency the actual requirements above the 8-in. that can be rolled by present facilities on the Coast will be negligible. Incidentally, the normal peacetime West Coast market has averaged about a quarter million tons of shapes annually, less than the combined capacities of Geneva and Fontana alone, without regard to existing plants. But half this normal demand has been for wide flange material that will not be rolled at either Geneva or Fontana.

It is held by the advocates that transportation will be saved by completing either or both of these mills, and on this slender thread emergency justification is hung. It is 590 miles from Pueblo to Geneva and that mileage would be saved by a Utah mill, on whatever minimum tonnage of shapes over 8 in. may be required for the balance of the duration on the West Coast. It is roughly 800 miles from Geneva to Los Angeles, San Francisco, Portland or Seattle, slightly less to Los Angeles, slightly more to Seattle. From Fontana, 50 miles east of Los Angeles, it is 1138 miles to Portland and 1338 miles to Seattle.

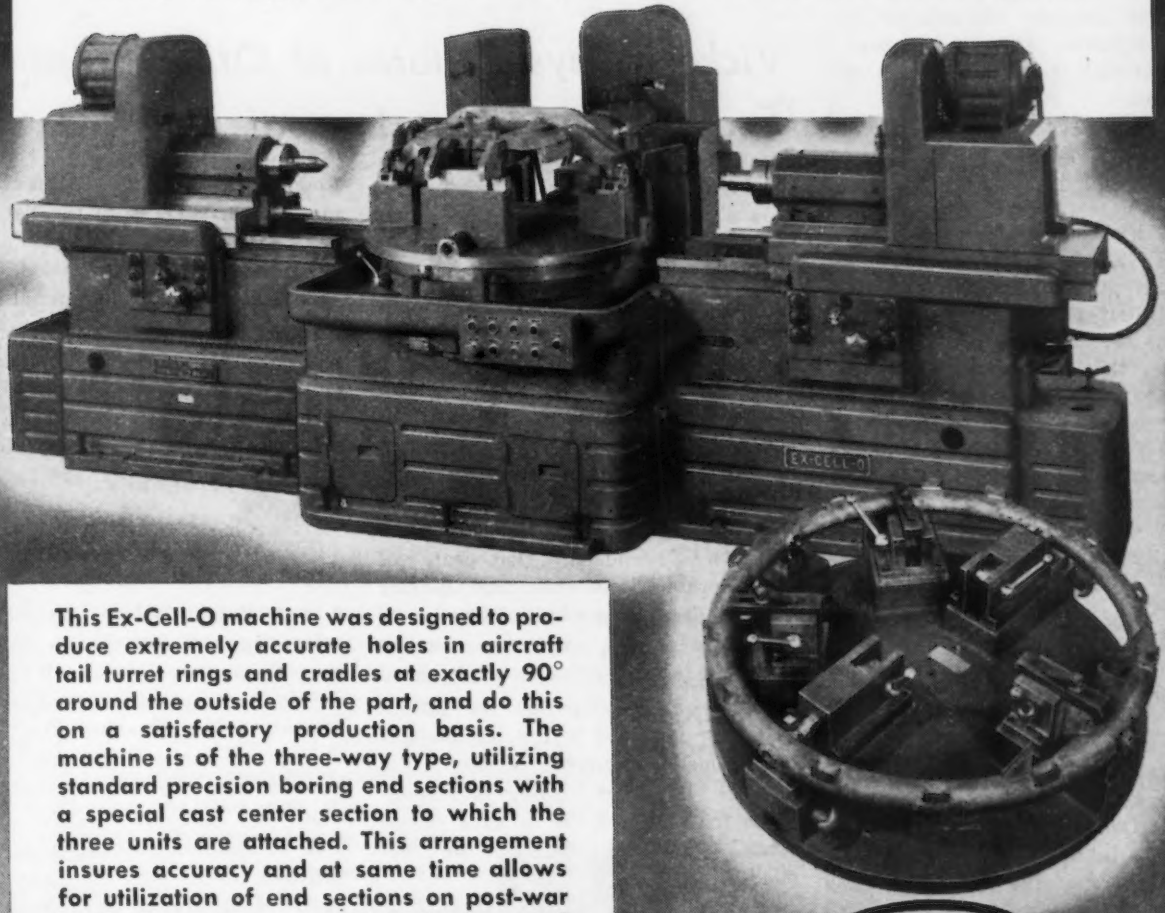
In the long-run post-war, both these facilities should be completed. Prudence and wisdom seem to justify modification of the plans for one or both of these plants, to provide wide flange sections and possibly to substitute tubular material particularly for the petroleum industry, not now obtainable west of Chicago. But cold-blooded, realistic, emergency consideration cannot argue with the WPB decision to hold up completion of these facilities during the emergency, to save manpower, to avoid a greater surplus and to hold war expenditure and outlay to those projects which are now required to finish the war.

LOS ANGELES—"Gentlemen, you will never get another chance like this in a lifetime," pleaded Watt L. Moreland, deputy regional director of WPB for the Pacific Southwest as he stood like an auctioneer before several hundred business men in the Embassy Auditorium at Los Angeles to open a campaign for the disposal of surplus material. "These are real bargain prices and it's not going to be difficult to buy," continued Mr. Moreland. And then he explained

The Standard for Tomorrow!

The Emphasis Will Be On More Accuracy . . . With Production

The trend for tomorrow's civilian production is definite . . . the increasing use of special or semi-special machines that will enable manufacturers in general to attain the extreme accuracy the users of high precision machines are now obtaining in the aircraft and other war industries. Typical of these precision machines is the one illustrated here, a practical application of the Ex-Cell-O precision boring process to vital aircraft parts. This Ex-Cell-O machine indicates the flexibility, accuracy and simplicity in use, with resulting money-saving, that will be demanded of *precision* machine tools tomorrow.



This Ex-Cell-O machine was designed to produce extremely accurate holes in aircraft tail turret rings and cradles at exactly 90° around the outside of the part, and do this on a satisfactory production basis. The machine is of the three-way type, utilizing standard precision boring end sections with a special cast center section to which the three units are attached. This arrangement insures accuracy and at same time allows for utilization of end sections on post-war work. Two parts are machined; one a tail turret ring of steel *(in insert)*; the other, a tail turret cradle of magnesium *(on machine)*.

EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

XLO

EX-CELL-O *for* PRECISION

PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES
BROACHES • GRINDING SPINDLES • HYDRAULIC POWER UNITS • DRILL JIG BUSHINGS
TOOL GRINDERS • CONTINENTAL CUTTING TOOLS • DIESEL FUEL INJECTION EQUIPMENT
PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

that a great volume of this material was made and purchased prior to Pearl Harbor by aircraft makers principally, when prices were lower and values sometimes sounder. After several months of canvassing among high priority buyers and government agency procurement offices, the inventories are now being exposed publicly, open to purchase by any but dealers and auctioneers. In the catalogs of the six major aircraft firms alone there are 1000 pages of tightly listed material, and an additional 500 pages come from miscellaneous sub-contractors and smaller holders. Half of the material is owned outright by private firms. In 35 per cent of the material the government has an interest because of contract changes or fixed price contracts. Only 15 per cent of the material is owned by the government.

Regional WPB priority and redistribution offices have received authority from Washington to release certain goods to qualified wholesale buyers without usual priority restrictions. Manufacturers and consumers can also purchase most of this material fairly freely. A similar meeting has been held in San Francisco, in order that as much as possible of this idle and surplus inventory material may move into regular trade channels before terminations of war contracts deluge the market with additional quantities.

STARTING Tuesday morning, Jan. 18, a major work stoppage of foundry workers in the Pacific Northwest kept 9300 men idle out of an employee roll of about 10,350 in some 79 plants. Only in Bellingham's three shops (open and unpicketed) and in one small shop each at Sedro Woolley and Everett, Washington, were foundrymen at work in western Washington and Oregon. Of 1500 workers in 27 plants in the Portland area, only 436 members of the local voted and of these 293 opposed the strike. Tacoma foundrymen were reported in similar opposition to a strike, voting four to one to remain on the job, but the Seattle local voted decisively to strike and its will prevailed. The regional WLB's best offer was from 2½ to 5c an hour increase for unskilled help, whereas the union had held out for 8c an hour straight, retroactive to June 1. By an agreement machinists were free to pass through the picket line at the Renton plant of Pacific Car & Foundry Co. so that wing spars for Boeing could continue in production. Navy and Maritime ship construction was expected to be at a standstill within a week or two if the supply of castings and foundry material was not resumed. Local reports indicated that WMC and WPB had favored the raise to the foundrymen but Regional WLB was not persuaded. The dispute has naturally been referred to National WLB. The liberal and calm Oregon Daily Journal editorially comments that "chickens of irresolute labor policy come home to roost." There seems neither bitterness, violence nor passion from either labor or management in the Pacific Northwest but only the feeling that such tragic, costly steps as this are necessary to get action and secure the "best possible terms."

o o o

Vickery Says Failures of Other Ships Exceed Percentage Loss of Liberties

Portland, Oregon

• • • **Rear Admiral** Howard Vickery of the Maritime Commission, said here Jan. 20 that failures of Liberty freighters are exceeded "in proportion to the number built" by another type ship.

"It is not a problem of Liberty ships but of welding stresses," he added.

The best minds are probing welding stresses, Admiral Vickery said in answering charges by Representative Warren Magnuson, Democrat, of Washington, that structural defects have caused Kaiser-built Liberties to crack up at sea, and some changes were made last spring to offset them.

Most of the ships on the failure list were launched before the changes were made, Admiral Vickery disclosed. Improper loading is responsible for many of the failures rather than structural defects, he declared.

On Jan. 9 at Seattle, Magnuson, member of the House Naval Affairs Committee, added the names of five more Liberty ships to the list which he said had cracked open at sea, bringing the number listed to 14. This is believed to be a partial list.

Edgar F. Kaiser, manager of three Kaiser shipyards in the Portland area, on Jan. 10 stated that if Liberty freighters had gone to sea with structural defects, inspections by four separate agencies failed to reveal them.

Steel Division Resignations

• • • **Ralph Wilson,** metallurgical sales engineer for Climax Molybdenum Corp.. has left the WPB steel division to accept a position with Timken Roller Bearing Co. Frank Foley, assistant to the president of Midland Steel Co. is returning to his company.

S. C. Spaulding and George Sands will now act as part time consultants to the Metallurgical and Conservation Branch. Mr. Spaulding is a metallurgist in charge of steel purchases for the American Brass Co. and Mr. Sands is a sales engineer with the Electro Metallurgical Co.

Miles K. Smith, assistant steel division director in charge of the Ferro-Alloys Branch, resigned to return to Latrobe Electric Steel Co., Latrobe, Pa. E. G. Ploughman, former western traffic manager for Colorado Fuel and Iron Co., and head of the steel division transportation branch, has resigned to accept a vice-presidency with Carnegie-Illinois Steel Corp.

. . . Cited for Awards . . .

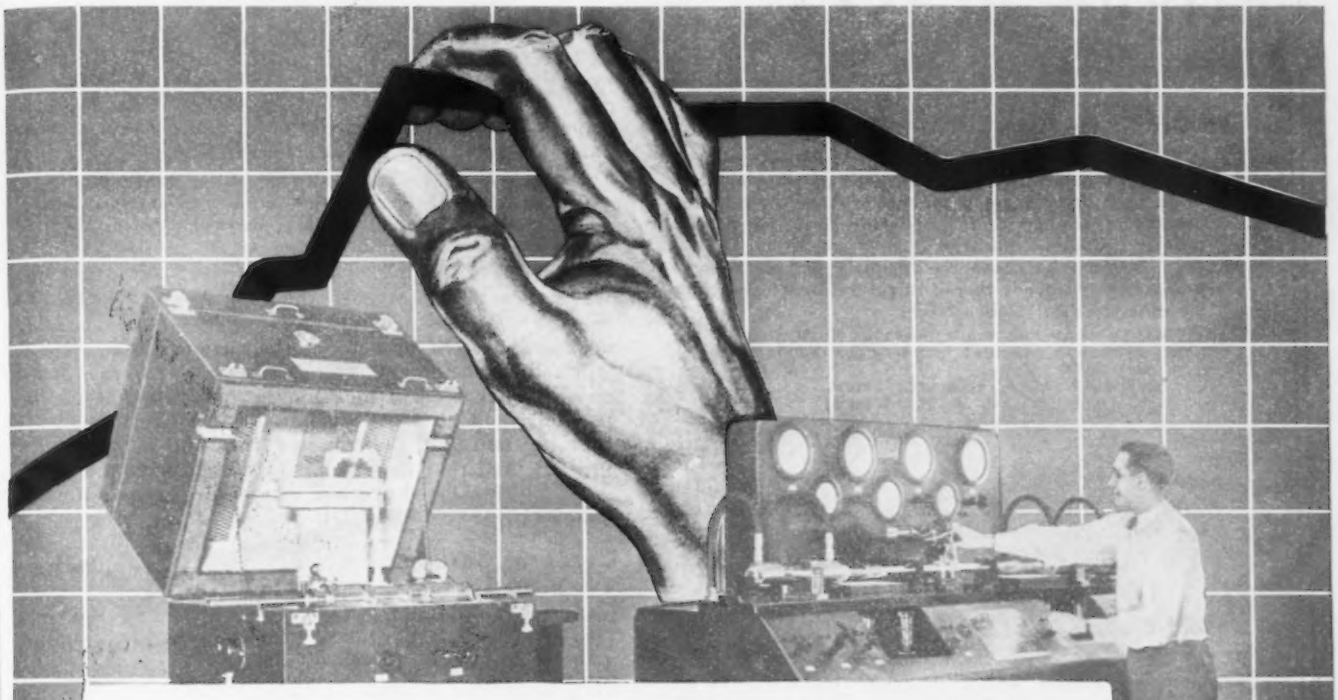
• • • **The following companies** have won the Army-Navy E for excellence in war production:

Federal Cartridge Corp., Anoka Plant, Anoka, Minn.
Moore Drop Forging Co., Brightwood Plant No. 1, Hinge Plant No. 3, Springfield, Mass., and Chicopee Plant No. 2, Chicopee, Mass.
John J. Nesbitt, Inc., State Road & Rhawn Street Plant, Holmesburg, Philadelphia.
New England Lime Co., Canaan Magnesium Plant, Canaan, Conn.
Saginaw Stamping & Tool Co., Saginaw, Mich.
Stackpole Carbon Co., Carbon Division, St. Marys, Pa.
United States Rubber Co., Woonsocket Plant, Woonsocket, R. I.
Wells-Gardner & Co., Chicago.
National Forge & Ordnance Co., Irvine, Warren County, Pa. (fourth star).
Dodge Steel Co., Philadelphia.
Babcock & Wilcox Co., Barberton Plant, Barberton, Ohio (third star).

Maritime M

Youngstown Sheet & Tube Co., Youngstown.

PULLING MAINTENANCE COSTS DOWN WITH INDUSTRY'S NEW RIGHT HAND



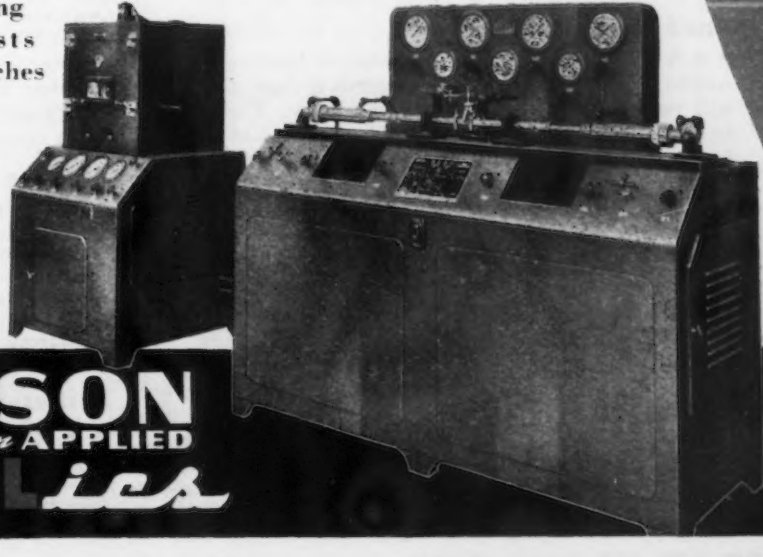
Making leather prove its mettle

Giving leather packings the third degree is the unusual job of this HydrOILic equipment.

The smaller unit tests assembled packings under controlled Fahrenheit temperatures of from 65 *below zero* to 200° above!

The larger unit makes continuous operational cycling tests at pressures up to 3000 pounds per square inch, to determine the life expectancy of packing materials. This special equipment illustrates, in just one way, how HydrOILic Engineering is pulling maintenance costs down in all branches of Industry. It is not only testing materials and equipment, but performing a multitude of production jobs as well.

Through the application of oil-hydraulic control of power and motion, Denison designers have made HydrOILics the key to *new* industrial achievements and *improved* industrial operations. They will be glad to show you how HydrOILics applies to your products or problems. Write to: The Denison Engineering Co., 1158 Dublin Rd., Columbus, Ohio.



DENISON
EQUIPMENT *in* APPLIED
HydrOILics
TRADE-MARK

Fatigue Cracks . . . BY A. H. DIX

No Credit to Them

Your recent remark that your editor's Remington is set to produce nothing but gems was well put, for his works bring forth a loud clang on the oft-honored bell with astounding regularity. I particularly liked his Jan. 6 parable, "Consider the Ant."

But the ant has been the recipient of such fulsome praise from all hands that it might be well to consider the observation of Ogden Nash:

The ant has made himself illustrious
Through constant industry industrious.
So what?
Would you be calm and placid
If you were full of formic acid?

—Charles K. Brown,
American Rolling Mill Co., Middletown, O.

Aptronym

The president of the Quick Mix Concrete Mixer Co., Port Washington, Wis., is A. Graveldinger.

—G. D. Gates, Mgr.,
Creamery Package Mfg. Co.,
Fort Atkinson, Wis.

Desert Bloom

• • • Someone told us there was a reference to us in a recent issue of *The Nation*. We doubted that anything said about us in *The Nation* would be flattering, and we were right. By careful pruning, we are, however, able to isolate this orchid:

. . . the industrial press, of which The Iron Age is the perfect flower.

New Foreign Patent List Ready

• • • That first reprint of the lists of seized foreign patents for metal products and processes went like a sale of Irish whiskey at ceiling prices. A new reprint is now on the fire — a bigger one, including all installments up to this week's.

If you want a copy send 24c in stamps or 25c in coin to us at 100 E. 42nd St., New York 17. But before you risk your money we think it only fair to warn you that some people tell us they find the foreign patents worthless. Others, however, show evidence of moderate enthusiasm.

Whether the lists will elate or depress you depends upon what you are looking for. It seems that the foreigners' inventive ability gushes generously along certain lines, but in others merely trickles like an old hot water faucet in a hard water area.

For a sample of what the 24c or 25c would add to your "Postwar Plans" folder, see page 118 of this issue.

Don't Streamline Mother . . .

• • • Which reminds us to mention that mail from soldiers overseas reveals a mounting fear that they will return to a world they never knew. This feeling is fostered by the designers' wilder dreams of postwar homes, cars, percolators and so on, as pictured in the Sunday supplements. A sergeant voices the soldiers' alarm in a rhymed plea to postwar planners appearing in *Yank*. The poem, entitled "Please Don't Streamline Mother While I'm Gone," begins:

Sitting here, in my foxhole muddy
Please don't think me fuddy-duddy
If I say that I'm not fighting
For plywood pants and neon lighting.

We are glad to be able to tell the sergeant that what has frightened him are merely the first highly volatile vaporings from the postwar brew. They are not to be taken too seriously, for most of them will disappear when the serious problems of postwar readjustment are undertaken. In fact, hedging against too great expectations has already begun. E. C. (Willys-Overland) DeSmet recently told the SAE:

The stylist has a remarkable dislike for details of construction, a definite aversion to production problems and a superb contempt for anything pertaining to cost, with the obvious exception of his own fee . . .

And Dr. Frank B. (AT&T) Jewett says that the war has actually impeded the progress of science and that few of the technical discoveries since the war began will have peacetime applications. We hope it will relieve the sergeant's nostalgia to know that when he gets back he will pick up the dish towel where he left off and dry the dishes in the old-fashioned way, that his hair will be trimmed with the old-fashioned clippers, and that he will have to fiddle with the knobs in the old-fashioned pre-war way before he gets a clear image on his television set.

Cerebral Cutback

• • •. We are indebted to the Army Air Force's Captain W. G. Berger for the news that the Spokane (Wash.) Spokesman-Review put this headline on an item concerning a charge made by the head of the CIO Aluminum Workers Union:

COLLUSION IS CHARGED
IN MENTAL CURTAILMENT

Pancake Hoarder

• • • And that leads to a criticism of an item we had recently in which we made use of the well-worn gag about the man who was so worried about his mental state that he visited a psychiatrist. He was asked to inventory his symptoms, and began, "I am passionately fond of pancakes." The psychiatrist said, "There is nothing unusual about that. So am I." The patient said, "Then you must visit me sometime. I have trunksful in my attic."

A member of this page's loyal army of eighteen readers who is with the Sullivan Machinery Co., Claremont, N. H., asks if "trunksful" is correct? We suppose so. As we heard it, the patient had several trunks, each full. If he had only one trunk, and had to use that as a measure, we are wrong.

"Ltd." to "Inc."

• • • We have always felt a bond of kinship with A. B. Farquhar Co., Ltd., York, Pa., because so many letters intended for it have come to us, owing to the fact that it makes, among other things, a line of farm implements trade-named "Iron Age."

Another thing that fastened the firm in our mind was the "Ltd." This always mystified us, as we thought "Ltd.'s" flowered only in English climate. But the mystery is broken. A notice from Farquhar informs us that it was "a limited partnership under the laws of Pennsylvania," and on Jan. 1 became a corporation, thus acquiring an "Inc." but losing something precious.

Lingerie Lore

You ascribe the initials B.V.D. to the old firm of Bennett, Vorhees & Day. While technically factual, this is unromantic, and therefore futile. The original owner of the company always told inquirers that the initials meant "Best-Vearing Drawers."

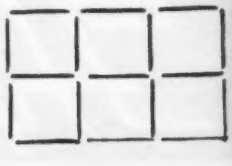
I was with Sherman & Bryan, the young advertising agency that first handled the account.

—W. G. Watrous, Chicago

Puzzles

• • • Last week's frog made it in 18 days.

Seventeen matches are used to form six squares. Remove five matches and leave three squares. Par is three minutes.



this red path IS REVOLUTIONIZING THE HEAT TREATING OF METALS

A COLUMN of super-hot air driven at terrific velocity from the heat source through the charge, is the revolutionary feature of the Lindberg Super-Cyclone Furnace. Heating solely with fan-driven hot air builds up temperature with rapid uniformity throughout the charge . . . up to as much as 1750 degrees F.

No radiant heat reaches the charge—no one-sided heat to cause distortion. Therefore the complete mass of each piece is heated at the same rate. Such high temperature with circulated hot air was always thought impossible. Yet users of Lindberg Super-Cyclones are daily saving time, saving space, saving cost of labor, fuel, straightening and handling, and turning out better work than ever before. Write us now for complete information and learn how Lindberg furnaces can save for you. Lindberg Engineering Company, 2452 W. Hubbard St., Chicago 12.

ARMY E NAVY

LINDBERG FURNACES

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

Dear Editor:

REUTHER RECONVERSION PLAN

Sir:

We are interested in post-war planning. The article in your Jan. 6 issue on Walter Reuther's reconversion plan, will, we believe, be of assistance to us in our work. Can you tell us how we may secure a copy of that plan?

MITCHELL FEIN
Consolidated Management Consultants,
521 Fifth Ave.,
New York 17

● The plan is not a formalized document as yet. In the "Assembly Line" of Jan. 6 (page 128) we sought simply to describe, in an advanced sort of way, the direction Mr. Reuther's thinking is taking.—Ed.

CENTRIFUGAL CASTING

Sir:

Please furnish us with the names of those companies that are United States or Canadian manufacturers of the latest types of centrifugal casting machines and equipment, as described in the article in your Jan. 6 issue.

J. V. CURTS,
Development Engineer,
Commercial Division
John Inglis Co., Ltd.,
14 Strachan Ave.,
Toronto, Ont.

● As far as we know there is only one company in the United States building centrifugal casting machines for sale. This is the Centrifugal Casting Machine Co., Tulsa, Okla. Most other companies producing centrifugal castings have devised their own equipment and are rather secretive about details of design and construction.—Ed.

MR. MACK COMES THROUGH

Sir:

I was in search of the author of the book "Know Your Steel" and you published my problem.

As a result, I received in the mail, not the address, but the book, from Mr. H. E. Mack, Vice President of LaSalle Steel Co., of Chicago, who happened to have an extra copy.

That's real service from IRON AGE and Mr. Mack.

J. A. OSBORNE
Westinghouse Electric & Mfg. Co.,
Dept. MV30,
East Pittsburgh, Pa.

GLUED METAL

Sir:

We are interested in obtaining a glue which is suitable for gluing steel to steel.

We are primarily interested in lighter gages but the gluing must be secure to such an extent that it would rival welding.

H. C. DAVIS,
Director of Purchases
Tyler Fixture Corp.,
Niles, Mich.

● Several companies have recently developed adhesives of this type. Write to: U. S. Stoneware Co., Akron, Ohio; B. B. Chemical Co., Cambridge, Mass.; U. S. Plywood Co., New Rochelle, N. Y.—Ed.

SILVER PRICES

Sir:

Page 127, Dec. 23, 1943 issue, quotes silver 44.75c. per troy oz. open market, New York. We take this to be troy oz. of 480 grains and that an adv. pound will be 14.5833 troy oz., making silver price $6.526 per adv. lb. on open market, f.o.b., New York.

However, we understand that industrial silver for solder, etc., must be bought at 71.04c. per oz. or $10.360 per lb. through the Metals Reserve Corp. If this is true, is there an open market in New York City, or should your figure be 71.04c. per troy ounce?

W. H. BROOKS,
Supt.
Carnation Co.,
Can Dept.,
Oconomowoc, Wis.

● The quotation for silver at 44.75c. a troy oz. is foreign silver which cannot be used for soldering alloys but for photography or medicine. Soldering alloys must be made from Treasury silver which sells for 71.04c. per troy oz. A third silver price quotation is 71.111c. per troy oz. for domestic silver used for jewelry, etc.—Ed.

SONIC TESTING

Sir:

In the Jan. 6 News Front you mention a method of testing castings and forgings sonically now being used in England.

Where can I get further information on this subject?

R. C. MURRAY,
Engineering Dept.
The Vendo Co.,
Aircraft Products Div.,
2500 Washington St.,
Kansas City 8

● So far we have been unable to track down the specific plants doing this work. The obtaining of additional data has likewise been difficult because of wartime restrictions. As soon as something more definite is known on the subject we will publish it.—Ed.

BORON DETERMINATION

Sir:

We have read your excellent article on important developments in metallurgy in 1943 published in your Jan. 6 issue, pages 108-113. We are especially interested in that part of the paper dealing with boron additions to steel and your discussion of the lack of suitable analytical procedures for its determination.

Since the interest in boron steel is so wide spread we are of the opinion that your statements beginning at the 3rd paragraph, column 1, page 109, are misleading and should be corrected. The facts are that a satisfactory analytical chemical procedure for the determination of small amounts of boron in steel was devised by L. C. Flickinger and G. A. Rudolph of The Youngstown Sheet & Tube Company in 1942.

Early in 1942 when we began to boron treat steel it was recognized that no suitable analytical procedure was available. With this in mind considerable time and effort was expended in our Laboratories toward the development of a procedure that would give accurate results in the low range of boron content, nil to .0030, or higher, that could be carried out in a reasonable length of time. As a result of this work a method was developed and has been in use since June of 1942 and is known as the Quinalizarin Method. A large number of chemical laboratories are now using this method for routine and check procedure and are obtaining satisfactory results. This procedure was published in *Steel* of April 5, 1943.

While we do not claim that the Quinalizarin procedure for the colorimetric determination of small amounts of boron in steel cannot be improved upon, we do feel that it provides the steel makers, and others, with a ready means of knowing whether their steel contains boron and how much. Accuracies of plus or minus .0002 per cent boron are readily obtained in the range of zero to .0040 per cent boron.

D. A. RUSSELL,
Chief Chemist
Youngstown Sheet & Tube Co.,
Youngstown, Ohio

HENRY BESSEMER IS NO MORE

Sir:

Having occasion to refer to the article on continuous casting appearing in your April 11, 1940 issue, we are very much interested in the article by Sir Henry Bessemer, on Page 48, but inasmuch as Sir Henry, on supposedly good authority, died in 1898, we would like to know the date and source of this quotation. Otherwise, we congratulate you on a very fine article.

JAMES T. MacKENZIE,
Chief Metallurgist
American Cast Iron Pipe Co.,
Birmingham 2, Ala.

● Sir Henry Bessemer made his original statement on the manufacture of continuous sheets of malleable iron and steel direct from fluid metal in the British Iron & Steel Institute reports of October, 1891—Ed.

HARDNESS CONVERSION TABLE

Sir:

I would appreciate if you would send me one copy of the article "Steel Hardness Conversion Tables," in your Dec. 9, 1943 issue, pages 65 to 67.

C. J. GASPAR,
Lieutenant, USNR
Navy Department,
Office of Inspector of Naval Material,
401 Old Post Office Bldg.,
Pittsburgh 19

CONSIDER THE ANT

Sir:

We would like to have 100 copies of the Jan. 6 editorial by J. H. Van Deventer, entitled "Consider the Ant." We will be glad to pay the necessary charges.

PHYLLIS WILEY,
Secretary to the President
Sheffield Corp.,
Dayton, Ohio

Are You Whistling in the Dark

ABOUT CLEANING COSTS AND PRODUCTION?

TYPICAL WHEELABRATOR PERFORMANCE

At Continental Motors Corp., Detroit, engine cylinder barrels which formerly required three full shifts to clean on an airblast table are now being cleaned in less than five hours on a Wheelabrator Multi-Tablast.

★

A Wheelabrator used by Detroit Diesel Engine Div., Detroit, Michigan, is cleaning 250 diesel engine parts in 5 minutes, whereas it previously required an hour to clean 50 pieces in a sandblast cabinet—25% to 50% of which required a final touch-up by handblasting because of imperfect cleaning on the interior of the parts.

★

The 36" x 42" Wheelabrator Tumblast at the Bierman-Everett Foundry, Irvington, N. J., cleans heavy loads of brass castings in 4 minutes and gray iron castings in 6 minutes. Cleaning time is only 1/3 of that required with their former tumbling barrel and airblast barrel.

A MYRIAD of production miracles have been wrought these last few hectic years—and more are on the way.

But on the other side of the ledger is the darker picture of myriads of production problems that are needlessly wasting time, money and effort.

The serious thing about many problems that lie dormant in the files of "unfinished business" is the fact that they tend to lose their real significance the longer they remain unstudied. This is invariably true of operations that are constantly "bulled through" under the pressure of heavy production.

Oftentimes the solution is simpler than conditions would seem to indicate. Especially is this true of problems involving blast cleaning, because there is convincing proof in the history of thousands of cleaning applications that airless Wheelabrators are earning their way by effecting unusual reductions in cleaning time, cost, manpower and space—and by speeding up and improving such operations as machining, grinding, inspection and final finishing.

A highly interesting, factual story about Wheelabrator performance in shops like yours, plus an actual demonstration of this performance on any or all of the difficult cleaning jobs which you encounter, are yours for the asking. Phone or wire us today for prompt action.

THE AMERICAN MOLDER

WHEELABRATOR AIRLESS BLAST CLEANING

American

FOUNDRY EQUIPMENT CO.

510 S. BRYKIT ST. MISHAWAKA, IND.

This Industrial Week . . .

- **Steel Ingot Output Rises Under Pressure of Invasion Program**
- **Task of Holding Lid on Production Will Be Troublesome for WP**
- **Mill Cutbacks, Cartel Discussion among Other Highlights of Wee**

REFLECTING the emphasis being put on the expedited and enlarged landing craft program as well as other invasion equipment, the national steel ingot operations this week are up one-half point to 99 per cent.

Plate and sheet mills continue to bear the brunt of the heavy demand for invasion equipment, but requirements for components also are making themselves felt in heavier orders for certain products other than flat rolled steel. There are indications that the landing craft program may be spread over a longer interval this year than appeared likely a few weeks ago. Another new development is the transfer of a war requirement from cold rolled sheets to terne plate, with the vacated space on cold mill schedules likely to be taken by barrel stock orders which have been on hot mills previously.

Meanwhile, rising pressure in favor of a faster easing of Limitation Orders threatens to make WPB's unenviable task of holding down the lid upon civilian production more difficult as time goes on. As a matter of fact, despite official announcements stating that controls will be maintained for the time being, allotments have been issued recently for steel in small amounts for several consumer items which a few weeks ago never would have been applied for or approved.

That WPB faces an extremely troublesome problem is a foregone conclusion in view of the statements issued by WPB executives and other informed authorities warning that more plant shutdowns and contract terminations can be expected. Already at least $8 billion in Army and Navy contracts have been cancelled.

Another warning that conversion to civilian production on too large a scale might interfere with the war program and give a false sense of security was voiced by Donald M. Nelson last week. Confirming reports of plans for "test tube" production of civilian goods in a few areas, he revealed that the Philadelphia, Cleveland and Kansas City districts had been chosen for the experiment, which will start about Feb. 1 and make use of small lots of idle materials by small concerns in the production of consumer goods under controlled conditions to "strengthen the position of small business and to improve the balance of the war economy." The Smaller War Plants Corp. will administer the order.

Four More Leaving Steel Division

WPB Steel Division officials entertained at a dinner Tuesday in honor of four men who have just resigned. The four are W. F. Vosmer, chief, carbon bar and semi-finished steel branch, who is returning to Cleveland as district manager of sales for Republic Steel Corp.; A. A. Archibald, chief of the shell section of the carbon bar and semi-finished steel branch, who is returning to the Philadelphia office of Jones & Laughlin Steel Corp.; M. M. Chapman, chief of the steel sheet section of the sheet and strip branch, who is returning to the sales division of Carnegie-Illinois Steel Corp. in Pittsburgh; and James A. Rowan, special assistant to the steel division director, who has accepted a position in industry.

IN the interval before the resumption of civilian goods production, a resumption which is expected in official quarters to follow a successful invasion of the European continent, steel ingot operations may slump. Members of the Steel Industry Advisory Committee last week indicated that they expect soon a drop in ingot production to around 85 per cent of capacity, which will be utilized for repairing war-punished equipment that is sorely in need of attention. The committee meeting with Nelson consisted of Vice Admiral S. M. Robinson and Maj. Gen. Lucius D. Clay. If the invasion becomes stalled, and controls are maintained rigidly, steel output may slide considerably below 85, it was said.

Shortly after the Steel Advisory Committee adjourned, WPB announced that it had recommended to the Defense Plant Corp., termination of work on seven steel plant expansion projects estimated to cost about $97,000,000, headed by the Republic electric furnace plant 98 per cent complete with 900,000 tons annual capacity at South Chicago.

Figures released simultaneously with the news of the proposed cutbacks showed the severe decline in demand for alloy steel over recent months. September output at 1,024,000 tons was about 200,000 tons below the peak reached last March and in December production was down to about 800,000 tons.

The presence in this country of Sir Andrew Rae Duncan, British Minister of Supply, who is participating in the renegotiation of Lend-Lease agreements, is reported to have provoked discussion in the steel industry regarding the possibility of establishing by law an American counterpart of the British Iron and Steel Federation, an international cartel. Sir Andrew

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Ore Consumption	95	Alloy Control Changes	100

formerly was director of the Federation. Presumably, existing anti-trust laws would have to be repealed, a highly improbable prospect. Three of seven members of the Senate Foreign Relations Committee, queried as to their attitude on the formation of an American Steel Cartel, indicated opposition, while two indicated approval and two were non-committal.

SENATOR McCarran's committee has mapped its plans for an aggressive study of the decentralization of heavy industries, including inquiry into the halting of the Geneva structural mill (which Russia is reported to be considering purchasing) and inquiry into the need for additional facilities at Fontana, Calif. A hearing is scheduled to be held at Carson City, Nevada, in February. The committee favors the creation of new industrial centers in the South and West through Government financing of new steel capacity. Projects at Tacoma, Wash., and Daingerfield, Texas, are reported to be among those closest to the committee's heart.

Possibilities that the Army's 1944 truck requirements may be cut back, allowing greater production for domestic commercial use are sighted in automotive circles. The ultimate total for commercial use may run as high as 200,000 units this year instead of the 88,000 earmarked for domestic use now. Another leading topic in automotive circles is the incorporation in Michigan of the Michigan Kaiser Co., a move interpreted as being Henry J. Kaiser's first step toward invasion of the auto industry with a light weight car.

Several leading steel companies recently have taken steps which will help protect post-war tonnage in an important consuming field, the steel barrel industry. Acquisition by Bethlehem Steel Corp. and by U. S. Steel Corp. have been announced during recent months. Previous asquisitions placed Inland, Republic, and J & L among the steelmaker operating barrel concerns. National output of drums in 1943 was about 10,000,000 units over the 1941 level of around 18,000,000 units. Heavy demand from the Navy is a feature of this market recently, with the cold rolled sheets being furnished with oxidized finish.

Some worry is reported being manifested in steel mill circles over their supplies of fuel oil. One of the largest mills in Pennsylvania has storage capacity of 3,000,000 gal. in its tanks, is said to have little over half that quantity on hand now. This mill uses about 500,000 gal. daily, replenishments coming in mainly by truck tank cars.

The rise in national steel ingot output to 99 per cent from 98.5 per cent last week was assisted by increases in output at Pittsburgh, up one point to 99 per cent; Chicago, up half a point to 103.5 per cent; Philadelphia, up half a point to 91 per cent; Cleveland, up four points to 100.5 per cent; Detroit, up four and a half to 103.5 per cent; and the Eastern district, up three and a half to 106.5 per cent. The only decline this week was the two point drop in the Cincinnati area to 95 per cent. Continuing at last week's level are Youngstown at 97; Wheeling at 95 per cent; and St. Louis at 101.5.

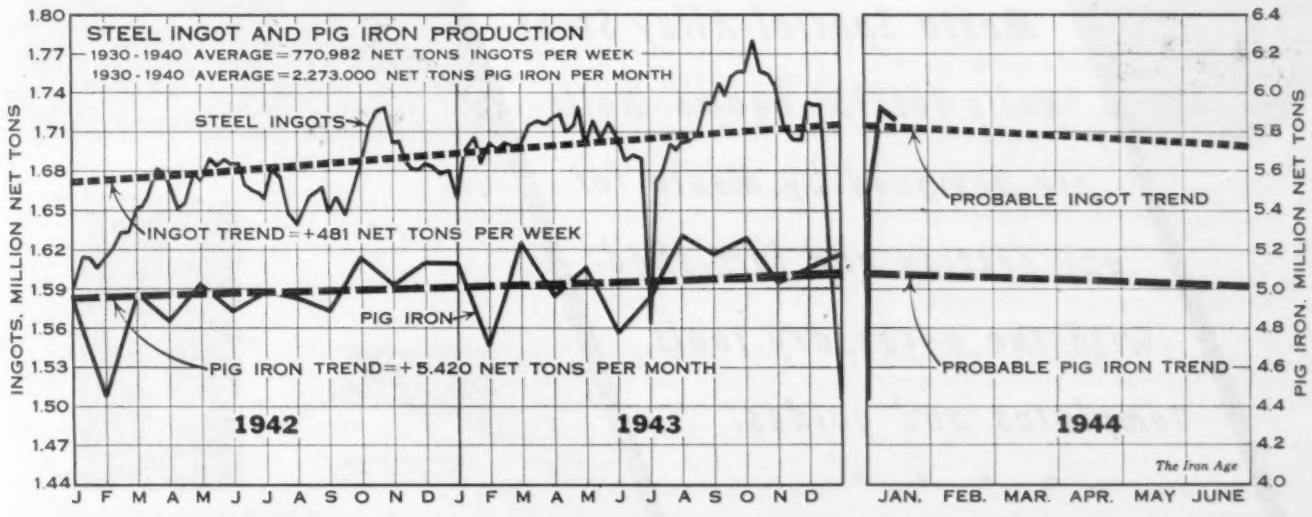
Canadian Roads Place Orders

Toronto

Large orders for rolling stock, on domestic account and for export, have been placed with Canadian builders, assuring capacity plant operations well into 1945. Contracts previously were reported from Canadian National Railways. W. M. Neal, vice-president of the Canadian Pacific Railway Co., announced orders for 70 locomotives and 2140 freight cars, the latter between Canadian Car & Foundry Co., National Steel Car Corp., Ltd., and Eastern Car Co. Canadian Pacific also will build 50 cabooses at its Angus shops in Montreal. The locomotive order calls for 25 freight locomotives of the Mikado type to be built at the Montreal Locomotive Works, Montreal, and 45 Pacific-type locomotives placed with Canadian Locomotive Co., Kingston, Ont.

National Steel Car Corp., Ltd., Hamilton, received orders for 140 overhead refrigerator cars of 50-ton capacity; 500 drop-end gondola cars of 70 tons capacity and 300 triple-hopper cars of 70 tons capacity.

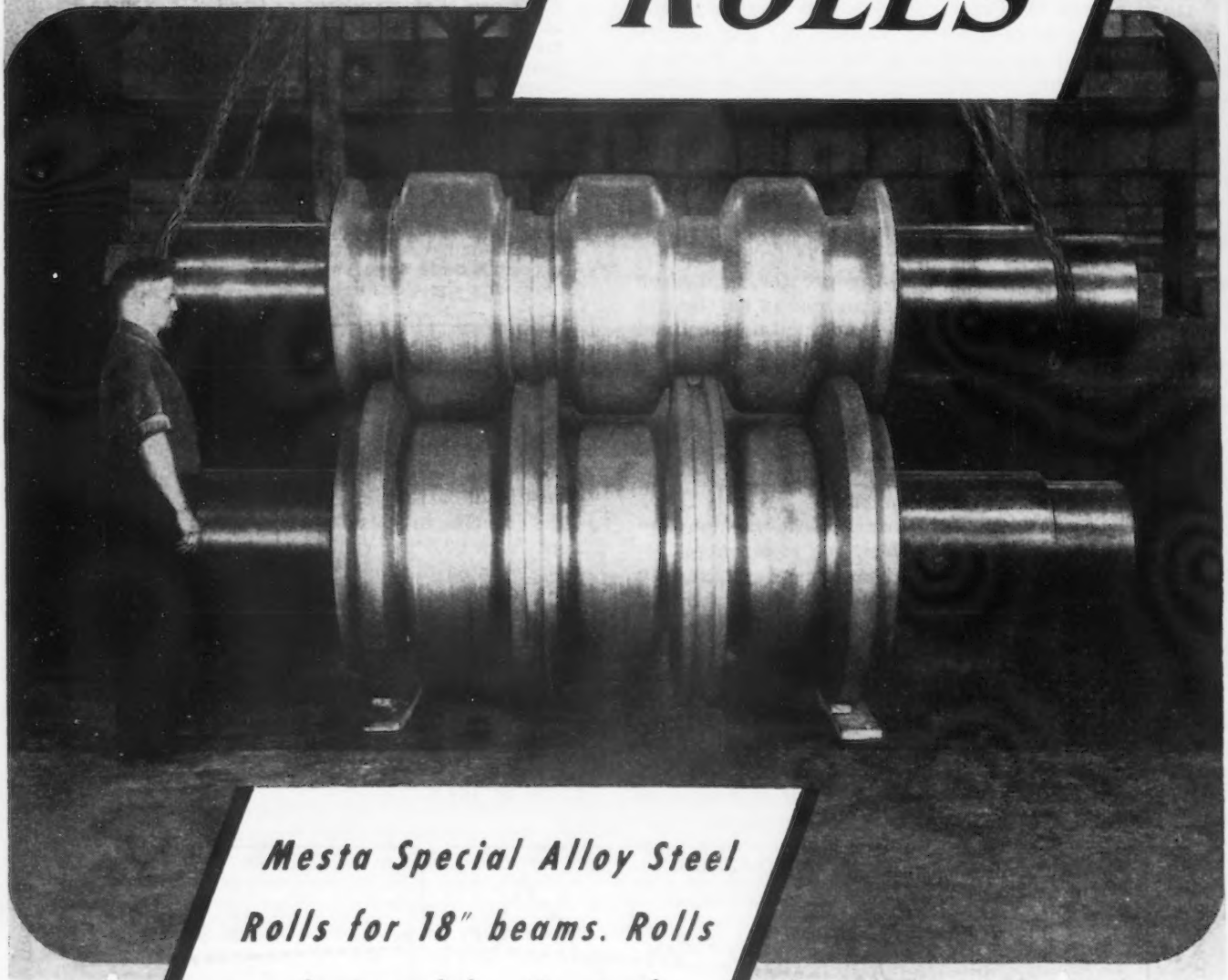
R. S. Hart, president of National Steel Car Corp., Ltd., stated that his company started work Jan. 10 on a contract for steel cars for Canadian National Railways and the Canadian Pacific Railway Co.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 20.....	98.0	103.0	97.0	90.5	96.5	104.5	95.0	99.0	103.5	95.0	97.5	101.5	103.0	98.5
January 27.....	99.0	103.5	97.0	91.0	100.5	104.5	95.0	99.0	103.5	95.0	95.0	101.5	106.5	99.0

MESTA ROLLS



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* * * *

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McCarran Group Will Study Soviet Desire to Buy Unit of Provo Plant

Washington

• • • **The McCarran** (Senate) Committee on Decentralization of Heavy Industries held its first meeting last Thursday to lay out a program for future hearings.

High on the list of inquiry are the reported Russian Government negotiations for purchase of the halted structural mill at the Provo, Utah, plant of the United States Steel Corp.

Senator Abe Murdock, Democrat of Utah, is also interested in the fact that the White House has, according to reliable sources, promised the Russian Government that the United States will furnish 8,000,000 tons of new steel capacity to the Reds for postwar use.

The Committee which has set as its goal the creation of new industrial centers in the South and West through Government financing of new steel capacity will seek reasons for the lack of representation of West Coast states on the WPB Steel Industry Advisory Committee.

"A very good start," Senator McCarren said, "might be made with an effort to uncover the activities of officials within the WPB and other government agencies which have led to, or tended toward, the stifling of projects for the proper development of economic resources.

"Why should a contractor in Los Angeles be forced to buy his steel at eastern mills and transport it two-thirds of the way across the continent when there are rich deposits of iron ore less than two hours from his home city?"

Although the findings of the Truman Committee are available, the McCarran Committee will investigate the postwar potentialities of Henry Kaiser's mill at Fontana, Cal., and those of the Geneva mill at Provo.

See also the "West Coast" column, page 80

Another subject of investigation will be the contentions of the Cascade Alloy Steel Co., Chelan County, Wash.

The company, which is located on the Eastern slopes of the Cascade mountains, has received negative reports from the Bureau of Mines, on core-drillings from Bluette Pass and CheElum properties, on the Western slopes. The company is not satisfied with these findings according to Congressional sources and it is expected that the Bureau of Mines will be pressed to make new tests. The WPB Steel Division has recommended that the new tests be made.

The Committee's real ambitions, however, are to get government finances for a complete new mill to cost $40,000,000 at Tacoma, Wash., and a similar sum to build open hearths and finishing capacity at Daingerfield, Tex.

With this toehold on socialization of the steel industry, it is expected that other members of Congress will turn to the Federal feedbag for handouts for the building of new steel plants in their own backyards.

The Committee also is said to have an eye on getting surplus steel capacity built under the expansion program with Government funds. The program is in its final stages and is expected to be completed early in March.

When it is finished, steelmaking capacity will be 95,136,730 net tons annually, according to WPB Steel Division estimates. Broken down, this capacity will consist of 82,857,450 tons of open hearth, 6,205,280 tons of electric furnace and 6,074,000 tons of Bessemer converter steel. The final total capacity upon completion of the program will represent an increase of 10,984,438 tons over the capacity of 84,152,292 tons as of Jan. 1, 1941, as shown by the American Iron and Steel Institute. Actual construction on the expansion program got under way in the fall of that year.

Actually, when the program has been completed, 13,000,000 tons of additional ingot capacity will have been built, most of it with Government funds, but some by the industry itself. But the net increase in capacity will be about 11,000,000 tons due to the tearing out of old and high cost units. Estimates have been made that the industry will eliminate as excess at least 10 per cent of the expanded capacity and this is said to have inspired efforts of members of Congress to get some of this excess located in their own districts rather than letting it be shipped abroad.

• *Onto the shore: A loaded LST participates in the invasion of Cape Gloucester.*

Navy Takes Over Operation Of York Safe & Lock Co.

• • • **Immediate possession** by the Navy of the York Safe & Lock Co., York, Pa., was reported ordered Monday by President Roosevelt. The company is manufacturing 44 mm. gun mounts for the Navy which are needed in large quantities, along with other War and Navy Department products. According to the Navy Department the plant is being taken over "because of unsatisfactory management conditions."

There is no labor trouble involved in this action, and existing wages and working conditions will be maintained. The President said that government possession of the plant would end within 60 days after he determines that the plants will be operated privately "in a manner consistent with the war effort."

Easier Alloy Steel Situation Forces WPB to Recommend Halting of 7 Projects

Washington

• • • **Formal** recommendation by WPB to the DPC was made Jan. 22 for the termination of work on seven more steel plant expansion projects, involving $97,000,000, which were to produce and roll high carbon steel and alloy steel, the supply of which already is adequate.

The chief project on which stoppage of work was recommended was the new electric steel plant of the Republic Steel Corp., at South Chicago. That this project was to be halted was announced in THE IRON AGE of Jan. 20, page 95. This plant is 98 per cent completed and, according to WPB, cost $88,484,860. It was to have been a duplexing plant and consists of three open hearth, and nine 70-ton electric furnaces, with an annual capacity of 900,000 tons, together with a 36-in. bar mill, and cooling and other equipment. Three of the electric furnaces have been in production while three others are complete except for cable installations. This plant was designed chiefly to produce gun forgings and miscellaneous parts for aircraft.

The six other projects on which work-stoppage has been recommended consist of five Republic projects and the Andrews Steel Co.'s new plant at Wilder, Ky. The Andrews plant, whose DPC appropriation was $5,133,000, is complete except for some items of equipment and consists of one 20-ton and two 40-ton electric furnaces with a mill to roll semi-finished alloy blooms for gun forgings.

The remaining five Republic projects are:

One at South Chicago, which would provide annealing furnaces for conditioning 9000 tons of alloy steel monthly. This project is more than half-completed and was to have cost $1,044,000.

One at East Hartford, Conn., 75 per cent complete, consisting of a wire mill and a bar mill with other facilities to increase production of cold drawn aircraft steel bars and other products by 49,200 tons. The estimated cost of this project is $1,708,000.

One at Massillon, Ohio, which has not been started, to consist of three ingot-warming pits. This project was to have cost $67,780.

One at Canton, Ohio, not started, was to consist of facilities for crushing and briquetting 48,000 tons of alloy steel turnings. This project was to have cost $43,000.

One at Canton, half-finished, consisting of two cooling furnaces estimated to cost $295,000.

Steel originally scheduled to be produced by the projects, all Government-financed, is not now needed in the war program, John T. Whiting, Steel Division director, said. Requirements for alloy and high quality carbon steel, it was pointed out, have declined in recent months.

Five other steel projects previously recommended by the Steel Division for cancellation, to save manpower and prevent unnecessary government expenditures for unneeded steel capacity were in the Carnegie-Illinois Steel Corp. plants in the Pittsburgh and Chicago areas and in the Geneva Steel Co. plant at Geneva, Utah.

The WPB announcement said: "No more Federal funds will be supplied after DPC orders cancellation, but the plants will remain in the hands of the operating companies, with the money already advanced remaining a debt against the plants. The companies may complete the projects with their own funds if they wish."

NEW COKE PLANT: *Spurred by heavy demands for steel and chemicals needed in the war effort, the new coke and chemical plant of the Pittsburgh Steel Co., at Monessen, Pa., is operating at peak capacity. Helen Dudick, one of the many women employed at the plant, is shown operating a device to drench and cool the hot coke with water before it is carried by conveyors to railroad cars.*

Carnegie-Illinois Pittsburgh Expansions Near Completion

• • • **The final unit** of the largest addition to the U. S. Steel's Monongahela Valley project built for Defense Plant Corp., will be placed in operation in February. The project, described in the January issue of the Corporation's employee magazine, *U. S. Steel News*, is turning out steel ingots at a rate of more than 1,000,000 net tons annually. It was constructed by Carnegie-Illinois Steel Corp., for the account of the Government.

The new facilities are located at three Pittsburgh district plants—the Edgar Thompson Works, Duquesne Works, and Homestead Works. They include two blast furnaces, eleven open hearth furnaces, three electric furnaces, a slabbing mill, a plate mill, a forge shop, a machine shop and heat treating and steel conditioning facilities. The blast furnaces are the largest ever built by a U. S. Steel subsidiary.

Operations in the 45-in., two high slab mill engineered and erected at the Homestead Works, began last week. The new slab mill has an annual rated capacity of more than 1,350,000 tons of steel slabs and can roll and shear slabs up to 60 in. in width.

The mill is fed from 20 gas-fired soaking pits, each 15 by 16 ft., and capable of reheating ingots to rolling temperature in five to six hours.

Shall U.S. Set Up A Steel Cartel?
Presence of Briton Opens Up Discussion

By DONALD BROWNE

Washington

• • • **The presence** in this country of Sir Andrew Rae Duncan, British minister of supply who recently came from England to participate in renegotiation of lend-lease agreements has provoked much discussion in the steel industry regarding the possibility of establishing by law an American counterpart of the British Iron and Steel Federation, an international cartel.

Sir Andrew, who was former director of the Federation, is expected to again head this organization when the war is over, according to the English press. Consequently, there is much speculation that Sir Andrew may unofficially approach the heads of American steel companies and also government officials with the proposal.

Such a proposal would involve permanent abandonment of the anti-trust laws, in the opinion of federal attorneys. Membership in the cartel would be compulsory and it would not only apply to the export business, but to domestic as well, foreign trade experts say.

The government would supervise the cartel, and subsidize credit and prices if the cartel is set up parallel to the Federation. The purpose of the cartel would be world steel export control by the United States and Britain together with other countries of the continent with which Britain has similar agreements.

While Secretary of State Cordell Hull could not be reached for comment, his views are well known. His policy of reciprocal trade agreements and general attitude with respect to foreign trade, preclude possibility of his approval of such a scheme.

On the other hand, if Sir Andrew should approach the State Department it could be expected to say that Sir Andrew is being received in his official capacity as the British minister of supply and not as an unofficial representative of the British steel industry. The department might also say that if the British Government wishes to make such a proposal the State Department would give its due consideration when received through established channels.

The Department of Justice has shown its attitude toward cartels in its brief filed in the federal court in the Southern District of New York against Imperial chemical industries and American chemical interests. These companies have been charged with conspiring to divide world markets in contravention of the Sherman Anti-Trust Act.

It is known that Attorney General Biddle will enforce the anti-trust laws so long as they exist and would continue to oppose cartels. To call the Department of Justice off, it is assumed that the anti-trust laws would have to be repealed, a highly improbable prospect.

Seven members of the Senate foreign relations committee were asked the following question: "What would be your attitude toward a proposal or the formation of an American cartel similar to the British Iron and Steel Federation to control world steel export markets and involving price and credit subsidies?"

The following are spur-of-the-moment comments of the senators:

Chairman Tom Connally, Democrat of Texas—"I should have to have time to study the problem."

Gerald P. Nye, Republican of North Dakota—"American industry must be equipped to compete after the war. If there is no other way to do this except through the establishment of cartels, then we shall have to have them. We must give American industry an even break."

Henrik Shipstead, Republican of Minnesota—"Such things lead to war. I don't see how they do anything else. The fight for trade leads to war. Cartels stand for exploitation and international trouble."

Walter George, Democrat of Georgia—"I couldn't express an opinion on so large a question without study."

Guy M. Gillette, Democrat of Iowa—"Off hand, I am against it."

Arthur Capper, Republican of Kansas—"It's a big idea. At least, there's no harm in discussing it. I think we should maintain an open mind. I wouldn't say I was against it."

Elbert Thomas, Democrat of Utah—"I should be against it unless it were made a part of an international munitions agreement, or unless there were a world understanding. I am not for anything inconsistent with existing treaties or the Atlantic Charter."

Reject Steel Disposal

• • • **Producers and** distributors of steel, who have off-grade or rejected steel or idle and excess inventories of steel which they are unable to move under CMP Regulations, may apply to WPB for permission to dispose of such material. Applications for permission to make such sales should contain (1) the name of the proposed customer, (2) the product to be made, (3) description of the material, (4) location of the material, and (5) length of time held and reason holder has been unable to move it under CMP Regulations.

Steel producers applications should be addressed to the appropriate Products Branch of the Steel Division, War Production Board, Washington. Distributors applications should be addressed to the Warehouse Branch of the Steel Division also in Washington.

Alloy Steel Output 13,116,000 Tons in 1943

• • • **Production of alloy steel** in the United States during 1943 reached the record-breaking total of 13,116,000 net tons of ingots and castings, according to preliminary reports of the American Iron and Steel Institute. The 1943 total was nearly 14 per cent above the previous record of 11,526,000 tons of alloy steel produced in 1942. *Note: The WPB Steel Division late last week issued slightly different figures for March, 1943 (1,264,697 tons) and December (816,300 tons).*

The peak month for alloy steel output in 1943 came in March when 1,284,000 tons were produced. Since that month, almost without interruption, alloy steel production declined.

In December, production of alloy steels was 799,000 tons, compared with 1,185,000 tons in December, 1942.

Of the total tonnage of alloy steel output in 1943, open hearth furnaces produced 70 per cent, or 9,221,000 tons. About 30 per cent, or 3,895,000 tons were produced in electric and crucible furnaces. That same ratio of open hearth to electric furnace alloy steel production prevailed in 1942. Before the war, however, open hearth furnaces produced as much as 75 per cent of the total alloy steel tonnage. Production of ingots and castings, in other years follows (net tons):

Years	Open Hearth	Bessemer	Crucible	Electric	Total
1942	8,133,076	.....	522	3,392,776	11,526,374
1941	5,739,655	3,890	933	2,461,651	8,206,129
1940	3,674,926	3,990	255	1,286,716	4,965,887
1939	2,458,854	3,486	231	749,384	3,211,955

Nelson, Patterson Discuss Reconversion

• • • **Asserting** that American industry must go forward rather than return to prewar standards, Robert P. Patterson, Undersecretary of War, pointed out before the U. S. Conference of Mayors in Chicago that reconversion to the prewar production pattern was basically impossible and would "result in a 50 per cent reduction in the national income, extensive unemployment and reduced production capacity." Donald M. Nelson, chairman of WPB, at the same meeting warned that the country was "coming into a period in which there may well be a certain amount of idle manufacturing facilities, idle materials and scattered pockets of temporarily unemployed men and women."

Mr. Patterson outlined a four-point program for reconversion which consisted of: 1. Negotiations by a procurement agency for a final termination of war contracts to be reopened only on evidence of fraud, and to be made without interference from third parties. 2. Formation of a central government-wide agency to formulate the policy for reconversion. 3. Establishment of a central disposal agency for surplus government property. 4. Provision of a comprehensive system of financial aid for war contractors pending final settlement of their contracts.

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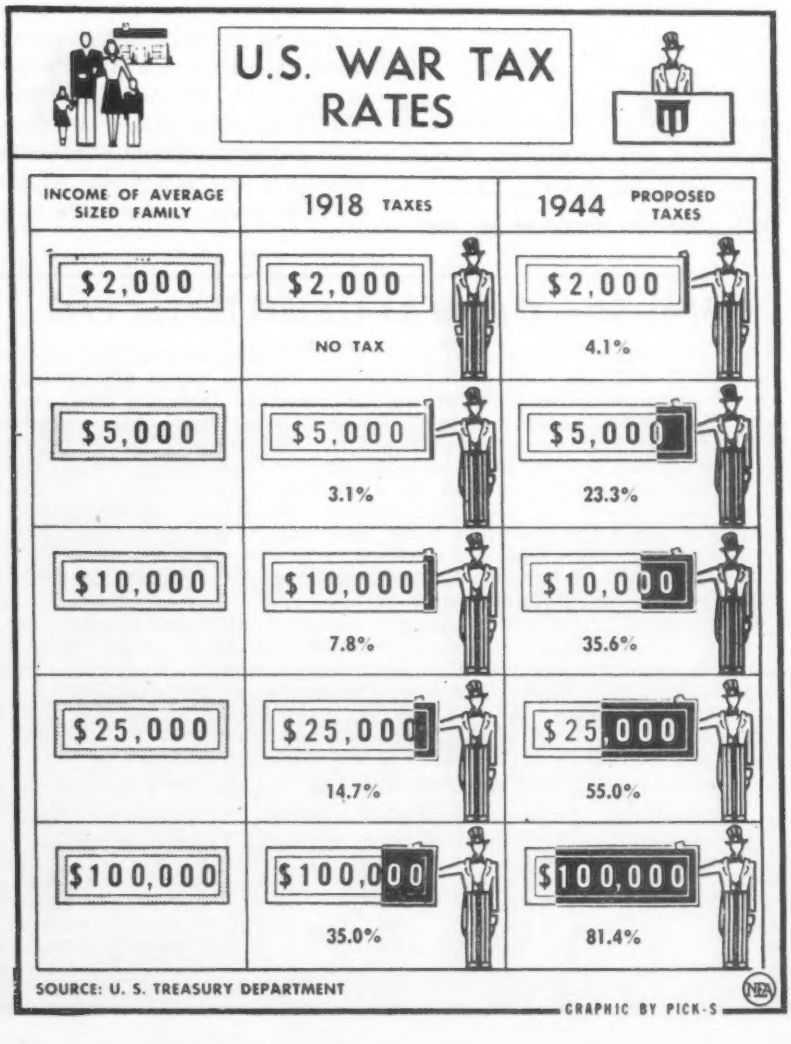
Jahco Workers Give $17 Million

Cleveland

• • • **In a request to 7400 associates** (employees) of Jack & Heintz, Inc., by the president, William S. Jack, to contribute $30,000,000 into non-voting preferred stock to replace post-war operating capital that the company is losing through "contracts renegotiation," associates were ready to contribute $17,000,000, according to Mr. Jack. He said that associates were being polled to learn the amount that might be expected, and the first contribution would be individual voluntary subscriptions.

Sources of money making up the $17,000,000 already subscribed included redemption of war bonds and subscription of war bond weekly deductions; working payless Sundays and turning back double time rates; production and Christmas bonuses; and cash subscriptions. Most of the $17,000,000 subscriptions were in cash, although part of them were in war bonds.

In commenting on renegotiation, Mr. Jack stated he would refer the order to pay back to the Government $7,000,000 to the highest legal authority in the country and fight it out to the end.



Won't Pay Income Tax

Westport, Conn.

• • • **Miss Vivien Kellems**, Westport war plant owner, stated at Kansas City that she has not paid her Dec. 15, 1943, income tax because she believed the tax law to be a violation of the Fifth Constitutional Amendment and possibly the Fourth. "It amounts to unreasonable seizure and its ultimate effect will be to deprive me of property without due process of law," she said. "Not only is the Government trying to collect a tax on profit but it is actually forcing me to anticipate profits on work not yet done."

Paper Work Reduced

Washington

• • • **Designed to reduce** paper work WPB on Monday announced that the Maritime Commission hereafter will use the single allotment number M-1 to identify all ship construction programs. This means that the Commission will discontinue using major program numbers M-2, M-3, M-4, M-5, M-6 and M-7. This does not, however, affect the use of the major program numbers M-8, M-9, or M-10, which identify programs of ship repair, other equipment and supplies, and construction and facilities.

In the future, manufacturers who have received allotments identified by any number from M-2 through M-7, may use the allotment number M-1 in placing orders for production materials or in making allotments for these programs.

Ease in Alloy Scrap Controls Will Not Cause Buying Spree

Chicago

• • • **Substantial additional** consumption of low alloy scrap by Chicago district mills in carbon steel melts has failed to materialize despite revision of WPB Order M-24-c, a survey of district mills shows. Most local mills already have been flirting dangerously close to molybdenum and nickel maximums in their carbon steel and a number of heats have been lost as a result of poor segregation of alloys from purchased carbon scrap. With carbon scrap plentiful and inventories relatively high, there is little disposition to purchase low alloy grades even though no price premium over carbon grades is charged.

Producers desiring high nickel content, up to 3.5 per cent nickel, have little incentive to trifle with low alloy scrap because of the bountiful supply of high nickel material in this territory representing a long lived hangover from the tank curtailment program. This high nickel scrap is being offered at little or no premium over carbon scrap prices with few buyers evident.

Despite the apathy of the mills to the M-24-c revision some miscellaneous buyers whose products would be benefited by alloy content are reported purchasing at carbon prices.

A further contributing factor to the lack of open market demand is the decreasing production of triple alloy steels resulting in generation of scrap exceeding requirements for new melting schedules. To the extent that the M-24-c order allows absorption of this excess production by mill producers it undoubtedly is preventing a more serious glutting of the open market.

Fears have been expressed in the trade that increased contamination of carbon scrap shipments from dealers will result from large tonnages of alloy material at this level because of inability to find a market on the segregated basis. Although order forbids such mingling it is believed that mounting desperation will make enforcement difficult until some outlet is found. One major mill has gone so far as to send a letter to brokers making a part of its contract terms that no alloys shall be included in this mill's purchases of carbon steel scrap. The difficulty is most acute on NE 8600, SAE 4100 and SAE 3100 grades with occasional trouble resulting from grades from off-alloy such as those containing aluminum. As stated, no market has developed for high nickel alloys (up to 3.5 per cent Ni), a headache here.

No threat has developed, however, to carbon scrap prices because of the fact that finished steel specifications prevent purchase of alloy scrap no matter what price inducements are offered. One district mill is out of the scrap market entirely and other mills are buying without enthusiasm. Those mills that consume alloy scrap in quantity have adequate inventories.

Therefore, direction four to Order M-21-a thus far has not caused any increase in demand although it may result in a slight increase in the proportion of scrap in alloy charges.

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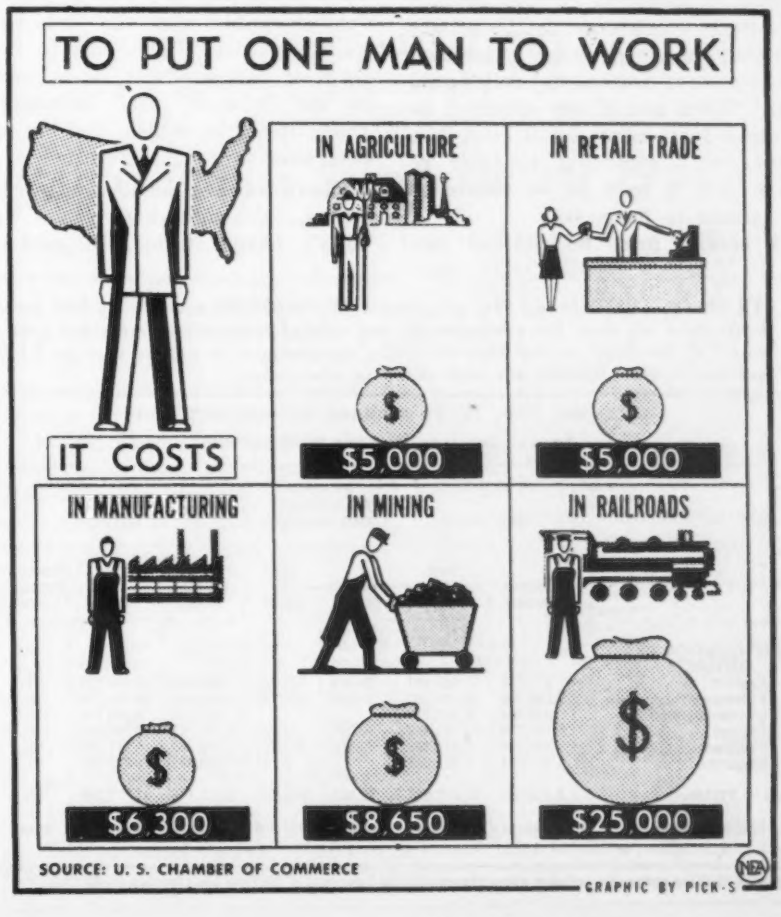
Ore Consumption Totals 89,027,689 Tons

Cleveland

• • • **With December Lake** Superior iron ore consumption in the United States and Canada totaling 7,509,096 gross tons, total annual consumption during the past year reached 89,027,689 gross tons. Of this amount, 86,585,241 tons were consumed by American furnaces and 2,442,448 tons were used by Canadian furnaces. This compares with consumption during 1942 of 83,714,331 tons by American furnaces and 2,511,018 tons by Canadian operations.

December consumption showed a slight increase over the 7,409,213 gross tons consumed in November, but was somewhat under December, 1942, consumption of 7,759,366 gross tons. Consumption by blast furnaces in United States alone was 7,313,034 tons last month.

Ore stocks at furnaces and Lake Erie docks on Jan. 1 amounted to 43,428,641 tons, which compares with 47,424,421 tons a year ago. With at the most five months to go before shipping opens up on the great lakes, these stocks represent better than 8,000,000 tons a month for blast furnace consumption. No concern is felt in regard to shortages of ore.



Small Steel Firms Plan for Lower Costs, More Equipment, Specialty Output

By TOM CAMPBELL
Pittsburgh Regional Editor

• • • **Small steel companies**, integrated and non-integrated, are planning aggressively for the postwar era, like their large competitors. Officials of some of these small units are not counting too much upon aid from the government or from bigger steel companies.

Although there has been considerable talk in the past that small steel companies, especially makers of flat rolled products, could not stay in business due to competitive conditions, it is noteworthy that the mortality of small steel companies in recent years has been negligible. Conditions over the past few years, however, which include higher raw material costs, and an unusual expansion in labor costs, may, according to some steel leaders here, present a far different problem for the small steel maker, not only in the postwar period but in the pre-postwar period.

Costs on semi-finished steel, which the large companies sell to the smaller ones, have risen substantially since 1939, and most observers look for an upward adjustment in the price of this item, which may not be proportionately matched by an adjustment in the price of finished flat rolled products. When and if this condition becomes a fact, many small steel companies will, according to their reports, find it hard to, or impossible to, remain in business.

A special price on finished steel products, to take care of the smaller companies, would be an empty gesture in a steel market where the potential supply exceeds total demand. This already has been proven by the falling-off in the volume of business at those steel plants where premium prices on specific products have been allowed. The WPB, and other consumers as well, have, where possible, shifted their business on specific products to plants charging the ceiling prices.

According to reliable sources, however, many small companies are taking a realistic attitude on potential steel markets, and already have set in motion plans or programs of their own which, if carried through, would seem to indicate that they do not expect to go out of business.

A typical program is believed to be somewhat along the following lines: complete studies on probable cost saving methods are already being made; every avenue wherein savings may be effected is being exploited to the utmost.

Knowing well that they cannot compete on a tonnage basis, for ordinary low cost flat rolled items, many small steel companies are laying plans to further expand what the trade knows as "specialties." This may be in the form of new products, or it may be in the form of small tonnages of those items in which the big steel companies are not interested.

Many of the smaller steel companies, although known as "hand mills", have, during the past few years, mechanized as far as possible their steel finishing operations. This trend is expected to become even more pronounced this year.

Other small outfits are said to be concentrating their attention on small tonnage orders of carloads or less, and are pointing to prompt and personalized delivery as a talking point. On this basis, some companies are attempting, with considerable success, to build up a great number of consumers, regardless of the quantity of steel involved in individual orders.

While there has been no definite undertaking, some small non-integrated steelmakers are known to have been thinking over the possibility of a common source of semi-finished material, owned and operated by several small steel finishers. According to one official of a small company, such a plan might possibly be feasible on the basis of a joint enterprise. In other words, ten or fifteen small companies making flat rolled material, conceivably could purchase a steel company with steel producing facilities. The program would call for the manufacture of nothing but semi-finished steel. The company could be owned and operated on a stock participation basis, with the profit or loss at the end of the year spread over the various small companies.

There are many in the trade, however, who consider such a plan as overly optimistic, especially in view of the high cost of steel ingot and semi-finished steel production. On the other hand, some of the smaller companies may toy with the idea on the basis that they will have a continuous, even though partial, source of basic supplies, with the possibility of "spreading the cost."

PIG IRON OUTPUT *during* 1943 *exceeded* 1942's 59,075,944 *net tons by* 3.17 *per cent, while total pig iron, ferro-manganese, and spiegel production during the past year was* 1.43 *per cent greater than in* 1942. *December iron output rose to* 5,139,541 *net tons from* 5,038,605 *net tons made in November.*

DECEMBER, 1943, BLAST FURNACE OUTPUT—NET TONS

Source: American Iron and Steel Institute

	PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	December Per cent of Capacity
DISTRIBUTION BY DISTRICTS:							
Eastern	971,516	11,467,183	24,456	237,741	995,972	11,704,924	91.3
Pittsburgh-Youngstown	2,035,283	25,129,302	19,626	221,725	2,054,909	25,351,027	92.5
Cleveland-Detroit	530,164	6,224,213	.....	.....	530,164	6,224,213	102.1
Chicago	1,137,790	13,195,467	10,921	10,921	1,148,711	13,206,388	103.4
Southern	343,795	3,811,488	18,602	205,872	362,397	4,017,360	96.6
Western	120,993	1,267,243	.....	6,141	120,993	1,273,384	91.1
TOTAL	5,139,541	61,094,896	73,605	682,400	5,213,146	61,777,296	95.6
1942 Production	xxxxxxxx	59,075,944	xxxxxxx	1,827,360	xxxxxxxx	60,903,304	xxxxx

During 1942 the companies included above represented 99.8 per cent of the total blast furnace production.

D. F. Austin Directs New C-I Production Planning Dept.

Pittsburgh

• • • **To coordinate** functions pertaining to the scheduling of orders and planning of production, the Carnegie-Illinois Steel Corp., here, has formed a production planning department. It will be under the direction of D. F. Austin, vice president of the corporation.

John A. Hagan, former superintendent of production and cost planning at the company's Ohio Works, was appointed general manager of this new department. James M. Morehouse, who was general manager of the company's order division, was made assistant general manager.

Fairless Airs Freight Inequities; Corp. Labor Policies; Expansion

Pittsburgh

• • • **In a speech** bristling with frankness and realism, Benjamin F. Fairless, president, U. S. Steel Corp. of Delaware, set Pittsburgh industrialists back on their heels last week, by warning that if unfair freight rates prevent Pittsburgh mills from reaching consuming markets of the country; in the postwar period, new facilities now being built may have been a mistake and the decline of Pittsburgh as an important steel center "must then be expected."

The occasion for this blunt warning was the annual Pittsburgh Chamber of Commerce dinner at the William Penn Hotel, but Mr. Fairless did not confine his remarks to freight rates and the future of Pittsburgh alone. On the question of steel capacity financed by the United States Government, he argued that the Government should dispose of its plants and facilities as promptly as possible after the end of the war, and should not attempt to go into business in competition with private industry.

In cases where Government owned plants were more efficient and low cost than private plants, "the Government should permit private industry to buy or lease these lower cost plants upon some equitable basis."

In those instances where Government owned plants cannot be economically operated after the war, "the Government should be realistic and either scrap the plant promptly or put it under lock and key for future national emergency use," Mr. Fairless argued.

After expressing frank views on Pittsburgh's future and the disposition of Government owned plants, Mr. Fairless struck out and reviewed the United States Steel Corp.'s labor policy, which, he said, "may not always have been clearly understood." He reiterated the company's labor policy of June, 1934, when the plan of employee representation was existent, and which in part said that the company would recognize the right of its employees to bargain collectively through representatives freely chosen by them, without dictation, coercion, etc. It also said that the company would negotiate with any group chosen to represent the employees and with any organization which represented its members, subject to the recognition of the principle that the right to work is not dependent on membership or non-membership in any organization.

Mr. Fairless insisted that this labor policy is still the labor policy of the U. S. Steel Corp., except for the change made necessary by the Wagner Act, which grants exclusive representation to a bargaining agent chosen by a majority of employees. He insisted that the first contracts of the Steel Workers Organizing Committee did not provide for a closed or union shop or for a check off, but were predicated on the labor policy of the company described above. He added that the compliance with the National War Labor Board directive, that the company sign a new form of agreement imposing maintenance of membership and the check off, was for one reason only—"That the country is at war and that your board has ordered this company to do certain things embodied in your directive. For the period of the contract under negotiations, this company bows to your decision and accepts that which it considers unnecessary, undesirable, and subversive of the workers individual freedom." Fairless ended his labor comments by flatly stating that the company's conviction is as firm today as it ever was that the right to work should not be dependent upon membership or non-membership in any organization.

On the subject of Pittsburgh, Mr. Fairless indicated that while there is evidence of his company's belief in Pittsburgh's potential future as an important steel center, he and his company were worried about the apparent disadvantageous freight rates on shipments moving from Pittsburgh to the east. Forty years ago, according to Fairless, Pittsburgh had an average freight disadvantage of only $1.00 per net ton on shipments of steel from Pittsburgh to New York, while today that freight disadvantage averages $3.80 a ton. "Nothing has occurred in the interval to justify such a 280 per cent increase in the differential," Mr. Fairless said. He added, "There may have been some reason for an increase in general freight rates from time to time in the past year, but there was no justification for penalizing the Pittsburgh steel industry by proportionally increasing this rate differential on each such occasion."

While indicating respect for railroad management in general, Fairless expressed disappointment that officials of the several railroads serving Pittsburgh have not taken action on their own initiative to remove an obvious discrimination against "a city of the potential traffic importance of Pittsburgh."

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100,000 Planes Scheduled for 1944

Washington

• • • **An increase in** the urgently needed combat type airplanes with a general reduction of trainer and certain other types, will be the trend of aircraft production during 1944, according to C. E. Wilson, chairman of the Aircraft Production Board. The percentage increase in number of planes will drop sharply during the coming year as compared to the two preceding years, but using weight as a production measure, output will continue steadily upward. Schedules for 1944 combat planes indicate that these ships will all be substantially larger than those they supplant. As smaller tactical models and certain types of trainers are removed from the program, the available factory space and labor will be utilized for subcontracting work for plane assemblers.

The following table shows statistically U. S. Aircraft production:

Year	Number of Planes Accepted	Average Weight of Frames and Spares, Lb.	Frame and Spare Acceptances, Lb.	Weight Output Index, 1942=100	Equivalent Number Planes on Basis of Types Accepted in 1942	Per Cent Increase in Number Over Preceding Year
1941	19,290	4400	85,700,000	29	14,800	.....
1942	47,873	6110	292,600,000	100	47,873	148.2
1943	85,946	8630	741,800,000	254	122,000	80.8
1944*	100,000	10,000	1,000,000,000	350	167,000	16.4

* All of 1944 figures are estimated, of course.
The figures in the right hand columns show what production would be if all planes produced were of the sizes, types and proportions produced in 1942 when the President issued his call for production of 125,000 planes per year and the increase percentage-wise, in numbers of planes built over each preceding year.

Controversial Features of New Tax Bill Hinge on Renegotiation

Washington

• • • **The passages** by the Senate of the 1943 tax bill on Jan. 21, was not considered here so much a defeat for the Administration, as it was a portent of future drives for economy in Government by Congress. The bill now goes to conference.

Clearly, Congress thinks that the limit has been reached in the taxpayer's patience and ability to pay new higher taxes, as witnessed by the passage of a $2,000,000,000 bill instead of a $10,000,000,000 one as requested by the President. There are conflicting conjectures whether the President will veto the bill.

But the real tip-off is the new questioning attitude of Appropriation Committees of both houses of White House requests for money to operate Government departments. Deep slashes in the 1944 budget can be expected.

The most controversial feature of the bill deals with renegotiation. A brief summary of how more knotty provisions stood before conference follows:

Renegotiation after taxes—Senate Finance Committee finally gave up on this one. Renegotiation will be before taxes as usual. Administration pressure prevailed and killed the hopes of conservative bloc in the Committee.

Standard commercial articles—Mandatory exemption proposed originally by Senate Committee stricken by amendment on the Senate floor. This result from sniping of Administration supporter who threatened to read into the record cases of "outlandish" profits on standard commercial articles. Exemption is not discretionary with individual price adjustment boards to agree with the House proviso.

Subcontract definition—Senate first wrote a clause which would have exempted from renegotiation majority of machine tools and industrial equipment contracts of supplies. Compromise clause passed by the Senate exempts durable tools — "having a useful life of more than 10 years." This will exempt 1943 tool and equipment contracts of concerns whose fiscal year ended Dec. 31, 1943. If fiscal year ended June 30, 1943, only contracts for the last half will be exempted. Exemption will apply to all contracts entered into in 1944 and after.

Renegotiation cut off—Senate bill proposes Dec. 31, but gives President discretion to extend to June 30, 1945 or beyond, not a very satisfactory provision.

Administrative review—Both bills agree. A new War Contracts Price Adjustment Board is created composed of representatives from War, Navy and Treasury Departments, Maritime Commission, RFC and subsidiaries and WPB. The granting of review is discretionary with the Board, although it may entertain cases on its own motion.

Court review—The Senate muffed this one. House provision would have permitted retroactive application of review by Court of Tax Appeals. The Senate Finance Committee which first proposed that this right be extended to all past and future renegotiation and that appeals be permitted and de novo before the Court of Claims backed down. The Senate passed a court review provision which limits the right of appeal to cases where the departments have made unilateral determinations. No contractor who has signed a renegotiation agreement will have any appeal rights.

The War Department has officially said that there have only been 24 such unilateral determinations and at most for the rest of the departments the number would not be over 50, officials estimated. This means a fight in conference. Some change is certain.

Post-war reserves—Senator Harry Truman, Democrat of Missouri, proposed an amendment permitting contractors to get back a 20 per cent of net taxes to defray reconversion costs. Money was to be converted into non-negotiable bonds.

The amendment was knocked out in a fight led by Senator Taft, Republican of Ohio. Senator Taft pointed out that the amendment would cost more money than the bill is calculated to raise.

Repricing—Legislative experts say that Senate title on this subject is mere separation of what was contained in House bill. Second War Powers Act gave the right, in 1942.

The way the departments are considering this subject is that renegotiation is repricing on contracts completed in previous years. Repricing is renegotiation in advance and is prospective, according to these experts. In no case, will a contractor be subject to both renegotiation and repricing on the same contracts and the same period.

MAGNESIUM INGOT OUTPUT
By Months, 1942-1943
Source: WPB.
(Millions of Pounds)

	Primary		Secondary	
	1942	1943	1942	1943
January	5.0	20.7	0.3	1.1
February	4.7	21.4	0.4	1.2
March	5.2	26.1	0.5	1.5
April	5.0	27.3	0.6	1.7
May	5.3	30.4	0.5	1.7
June	5.3	30.3	0.6	1.6
July	6.6	33.4	0.6	1.7
August	6.9	34.5	1.0	2.1
September	8.2	32.6	1.0	2.5
October	11.7	35.6	0.8	2.7
November	15.9	.....	0.7	.....
December	18.2	.....	0.9	.....
Total, year	98.0	.....	7.9	.....

Steel Control Relaxed to Ease Tight Manpower Supply

Washington

• • • **As the steel** supply situation progressively becomes easier, there are growing examples showing how manpower has been lost and breakage caused through the use of substitutes. These substitutes, whose use had been ordered as a means to conserve steel, now are being either wholly or partailly discarded to permit the use of steel.

Indicative of this situation was a WPB announcement that manufacturers of conveying machinery and mechanical power transmission may now use small amounts of carbon steel in the fabrication of such equipment in place of the substitutes formerly employed. WPB estimated that the quantity of such steel to be released to these manufacturers will run about 800 tons quarterly. It has been unofficially predicted that this quantity will be increased.

WPB said that the use of substitutes has caused a considerable increase in the number of man-hours of labor to build conveying machinery and mechanical power transmission equipment and considerable losses due to breakage, according to industry representatives. The quantity of steel now authorized, WPB pointed out, is expected to be more than offset by the saving in manpower and elimination of breakage.

WPB's action was included in an amendment to L-193. It also adds pneumatic tube delivery systems to the list of machinery that requires an AA-5 priority to manufacture.

Plans Made to Show Public Seriousness of Manpower Problem

New York

• • • **Fitting available** material, manpower, productive capacity, and similar components together in jig-saw puzzle fashion to result in a coordinated maximum finished product output has been, since the start of the war, the main problem of Washington. Today, as the production capacity and material factors ease, manpower becomes continually scarcer and will be an increasing headache for production schedulers through to the end of the war. Appeals continue to stream from Washington for everyone to do his part on the production front, mostly in slogan style, but the problem eases none.

This week in Washington the Army, Navy, and war agencies of general information policies planned a campaign through the Office of War Information to increase public understanding of war production and employment problems. The object of the meeting was to set a definite policy in regard to the labor problem. The planned program is by and large an internal one that among other things seeks to: (1) Avoid speculation by military and civilian officials as to the end of the war; (2) exercise care among officials in discussion pre-post-war and post-war economic developments and reconversion; (3) emphasize that no extensive resumption of civilian output is possible; (4) fully and accurately explain the facts in public expressions of production cuts; and (5) to eliminate discussion of actions of agencies with which officials are not connected.

In spite of WPB putting Cleveland in the category of a "trial guinea pig" for civilian production, Cleveland WPB officials stated that new war contracts would take up all slack resulting from cutbacks and the city is still a No. 1 manpower shortage area. Consequently, little or no civilian production is possible. However, in Youngstown, the WPB is conducting a survey among 500 smaller plants to determine the nature of equipment, types of war orders now on hand, and in which plants it would be most suitable to make "tests" in reconverting to civilian production.

On the labor front, WLB this week certified the issues in the contract negotiations between the Republic Steel Corp., and the CIO-USWA. The case was referred to the WLB by the Secretary of Labor after negotiations were broken off.

• • • The WLB on Jan. 22 ordered inclusion of a standard voluntary check-off of union dues in contracts between American Can Co. and the USWA covering seven of the company's plants.

• • • Foundry workers in the Northwest who struck Jan. 18 voted to return to work on Jan. 21 in about 80 plants. Some 6000 were involved, striking in refusal to an 8c. an hr. increase granted by the WLB. . . .

A walkout of 650 Ford Motor Co. technicians, including metallurgists, chemists, and physicists on Jan. 19 was effected at the Rouge and Willow Run bomber plants in a dispute over the demands of these employees for union status. . . . Meanwhile, the week-old strike of Chrysler Corp. foremen spread to a sixth plant last week, leaving fewer than 400 of the 1432 supervisors to direct production of war materials.

• • • John A. Roebling's Sons Co.'s Trenton, N. J., plant stopped production during the past week because of a walkout of 2700 employees. The strike resulted from a "minor grievance between the firm and 19 employees in the aircraft department," according to company officials. However, a wage differential of about 15 per cent for women workers performing the same tasks as men was also reported to be the basis for the trouble. . . . A strike of 350 Bison Casting, Inc., Buffalo, employees over a WLB wage ruling tied up production during part of last week.

• • • Acting on a petition of the Sheffield Steel Corp., Houston, Texas, the National War Labor Board set a common labor rate for the company's plant at 60.5c. per hr., 2.5c. less than previously directed by the regional WLB, Dallas. An increase of 10 per cent an hour for classifications other than common labor as ordered by the regional board was also disallowed by the National board. These rates were ordered to be negotiated between the company and the USWA-CIO. . . . Eight U. S. Steel Corp. fabricating and other subsidiaries have asked that collective bargaining conferences with the USWA-CIO be immediately arranged. These companies previously suggested that such conferences be withheld pending the commencement of negotiations between the Union and the five steel producing subsidiaries of the U. S. Steel Corp. Companies making this request were American Bridge Co., Virginia Bridge Co., U. S. Steel Supply Co., U. S. Steel Products Co., Universal Atlas Cement Co., Oliver Iron Mining Co., Oil Well Supply Co., and Tubular Alloy Steel Corp., In November, 1943, average hourly earnings in these companies were $1.095, representing an increase of 32.7 per cent over the average hourly earning in effect in January, 1941.

ALUMINUM CASTINGS—SHIPMENTS BY MONTHS, 1942-1943

Source: WPB. (in thousands of pounds)

	SAND CASTINGS				PERMANENT MOLD CASTINGS			DIE CASTINGS			
	Heat-treated										
	Cylinder head	Other	Non-heat-treated	Total	Heat-treated	Non-heat-treated	Total	Cold chamber	Goose neck	Total	Total Castings
1942											
January	NA	*8,129	4,331	12,460	3,563	316	3,879	NA	NA	3,594	19,933
February	NA	*7,828	4,055	11,883	3,557	306	3,863	NA	NA	3,965	19,711
March	NA	*9,145	4,584	13,729	4,016	369	4,385	NA	NA	5,161	23,275
April	NA	*10,393	4,834	15,227	4,041	442	4,483	NA	NA	5,154	24,864
May	NA	*10,940	4,672	15,612	3,909	520	4,429	NA	NA	3,969	24,010
June	NA	*11,728	4,797	16,525	4,148	620	4,768	NA	NA	4,132	25,425
July	4,730	7,897	5,260	17,887	4,070	475	4,545	NA	NA	4,511	26,943
August	5,993	8,207	5,102	19,302	4,604	448	5,052	NA	NA	4,746	29,100
September	6,349	8,518	4,848	19,715	5,432	562	5,994	NA	NA	4,916	30,625
October	7,357	9,062	5,411	21,830	5,841	639	6,480	4,418	1,036	5,454	33,764
November	7,465	8,907	4,758	21,130	5,713	573	6,286	4,049	889	4,938	32,354
December	8,403	9,074	4,711	22,188	5,865	614	6,479	4,473	911	5,384	34,051
Total	NA	*150,125	57,363	207,488	54,759	5,884	60,643	NA	NA	55,924	324,055
1943											
January	8,875	9,032	3,968	21,875	5,808	598	6,406	4,036	767	4,803	33,084
February	9,039	8,918	4,082	22,039	5,950	566	6,516	3,944	880	4,824	33,379
March	10,974	9,997	4,338	25,309	7,268	680	7,949	4,519	958	5,477	38,735
April	9,963	9,973	4,360	24,296	6,919	667	7,586	4,301	882	5,183	37,065
May	10,415	10,039	4,524	24,979	6,988	679	7,667	4,157	887	5,044	37,690
June	9,710	9,544	4,825	24,079	6,244	642	6,886	4,367	965	5,332	36,297
July	10,372	9,737	4,563	24,672	6,411	710	7,121	4,635	728	5,363	37,156
August	10,393	10,202	4,871	25,376	6,442	736	7,178	4,751	866	5,617	38,171
September	11,466	10,719	5,028	27,213	7,158	801	7,959	4,786	886	5,672	40,844

NA—Not available. (*) Includes cylinder head castings.

Orders Affecting Alloy Steel Output and Alloy Scrap Announced

Washington

• • • **WPB last Friday** announced relaxation of restrictions on the manufacture of alloy tool steels and heat resistant steels and use of electric furnace facilities. WPB, at the same time, required alloy steel producers to use 50 to 60 per cent alloy scrap in all melts. Many melters, it is reported, now are not using more than 20 to 30 per cent alloy scrap. The remainder of the charge is being taken up in virgin alloys. WPB took this step undoubtedly in conjunction with its removal of restrictions on the use of ferro-alloys as a conservation measure. Reluctance to use 50 to 60 per cent alloy scrap is attributed to the high cost it involves through having to hold up production until higher grade scrap can be obtained.

The greater availability of alloying materials and the expanded electric furnace capacity of the nation made possible five moves by WPB, which together make a sweeping change in the alloy steel picture.

By revoking Direction 1 to Supplementary Order M-21-h and Supplementary Order M-21-g, WPB removed all restrictions on the formulae by which vanadium, tungsten, molybdenum, and nickel alloy steels and chromium-nickel alloy iron and alloy steel were produced. Hereafter, producers may use any alloy content they desire in making these melts. WPB estimated that by permitting the free use of alloys in tool steel and considering the present tonnage of tool steels being melted monthly, increases in the use of alloying elements would not exceed 5 per cent in any case.

Supplementary Order M-21-a was amended to permit producers to melt carbon steel in electric furnaces without filing schedules and obtaining permission from WPB. Direction 4 to M-21-a, covering all types of alloy steel except stainless and valve steels, which are covered by another direction to this order, was issued to provide that each producer must use alloy scrap in not less than the following amounts for melts in any one calendar month:

	Electric Furnace, Per Cent	Open Hearth, Per Cent
Scrap (solids and turnings)	60	50
Turnings, per cent of solids	5	8
Machine shop turnings, per cent of solids	4	4

An amendment to M-21-h revokes the requirement that producers of tool steels file melting schedules before making their melts. However, the amendment still provides that certification must be made that orders are for tool steel.

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CMP Order Changes Clarified

Washington

• • • **Rules governing** changes in authorized controlled material orders have been clarified through the issuance of Interpretation No. 10 to CMP Regulation No. 1.

The interpretation chiefly concerns determination of when a change in an authorized controlled material order constitutes placement of a new order and when it does not. It is important for producers to know when a change constitutes a new order so that they may be in a position to adjust their production schedules of controlled materials accordingly.

Generally, any change in a customer's order constitutes a cancellation of the earlier order and placement of a new order on the date of the change, if (but only if) the change necessitates alteration of the producer's production schedule to a point which would interfere with production.

In illustration of this general rule, the Interpretation points out seven specific cases, as follows:

(1) The mere substitution of one allotment number for another which does not require alteration of the producer's schedule is not considered to constitute the placing of a new order. The customer must, of course, have an allotment identified by the substituted allotment number to support the change.

(2) A change in shipping destination does not constitute the placing of a new order.

(3) An increase in the total amount ordered constitutes the placing of a new order to the extent of the increase.

(4) An advancement or deferment of delivery, when made by the customer, will constitute entry of a new order.

(5) A reduction in the total amount ordered will presumably not require a change in the producer's schedule and will not constitute a new order. Of course, if the quantity is reduced below a minimum mill quantity, the producer may reject the order and remove it from his schedule, as provided in paragraph (t) (2) (i) of CMP Regulation No. 1, though he must not discriminate between customers in so doing.

(6) When the customer directs the producer to hold or suspend production on an order, without specifying a new delivery date, the order will not be considered as on a producer's books for the purpose of determining his obligation to accept other orders. When the customer instructs the producer to reinstate a suspended order, it shall be considered a new order as of the date of such instruction.

(7) Where minor variations in size, shape, gage, etc., are requested by the customer and can be arranged by the producer without interfering with his production, such changes do not constitute a new order.

Where changes constitute placement of new orders, the acceptance or rejections of the new order in the producer's schedule shall be governed by the conditions existing at the time the changes are received by the producer.

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Controls Eased On Output Of Oil Country Tubing

Washington

• • • **Resumption of manufacture** of light-weight tubing, used largely by gas well operators in the eastern area, is permitted by WPB. Before fabrication of this tubing was forbidden in April, 1943, large quantities of it were used. Needs for this tubing by the eastern operators warrant fabricating it, and this production will contribute to worth-while economies in steel production due to the lighter weight achieved by the new specifications.

Production of the new light weights was authorized by amending Order L-211, Schedule 9. Specifications for these tubings follow:

PERMITTED SIZES OF CASING AND TUBING

Casing (Seamless and Electric Weld) Grade J-55

Size, Outside Diameter, In.	Wall Thickness, In.	Nominal Weight Per Ft., Lb.
8⅝	0.264	24.00

Standard Tubing (Non-Upset), Seamless and Electric Weld, Grades F-25, H-40, J-55 and H-80

Size, Nominal	Outside Diameter, In.	Wall Thickness, In.	Nominal Weight Per Ft., Lb.
2	2.375	0.167	4.00
3	3.500	0.216	7.70

These sizes for seamless and electric weld casing and tubing apply only to short thread casing and to standard non-upset tubing. In all respects other than wall thickness and weight per ft., such casing and tubing shall conform to the requirements of American Petroleum Institute Specification for casing, drill pipe and tubing, API Standard No. 5-A, dated May, 1942, and Supplement No. 1 thereto, dated December, 1942.

Lap-Weld Casing

Size, Outside Diameter, In.	Wall Thickness, In.	Nominal Weight Per Ft., Lb.
5½	0.304	17.00
6⅝	0.186	13.00
7	0.272	20.00
8⅝	0.304	28.00
10¾	0.307	35.75

Standard Lap-Weld Tubing (Non-Upset)

Size	Outside Diameter, In.	Wall Thickness, In.	Nominal Weight Per Ft., Lb.
2	2.375	0.167	4.00
3	3.500	0.216	7.70
4	4.500	0.237	11.00

These sizes for lap-weld casing and tubing apply only to short thread casing and to standard non-upset tubing. In all respects other than wall thickness, weight per ft., and threading practice, such casing and tubing shall conform to the requirements of American Petroleum Institute Specification for casing, drill pipe and tubing, API Standard No. 5-A, dated May, 1942, and Supplement No. 1 thereto, dated December, 1942.

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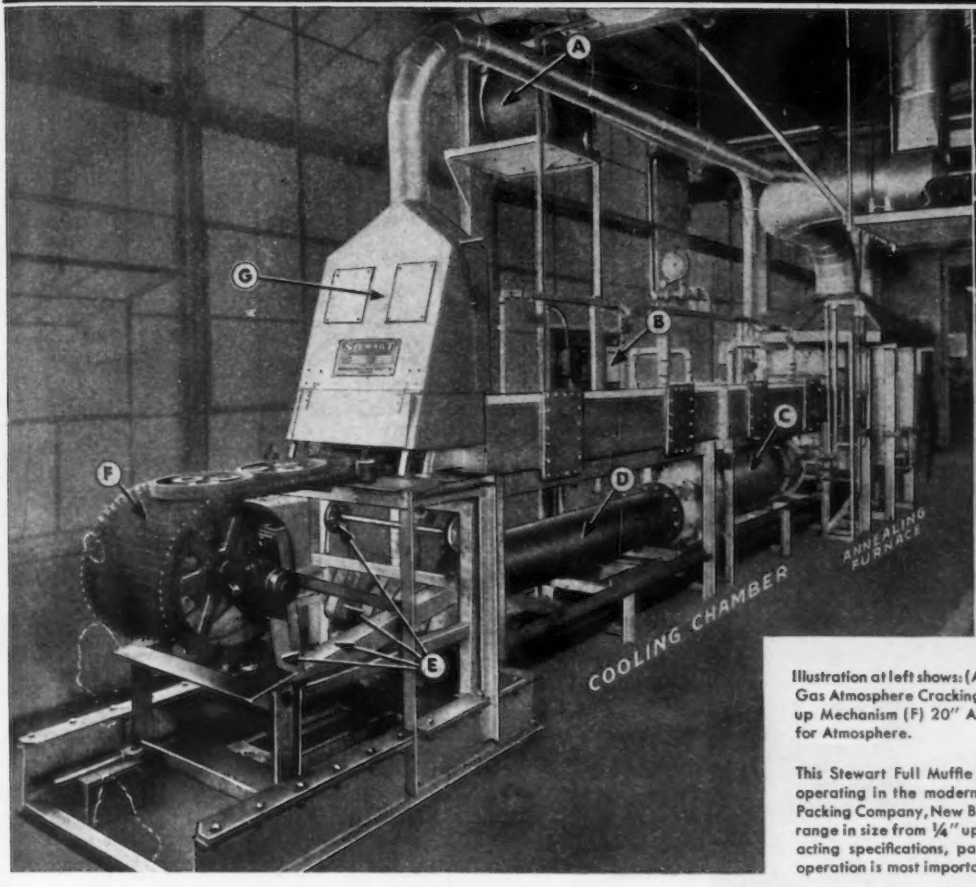

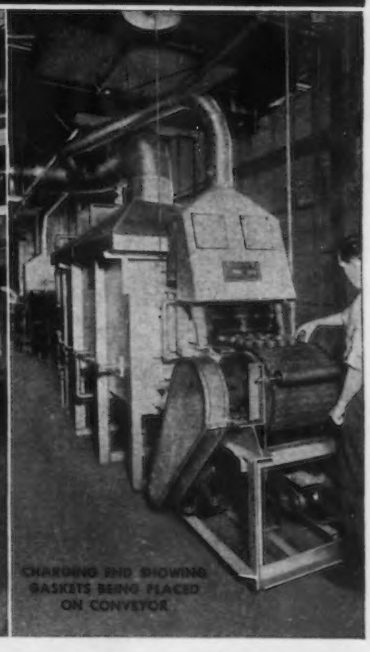

Illustration at left shows: (A) Blower (B) Strip-Chart Controller (C) Special Gas Atmosphere Cracking Unit (D) Gas Cooler (E) Automatic Belt Take-up Mechanism (F) 20" Alloy Mesh-type Belt (G) Vestibule Protection for Atmosphere.

This Stewart Full Muffle Conveyor-type Bright Annealing Furnace is operating in the modern, efficient plant of the Goetze Gasket and Packing Company, New Brunswick, N. J. Most of their solid metal gaskets range in size from ¼" up to 18". Because these gaskets must meet exacting specifications, particularly as to hardness, the heat treating operation is most important.

"Although as a usual procedure gaskets are washed and cleaned prior to going into the furnace, we can now put them on the conveyor with the oil and grease from the machining operation still on them, and they come out perfectly clean," reads a report on the operation of the Stewart Bright Annealing Furnace from the Goetze Gasket and Packing Company, New Brunswick, N. J., one of America's oldest and largest manufacturers of industrial gaskets. "We can machine the rings and anneal immediately as we have no scale or discoloration to contend with. Formerly we had trouble getting the scale off the gaskets and several men were required to do this work. The operation was hard on tools and took valuable time.

"Another advantage is the uniformity provided by our bright annealing process. We get a uniform ring every time—an important requirement of all Goetze gaskets. A third advantage is the increased production. It is possible, when desired, to get a production output far in excess of that for which the furnace was originally rated."

This installation is typical of the industrial furnaces Stewart engineers are building every day to meet the specified requirements of manufacturers all over the continent. Stewart builds, in addition, a full line of standard furnace types.

NEW FURNACE MAINTENANCE WALL CHART

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A handy, ready reference, 17" x 23" chart giving suggestions for Proper Maintenance of Industrial Furnaces—Check Points for Care and Upkeep—Repair, Replacement and Installation Procedure—Tips on Burners—Notes on How to Make Your Pot Furnaces Last Longer. Designed as an aid in keeping your furnaces in AA-1 condition and simplifying the ordering of replacement parts. Printed on special glazed-finished stock to resist dust and dirt when posted in your heat-treating department.

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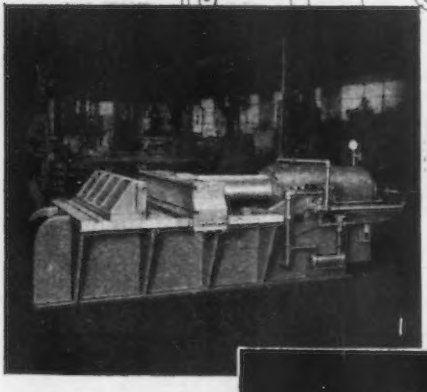
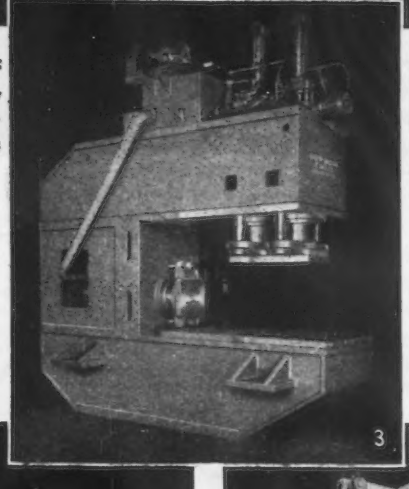
Metal Working Machines for WAR and PEACE

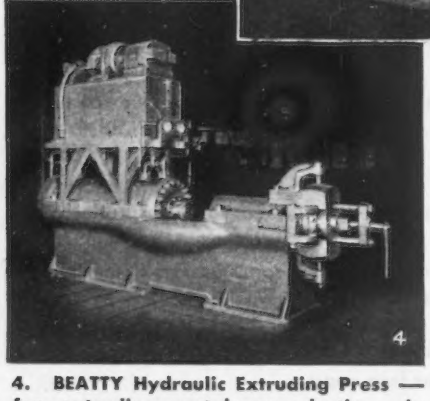


1. BEATTY Hydraulic Bulldozer. A rugged, modern design in capacities of 35-tons through 200-tons.

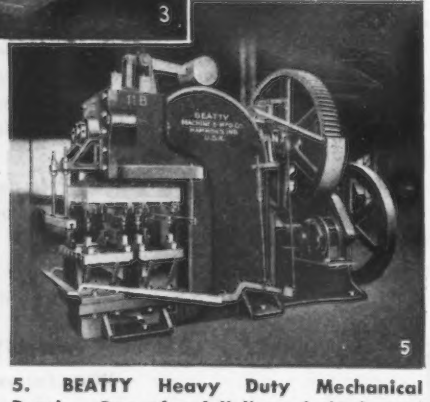
2. BEATTY Horizontal Hydraulic Bending Press. Fast, easily operated, in capacities from 35-tons through 200-tons.



3. BEATTY Hydraulic Forming & Flanging Press. Self-cooling oil circuit. Capacities of 200-tons and 400-tons.



4. BEATTY Hydraulic Extruding Press — for extruding metals or plastics. In three models, in capacities of 150-tons through 425-tons.



5. BEATTY Heavy Duty Mechanical Punch. One of a full line of single and double end punches — and spacing tables — for heavy metal working.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

Priority Changes

L-53—Simplified version of order restricts the sale or delivery of new track-laying tractors to those having specific WPB authorization. (1-21-44)

●

L-158—Amended order removes time limitation of April 1 on the use of AA-1 ratings to cover production of replacement parts for specified vehicles. (1-20-44)

●

L-185—Amended order permits both new and used direct and indirect fired water heaters to be sold to consumers for replacement and maintenance purposes without ratings. (1-22-44)

●

L-193—Amended order permits manufacturers of conveying machinery and mechanical power transmission equipment to use small amounts of carbon steel in the fabrication of such equipment in place of the substitutes formerly employed. (1-20-44)

●

L-211—Sched. 9, as amended, prescribes certain standards for the manufacture of oil country tubular goods. The schedule does not relate to use; oil country tubular goods made in accordance with this schedule may be used for any purpose. (1-21-44)

●

M-1-g—Int. 1 rules that paint manufacturers may not deliver more than one gal. of aluminum paint or other aluminum coating, or 2 lb. of aluminum pigment in any one month to any retail outlet, whether or not the outlet is owned by the manufacturer, unless the outlet can furnish ratings of AA-5 or better. (1-20-44)

●

M-9—Order supersedes M-9-a and M-9-b which have been revoked, and permits more orderly release of copper. Dir. 1 maintains a steady flow of needed grades of copper scrap and prevents the accumulation of needed copper scrap in the hands of scrap dealers. (1-19-44)

●

M-9-c—Amended order prohibits the manufacture of new brass or copper tubing, pipe or fittings for installation in gas supply and gas distribution systems. (1-21-44)

●

M-21-a—Supplementary order amended to permit producers to melt carbon steel in electric furnaces without filing schedules and obtaining permission from WPB. Dir. 4 provides that each producer must use alloy scrap in not less than specified amounts for melts in any one calendar month. (1-20-44)

●

M-21-h—Amended order revokes the requirement that producers of tool steels file melting schedules before making their melts. (1-20-44)

●

M-293—Amended order transfers jurisdiction over scheduling of steam boilers. (1-22-44)

●

M-370—Order places certain chrome pigments under complete allocation. (1-21-44)

CMP Developments

● Int. 4 to Reg. 3 deals with use of production material ratings in ordering non-controlled materials and components for advance quarter delivery.

●

● Dir. 42 to Reg. 1 removes copper or copper base alloys powders from controlled materials list beginning Jan. 1.

●

● Dir. 44 to Reg. 1 permits producers and distributors holding off-grade or rejected steel or idle and excess inventories that cannot be moved under CMP to apply to WPB for permission to dispose of same.

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to KEEP 'EM WORKING!

Everyone marvels at the speed of American production for war . . .

But how many realize that much of the credit should go to machine tool designers?

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Standard Conveyors Synchronize Production All "Along the Line"

WORK in process is quickly shunted from one machine line to the next in this effective Standard Conveyor installation. The transfer table in the foreground consisting of a section of roller conveyor mounted on wheels, provides quick easy means of shifting the work-pieces from one line of roller conveyor to another. Two machine lines are thus continuously fed with work — without halt or interruption and with a minimum of manual handling.

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•

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Sales and Service in All Principal Cities

★ ENGINEERED FOR FASTER PRODUCTION ★

Price Briefs

• Int. 1 to PR 7 points out that waivi buyers' certification does not allow seller rate an order which buyer has not attempt to rate.

•

• Int. 3 to Reg. 1 outlines cases under whi rated orders may be refused.

•

• Amdt. 2 to MPR 29 raises ceiling pric on all by-product and retort gas coke pr duced in the East by 50c. per net ton to co pensate for increased labor and coal costs.

•

• Amdt. 11 to Order A-2 under MPR 1 permits price adjustments for direct-fired g side-arm water heaters, plumbing specia brass fittings, asbestos packed plug cocks, a stove and furnace pipe and elbows.

•

• Amdt. 5 to MPR 351 provides conditio under which manufacturers of ferrous for ings may enter into adjustable pricing co tracts. (Release No. OPA-T-1652)

•

• Amdt. 1 to MPR 350 authorizes produce of packers' tin cans who sell containers coat with special enamels developed since Oct. 1 1941, to apply to the price agency for a ma mum price on such cans. (Release No. OP T-1641)

•

• Amdt. 3 to MPR 77 permits producers a distributors of beehive oven coke made Wise County, Va., to add a sum not excee ing $1 per net ton.

•

• MPR 20 has been revised making chang in ceiling prices to facilitate the movement o copper scrap and copper alloy scrap to ing makers and copper refiners. (Release N OPA-T-1655)

•

• Amdt. 2 to MPR 377 provides that begi ning Feb. 1, producers of die castings who deliveries of such items totaled less tha $100,000 during the most recent period of fo calendar quarters will be exempt from pri control. (Release No. OPA-T-1638)

•

• Amdt. 80 to MPR 120 extends to April 3 for some producers, permission to sell bitu minous coal at minimum prices allowed und the former Guffey Coal Act where those min mums exceed OPA maximum prices. (R lease No. OPA-T-1643)

COMING EVENTS

Feb. 21 to 24—American Institute of Mining & Metallurgical Engineers, New York.
March 14, 15—National Association of Waste Materials, Inc., New York.
March 27, 28—American Society of Tool Engineers, Philadelphia.
March 30, 31—American Gas Association War Conference, Rochester, N. Y.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.
Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.

Battery of "Type D" 16" 6-spindle Mult-Au-Matics machining cylinder barrels for Wright Aeronautical Cyclone Engines. On this job 5 operations are completed in one cycle of 11 minutes.

because of Production Batteries like this

Planes—Courtesy of U. S. Navy

Pictured here is one of the reasons why America is now getting the planes in the overwhelming numbers that we need. Each of these Mult-Au-Matics machines 5 airplane engine cylinder barrels at once . . . and remember that this battery is but one of scores like it, many of which are on jobs other than airplane engine work.

•

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THE BULLARD COMPANY

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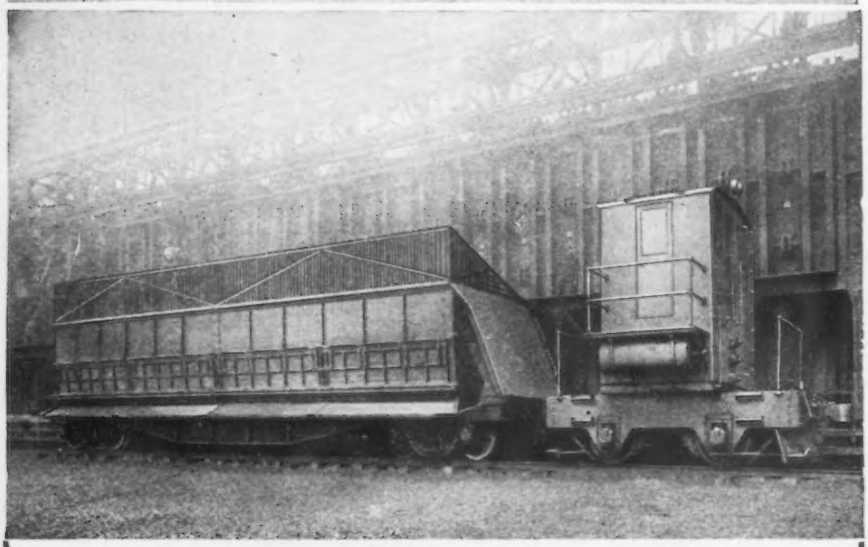
COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

Plan Now for Post-War Construction

New York

• • • **Emphasis during** 1944 in the field of industrial engineering and building will be placed definitely on design work for post-war plant conversions, expansions and additions, according to the H. K. Ferguson Co., Cleveland.

Pertinent points summarized follow:

(1) Reconversions of plant facilities already are under way in some instances. Many Government plants have shut down. Some have been converted to other purposes while others are being dismantled.

(2) Some construction materials are now available for use in sufficient quantities but controls are still being maintained by Government agencies. By late summer it is hoped that WPB releases certain items. Top military and production men will then know better material requirements for the future because the European invasion pattern will be set.

(3) A shortage of designing and construction engineers is likely to develop. Corporations should plan in detail early, because men are now available and competent organizations are intact.

(4) The peak in building costs has not yet been reached. Post-war costs will be higher per unit than war costs. A run-away market is expected once post-war building starts.

(5) It is true that the country is "over-built" in total volume of factory floor space, but the floor space is generally not located in the proper places for economical use. The reasons are legitimate, the principal one being that sites for wartime plants and sites for peacetime plants do not have the same requisites.

Maintenance Arc Welding Subject of New Lincoln Book

• • • **First volume** of its kind on maintenance welding ever to be published by the trustees of the James F. Lincoln Arc Welding Foundation, "Maintenance Arc Welding" is the second book to be developed from the 1940-42 Industrial Progress Award Program. This compilation of 25 of the most outstanding maintenance studies in the group submitted deals with the use of arc welding in reclaiming broken and worn parts and also gives details on the application of welding in the fabrication of replacements.

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HARPER fastenings add years and years to the service life of products and equipment on which they are used . . . and do it at a trifling extra first cost. They insure your product against the ravages of rust and corrosion. They resist numerous acids and alkalies . . . ocean salt . . . tropic sweat. They save hours of time and labor required to replace rusted common steel bolts . . . prevent failure of vital equipment . . . keep production rolling . . . are repeatedly removable. In certain alloys they are non-magnetic and non-sparking. 4320 items in stock. Write for catalog in 4 colors.

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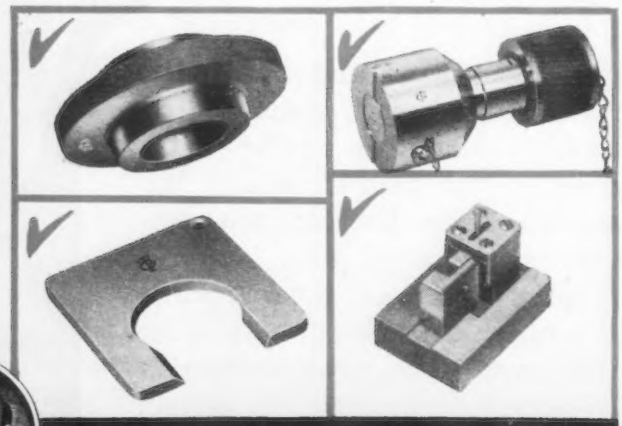

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2629 HILTON ROAD • • • • FERNDALE, MICH.

Get all the facts about PLAST-O-LOCK GAUGES

● This three-color folder is just off the press. It tells you all about Turner's new Plast-O-Lock (pat. applied for) collet type gauge. This gauge is another first by the Turner Brothers in bringing to industry an improved type of standard plug gauge that will save you time and money in your inspection department.

WPB Maps Plan to Curb Industrial Accidents

Washington

• • • **With industrial** accidents claiming the lives of a full division of production soldiers each year—some 18,000 workers—the industrial health and safety section of the WPB labor production office has announced an anti-accident campaign. The campaign will be under the direction of a National Advisory Committee representing the A.F. of L., the CIO, the U. S. Chamber of Commerce, the National Association of Manufacturers, and the National Safety Council.

In the five-point plan proposed, the committee recommended and directed that the industrial health and safety section:

(1) In conformity with agreements reached with the Federal agencies having operational authority and technical staffs, should bring to the attention of such Federal agencies problems of industrial health and safety which are interfering with war production and which have been brought to the attention of the industrial health and safety section through the channels of the WPB, and that the industrial health and safety section should enlist the cooperation of such Federal agencies, labor and management in solving such problems.

(2) Establish procedures to assure the carrying out of remedial action suggested as a result of investigation by said agencies.

(3) Attempt to promote more intelligent and widespread acceptance by labor of its responsibility in the health and safety field. In this connection it was felt that top labor officials should be contacted immediately and their support and approval of an active campaign among labor unions be secured.

(4) Help promote the establishment of plant labor-management committees on health and safety. This is to be done wherever possible in conjunction with established labor-management committees, but it was felt to be vital that health and safety committees not be closely allied with committees dealing with wages and hours or other grievances.

(5) Assist in the establishment of classes on health and safety in cooperation with the U. S. Department of Labor and the U. S. Office of Education, and assist in the dissemination of literature prepared by Federal and other agencies interested in industrial health and safety.

Metals Export Club Elects E. C. Gyllensvard President

• • • **E. C. Gyllensvard,** export manager, Sullivan Machinery Co., was elected president of the Machinery-Metals Export Club, at its recent annual meeting in New York. Other officers elected are as follows: G. S. Gildersleeve, manager, export sales, Truscon Steel Division, Republic Steel Corp., first vice-president; E. H. Gaither, export manager, B. F. Sturtevant Co., second vice-president; F. J. Muller, Business Publishers International Corp., secretary-treasurer, and K. P. Bliss, Business Publishers International Corp., assistant secretary-treasurer.

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Station Wagons That Will Meet You

Magnificent new designs, like this one, will some day be popping up very rapidly. These advanced models will be powered with modern motors that will operate economically at high speeds. Bohn engineers will be of vital importance in developing these new engines. Light alloys by Bohn will be generously used. If your product can—or should be—made of a light alloy remember the Bohn organization. This is the only large scale operation in the world which engineers and fabricates aluminum — magnesium —and brass products within the one organization.

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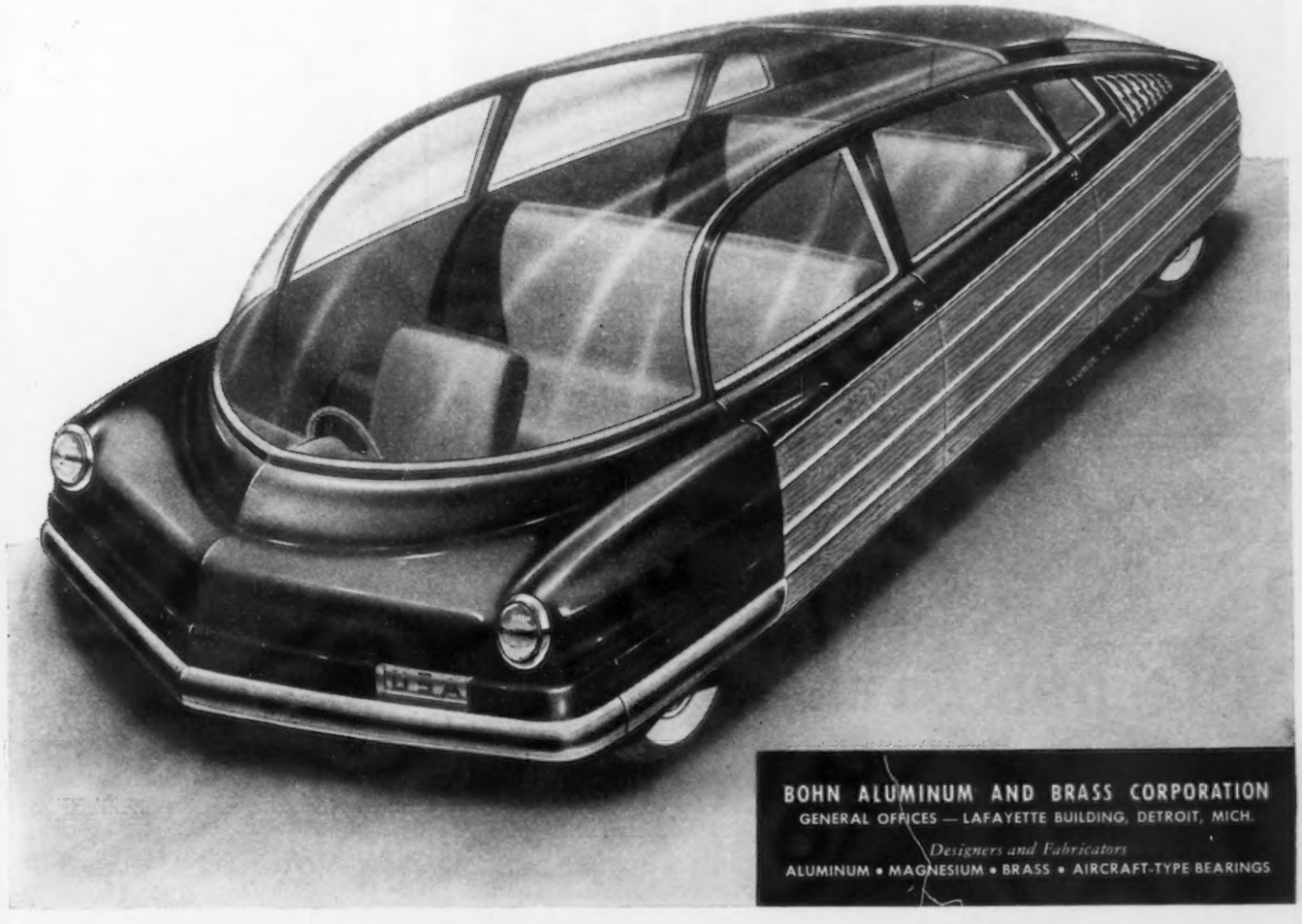

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COATESVILLE, PA.

Tool and Die Makers Plan To Stave Off Business Failure

• • • A large 1944 promotion program is being planned by the Cleveland Tool, Die & Machine Shops Association under the direction of its new president, H. L. Freeman of the Industrial Machine Co.

As explained by F. W. Denning, treasurer and manager of the Denning Mfg. Co., the plight of the small tool, die and machine shops was somewhat alleviated in Cleveland when back in the days of the depression a small group of shop owners in the area formed an organization which was to become the nucleus of the present association. The association works to keep orders coming into Cleveland and, through a spirit of cooperation, eliminates unfriendly competition. Today, these little shops all over the country have helped greatly in lining up tool programs, engineering, designing, building tools and doing their part toward keeping assembly lines running smoothly in the entire war production machine.

The association's first president was Glenn Barth, and Joe Lyons, Fay McKinney and Al Sommer became its successive presidents. The group started out as a luncheon club which met each Wednesday. In 1943 under the administration of A. L. Sommer, president of Sommer & Adams Co., the organization was incorporated. The group is also affiliated with the National Tool, Die & Machine Association which was organized under the personal sponsorship of Mr. Sommer.

At a recent election the following officers were elected to the local organization's board of directors: H. L. Freeman, Industrial Machine Co., president; R. H. Cope, Bunnell Machine and Tool Co., vice president; F. A. Schmalz, Paramount Tool Co., secretary-treasurer. Charles J. Thomas of the Cleveland Chamber of Commerce was appointed executive secretary.

New England Foundrymen Elect T. C. Weiser President

• • • T. C. Weiser, Griffin Wheel Co., Chelsea, Mass., was elected president, and M. A. Hosmer, Hunt-Spiller Mfg. Corp., South Boston, vice-president of the New England Foundrymen's Association at the 48th annual meeting in Boston on Jan. 12. Arthur W. Gibby, East Boston was reelected treasurer, and Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, secretary.

PRECISION QUALITY CONTROL
• From raw materials to finished products, our system of thorough tests and checks assures precision accuracy in the manufacture of welded steel tube, tubular parts and assemblies. Your job is held rigidly to your specifications throughout all manufacturing operations.
AMERICAN METAL PRODUCTS COMPANY
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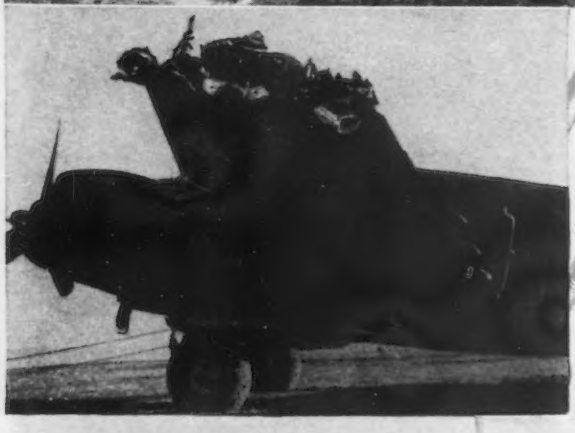
STILL BRINGING 'EM BACK-



Crippled, flak-riddled American built war planes are still bringing 'em back alive from the world's aerial battlegrounds — bringing 'em back in increasingly larger numbers to prove our supremacy of the air.

World mastery of air, land and sea can be credited to America's superior weapons, most of which are fastened with HOLTITE Screws, Bolts and allied fastenings.

Illustrations from top to bottom—Lockheed Hudson Bomber • Vega Ventura • Douglas Scout Bomber • Boeing Fortress

CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.
BUY MORE WAR BONDS

Brazil Now Supplying War Goods, Seen As Big Post-War Market

• • • "**Brazil,** mineralogically richest country of South America, can be a major post-war market for United States industry only to the extent that North America assists in the development of that country's productive possibilities," Dr. A. Allen Bates, chemical and metallurgical manager of the Westinghouse Research Laboratories said following his return from a three-month stay in that country.

"Brazil," he said, "is the most fantastically rich country in the world in iron ore—the basic ingredient of industrialization." But, he added, "Brazil's industrialization has up to now been directed toward the provision of power facilities and transport, and the metallurgical sciences are just beginning to assume the importance there that they must have if the buried wealth of the land is to be turned into a commercial asset that will alter the whole economic and cultural structure of Brazil."

As an official representative of the U. S. government, Dr. Bates was invited by the government of Brazil to study technical education methods in that country and to set up a course in metallurgy at the Escola Politechnica, Brazil's leading technical school at Sao Paulo.

He was the first of three leading American metallurgists, working under the supervision of the Stevens Institute of Technology and the CIAA, who were loaned by this nation to help Brazil utilize her vast mineral wealth to turn from an agricultural economy to one based on strong domestic industrialization.

Dr. Bates said that "as an industrial metallurgist, I was deeply impressed by the wealth of ores and minerals in Brazil. In this country, we have already used the best of our iron ores, and are steadily depleting them further at a rate not pleasant to think about.

"Brazil, however, holds in her huge area one-third of the whole world's supply of this basic raw material. She also has extraordinary opportunities for the development of the electrical power so essential for the conversion of iron ore into the steels of industry." He pointed out that North America can use the fine Brazilian ores to bolster our own dwindling supplies, in return for coal for Brazilian steel mills.

"In that case," he said, "we can also

HERE'S YOUR ANSWER TO *Accurate Radii* —

• The form produced by a radius dresser is only as accurate as the diamond used to dress that radius form. It is because Wheel Trueing engineers know this—because they know the importance of extreme accuracy and precision in radius forming operations that the diamonds used in Wheel Trueing Radius Forming Tools are selected with the greatest care according to the particular radius each is to dress.

But careful selection of diamonds alone is not enough! The diamonds in these tools are set by experts who make certain that each diamond is concentric with the shank. And throughout the various manufacturing operations, these tools are subjected to rigid tests and careful inspections by men whose skill, experience and engineering knowledge cover the fields of industrial diamonds and grinding wheels. These men know diamonds! They know the production man's problems! They know how to design and manufacture tools to solve those problems!

Next time you buy radius forming diamond tools specify Wheel Trueing! You'll be assured of utmost precision, accuracy, dependable performance and money-saving economy. You'll get radius forming tools *engineered to your jobs!*

Other Wheel Trueing products include diamond tools for straight or form dressing—thread dressing—contact gauges—and drill bits for coring or blasting.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Ave. Detroit 6, Michigan

The need for close tolerances on high speed production of war equipment has given new importance to selecting polishing abrasives. That LIONITE has been selected in hundreds of plants indicates its ability to produce uniform results at high speed and low cost. LIONITE grains are noted for their uniformity from lot to lot.

Due to tremendous expansion over the past three years, production of LIONITE grains has increased many times over. Conservation Order M-319 has now been amended so that most users of 20,000 lbs. or less of abrasive grains in a two months' period can now purchase LIONITE without allocation. LIONITE grains in practically all sizes are now available for prompt shipment from stock.

GENERAL ABRASIVE COMPANY, INC.

Lionite and Carbonite Abrasive Grains

NIAGARA FALLS, NEW YORK, U. S. A.

help Brazil by enabling her to turn the wood of her vast forests into the by-products of wood distillation—alcohols and basic organic acids—instead of burning it as fuel. In the Brazilian climate, eucalyptus trees attain a diameter of 10 in. and a height of 60 or 70 ft. only nine years after planting.

Dr. Bates, who for 10 years was a professor of metallurgy at the Case School of Applied Science, joined the Westinghouse Electric & Mfg. Co. in 1937. When wartime demands placed many metals on the critical list, he directed the intensive research which led to the development of new substitutes. His division also developed and improved a number of new alloys which have vital military applications because of their ability to withstand high temperatures.

Born in Elyria, Ohio, Dr. Bates was graduated from Ohio Wesleyan University in 1923 with a degree of Bachelor of Arts. Further study at the Case School of Applied Science brought him the degree of bachelor of science in 1925 and that of master of science in 1927. After winning a fellowship, he went to France in 1931 to study at the Ecole de Metallurgie in the University of Nancy. From 1925 to 1937 he taught metallurgy at the Case School and at intervals during that period was also a consulting metallurgist for companies in Cleveland, Detroit, and elsewhere.

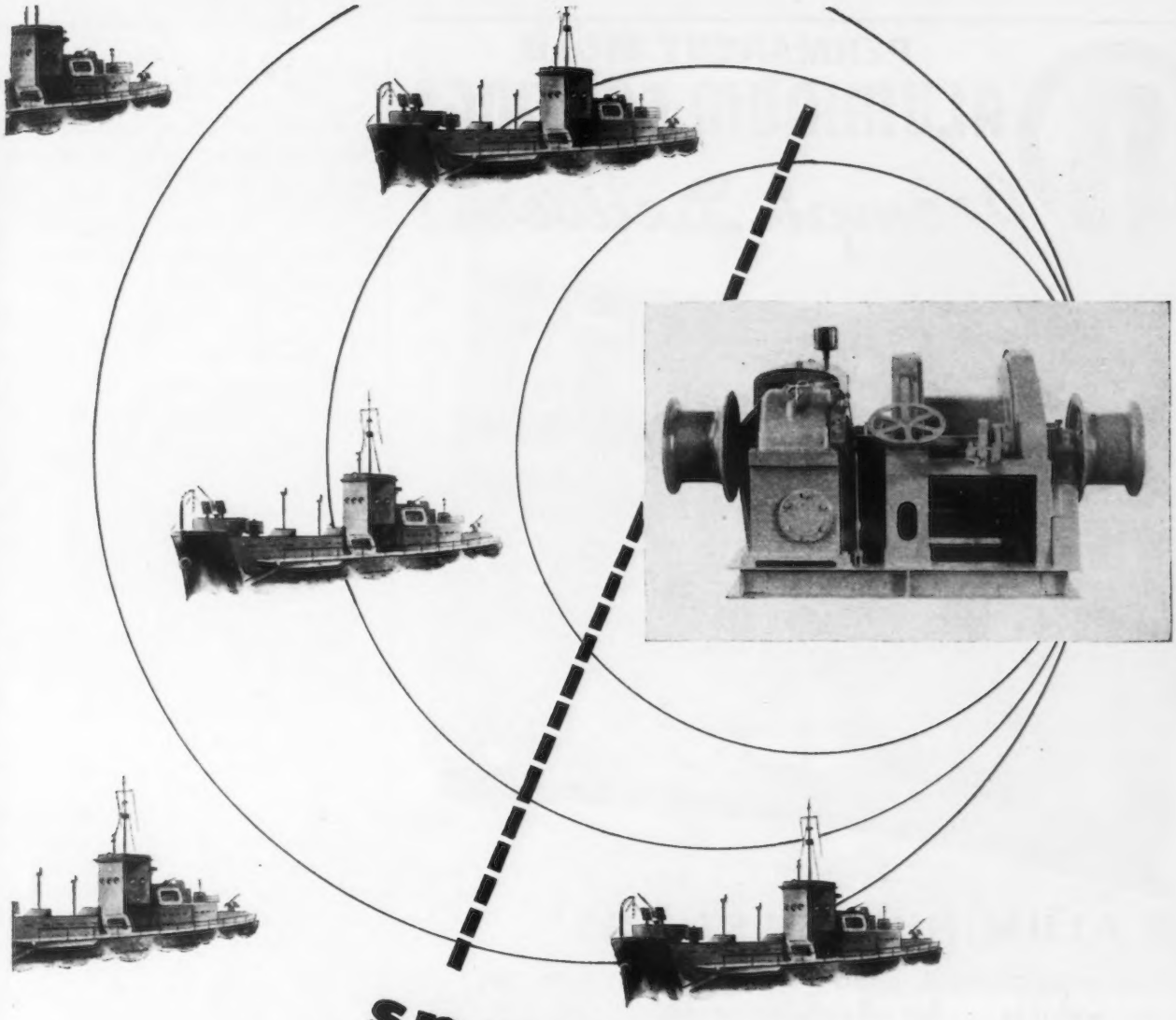
•

A **summary** by the Co-ordinator of Inter-American Affairs of the chief materials Brazil is supplying United Nations war industry follows:

Bauxite — Brazilian bauxite, described as of superior quality, with the advantages of shallow deposits and low mining costs, are being developed for export as well as for an aluminum industry in Brazil. Large deposits of bauxite are well distributed, particularly in the states of Minas Geraes, Espírito Santo, Maranhao and Para.

Beryllium—Brazil is rated the principal supplier of this light-weight mineral, which is used in combination with other metals to make heat and shock-resistant alloys especially adapted for airplane and automobile parts, surgical instruments and electrolytic processes.

Bismuth — This element, rather widely distributed in Brazil's mineral regions, is used in the preparation of alloys employed in the manufacture of electrical fuse wire, fire-fighting



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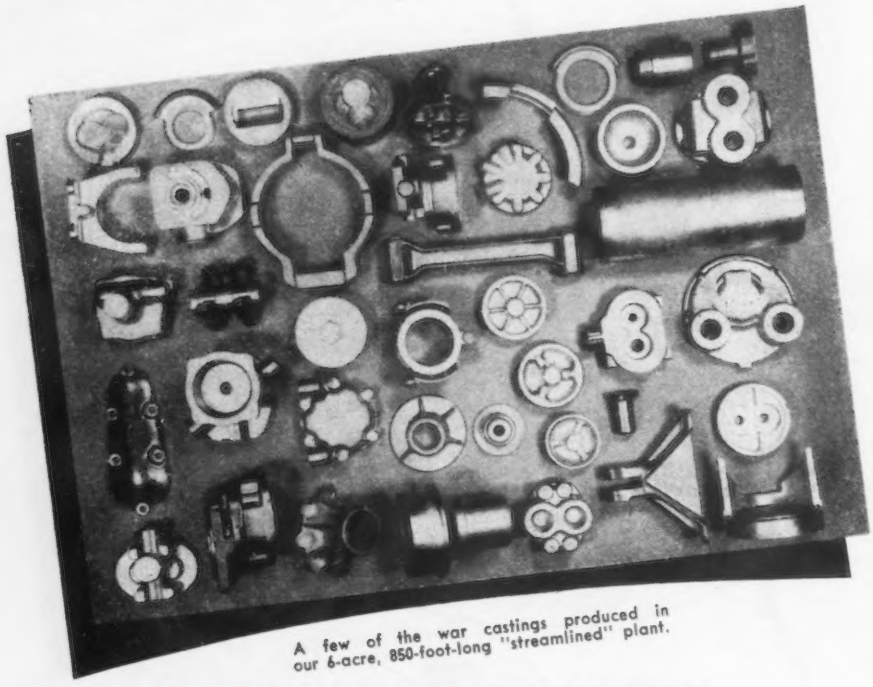

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apparatus and for safety plugs in boilers.

Corundum — Next to diamonds in hardness, corundum has an important war role in providing cutting edges and abrasives for machine tools. Geologists have located excellent deposits of corundum in Brazil to help supply war-expanded needs for this material.

Diamonds—Wartime industrial demand for diamonds makes the Brazilian deposits relatively more important than before the war.

Iron Ore—Brazil's iron ore deposits are generally recognized as among the largest known. Some deposits in the State of Minas Geraes assay as high as 90 per cent iron. Transportation is being improved to permit United Nations war industry to use the Brazilian iron deposits on a larger scale.

Steel-Making Materials — Brazil's mineral regions are productive of various materials which are used to give special qualities to steel indispensable in the manufacture of arms, farm machinery, rail and other heavy equipment. Notable among these alloying materials are manganese, chromium and molybdenum. Material for alloys has been an especially valuable contribution to United Nations war industry. Brazil's output of manganese has been expanded greatly. Also well distributed in Brazil's mineral regions are wolframite and scheelite, the ores from which tungsten is derived.

Mica—Brazil has become increasingly important as a source of high-grade mica for United Nations war industry, and is rated high in priority among United States imports, in view of the great production of electrical equipment for war purposes.

Monazite and Lithium—Along Brazil's shoreline and river banks are found sands which yield rare minerals prized for chemical uses. Brazil's monazitic sands are estimated to be the largest in the world and are the source of thorium, cerium and other rare minerals. Lithium is also derived from these rare minerals.

Nickel and Cobalt—United Nations war industry gets nickel mainly from Canada, but Brazil has substantial deposits which are being worked to some extent for wartime needs. It is one of the essentials in the manufacture of armour plate for battleships. Brazil's nickel deposits are a reserve for future use, including postwar industrialization in Brazil. Cobalt, likewise used in special quality steels, is found in Brazil in association with nickel.

ARC WELDING HIGH LIGHTS

MUREX ELECTRODES were among the first of the "hot rods" available to the welding industry. Introduced thirteen years ago by Metal & Thermit, these heavy, all-mineral coated electrodes for downhand welding were sensational because of the high currents at which they operated and the excellent, X-ray clean weld metal they produced.

Fabricators of pressure vessels, machine frames, bases and other heavy units were quick to appreciate the advantages of electrodes of this type, and to put them to use in reducing welding costs and improving the quality of welding.

Today, concerns who were among the original users of downhand Murex Electrodes are the leading producers of war materials and are making use of the high speed welding techniques which these "hot rods" make possible to turn out tanks, gun mounts, bombs and other armaments at an unprecedented rate.

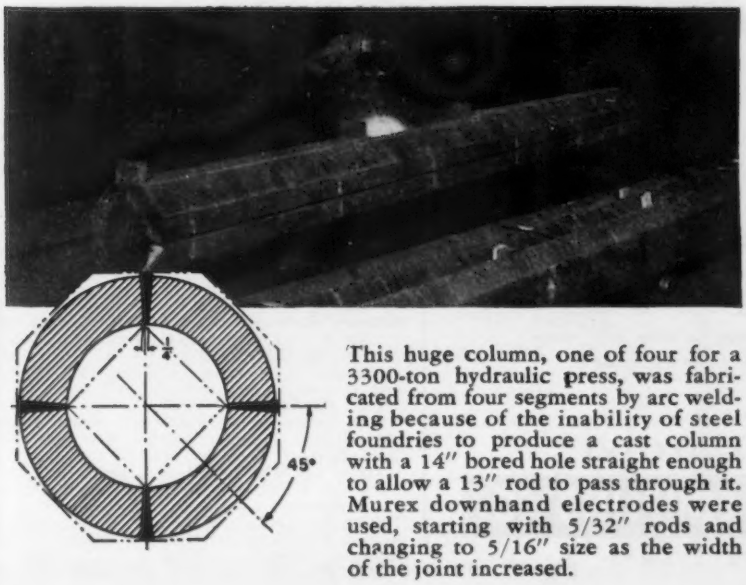
Illustrated are several typical applications—past and present—of this kind of welding.

The Murex line, of course, also includes electrodes for all-position work, for use with a.c. equipment, for welding alloy steels and for hard surfacing. Write for the Murex war time catalog.

Pressure vessels, made by Black, Sivalls & Bryson Inc. of Oklahoma City, for low temperature service in the oil refining industry, are fabricated with Murex nickel steel electrodes, chosen because of their fast downhand characteristics and high physical properties. Such pressure vessels are welded as rapidly as mild steel.

In the early days of coal mining every operation was performed by human labor and animal power. Today mechanization dominates every activity. Typical of the heavy equipment, which must stand hard and constant usage, is this Goodman Shaker Conveyor. Photograph shows welding a shovel trough of a duckbill loading head with Murex Electrodes, selected because of the strength and ductility of the deposited metal.

At the plant of the Eljer Co., Salem, Ohio, men who had become skilled in making plumbing fixtures are now turning out 1000-pound bomb casings. Photograph shows arc welding first pass on upper and lower portions of an aerial bomb. The use of downhand Murex Electrodes assures X-ray clean welds of good penetration and excellent ductilities.



This huge column, one of four for a 3300-ton hydraulic press, was fabricated from four segments by arc welding because of the inability of steel foundries to produce a cast column with a 14" bored hole straight enough to allow a 13" rod to pass through it. Murex downhand electrodes were used, starting with 5/32" rods and changing to 5/16" size as the width of the joint increased.

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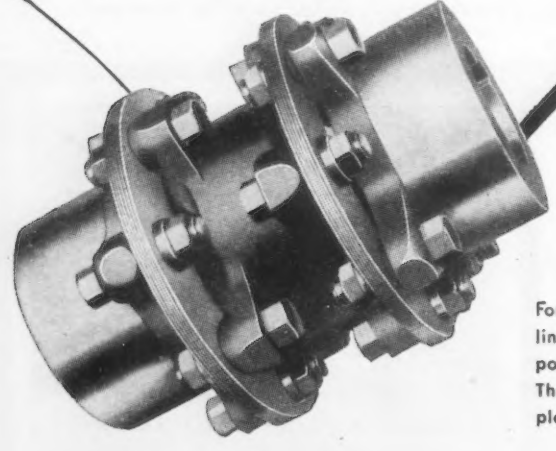

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T-5

Electric Furnace Accessories Shown In Enemy Patent List

• • • In the twelfth list of seized enemy patents available on the obtainment of a license from the Alien Property Custodian, electric furnace accessories and controls are shown. These patents deal with all types of electrically heated industrial furnaces. This series of seized patents began in the Nov. 4 issue of THE IRON AGE, where information on rules and procedures was shown.

In the items shown, the sub-class number appears first, followed by the patent number, description, inventor's name and nation, and date of patent issuance. The patent description in full may be acquired from the Government in the manner described in the Nov. 4 issue of THE IRON AGE, page 95.

Class 13—Electric Furnaces

(1) 1,690,795. Electric furnace for melting and relining metals and metal alloys and especially steel. G. Sagramoso, Italy. 11-6-28.

(1) 1,830,992. Electric arc furnace comprising a double-walled furnace shell and a wide hearth or trough with a single wall. F. Frenzel, Germany. 11-10-31.

(6) 2,071,707. Electric furnace for melting glass in which the glass is melted by means of electric current flowing through the body of glass. J. Regenstreif and O. Sorge, Germany. 2-23-37.

(6) 2,274,986. Apparatus for drawing sheet glass. G. Kilian and R. Strohschneider, Germany. 3-3-42.

(9) 1,660,159. Production of alloys of the platinum group by means of an apparatus which melts small bodies of pulverized metals in the electric arc, consisting of a supporting plate of calcium oxide and means to apply one electrode parallel and adjacent to the surface of the plate and the other electrode diagonally opposite the first electrode. E. Haagn, Germany. 2-21-28.

(11) 2,164,024. Electric arc furnace for the performance of smelting processes and reactions in the solid or liquid phases. Kurt Schneider and Herman Schunck, Germany. 6-27-39.

(11) 2,171,435. Method of and means for magnetically blowing electric arcs on metal electrodes. K. Schneider and H. Schunck, Germany. 8-29-39.

(11) 2,171,436. Method of and means for magnetically blowing electric arcs on metal electrodes. K. Schneider and H. Schunck, Germany. 9-29-39.

(12) 1,669,453. Wiring system for transformers for multiphase furnaces. H. Brock, Germany. 5-15-28.

(13) 2,248,020. Means for automatically controlling and adjusting the electrodes of an arc furnace during operation thereof. K Freudenhammer, Germany. 7-1-41.

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(14) 2,297,484. Electrode holder consisting of two spaced superposed clamping jaw arrangements. F. Lehrer and J. Wotschke, Germany. 9-29-42.

(15) 1,675,742. Electrode holder for electric furnaces. F. Weckerle, Germany. 7-3-28.

(16) 1,677,712. Electrode holder, more especially for carbon electrodes in closed electric furnaces. J. Dion, Germany. 7-17-28.

(16) 1,737,890. Apparatus and method of controlling electrodes in electric furnaces without interruption of the furnace operation. F. Noichl and E. Schmidt, Germany. 12-3-29.

(16) 2,121,578. Means for adjusting the electrodes of electric furnaces. E. Winter and F. Luckerath, Germany. 6-21-38.

(18) 1,785,587. Method of connecting electrodes by means of which the stump of an old electrode is united with a new electrode. C. Kuhlmann, Germany. 12-16-30.

(18) 1,850,515. Device for joining two sections of a carbon electrode together. G. Peltz, Germany. 3-22-32.

(19) 1,840,491. Process of manufacturing carbon electrodes for electric furnaces. O. Dietsche, Germany. 1-12-32.

(20) 1,661,694. Electric resistance furnace

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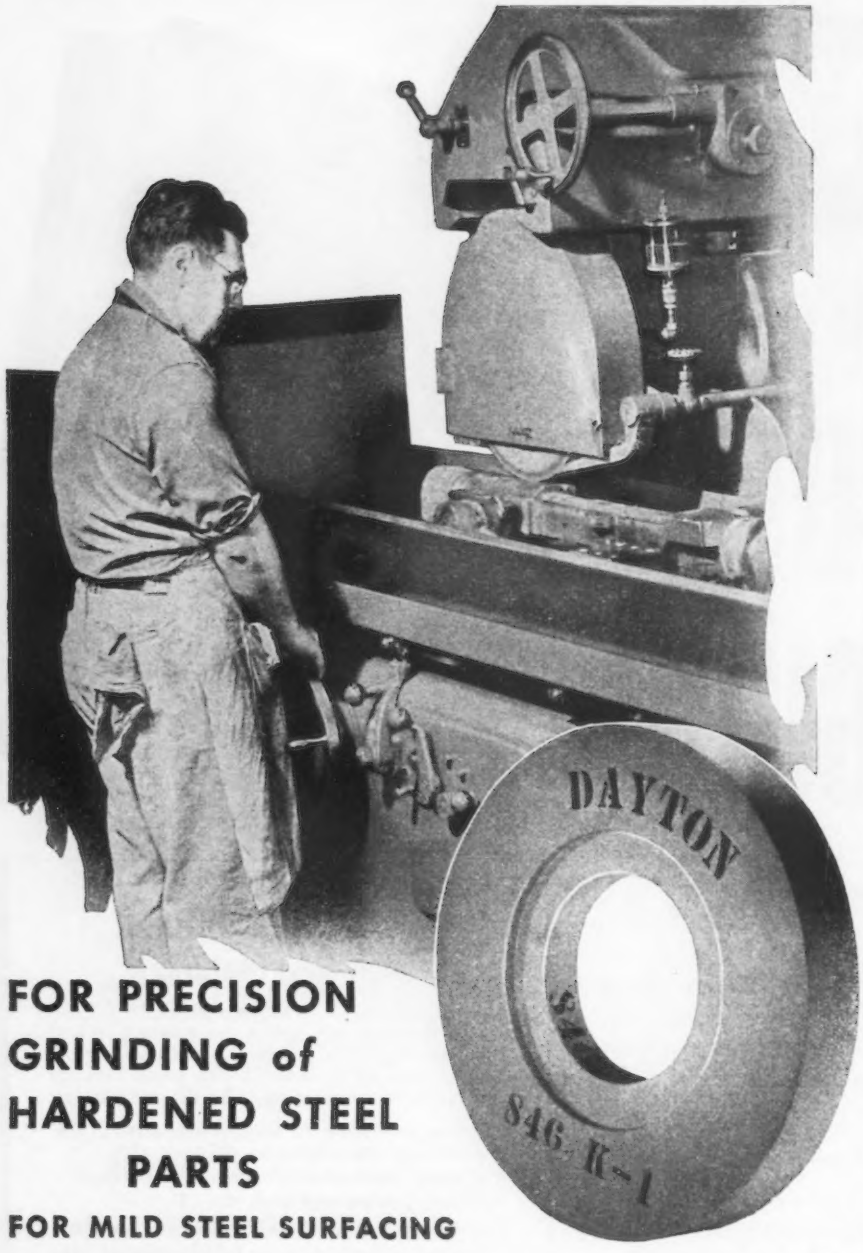

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DAYTON GRINDING WHEELS

adapted for heating by nitrogenization. A. Fry, Germany. 3-6-28.

(20) 1,700,942. Apparatus for the production of substantially pure carbon for use in the manufacture of carbon filaments of the crystalline variety to be used in incandescent electric lamps. A. Lederer, Austria. 2-5-29.

(20) 1,747,934. Apparatus for hardening products of iron, steel and other ferro-magnetic materials. W. Heidenhain, Germany. 2-18-30.

(20) 1,776,053. Apparatus for the manufacture of castings of difficulty-meltable metals and metalloids. H. Voigtlander and O. Kaufels, Germany. 9-16-30.

(20) 1,995,524. Aluminium melting furnace adapted to be tilted like a cradle to each side of the vertical central axis, consisting of two melting chambers heated from the roof and a common collection chamber for the molten aluminium. E. Russ, Germany. 3-26-35.

(20) 2,104,886. Electrically heated annealing furnace. W. Rohn, Germany. 1-11-38.

(20) 2,323,051. Electric furnace comprising a resistance heating rod, a water-cooled metal terminal connected to said rod at one end of the latter, a carriage disposed outside the furnace, current feed wires connected to said carriage and a stationary support. O. Junker, E. Breuer, K. Knauff, Germany. 6-29-43.

(22) 1,678,875. Electric bright annealing furnace, in combination, an elongated air-tight furnace shell closed at the top and open at the bottom and filled with a protective gas during the annealing operation. W. Rohn, Germany. 7-31-28.

(22) 1,678,876. Electric bright-annealing furnace for continuously bright annealing. W. Rohn, Germany. 7-31-28.

(23) 2,206,608. Apparatus adapted for metallurgy and similar fields of utilization wherein high voltage, high frequency electric current is employed. H. Kikuchi and M. Hirose, Japan. 7-2-40.

(23) 2,215,045. Apparatus adapted for metallurgy and similar fields of utilization wherein high voltage, high frequence impulsive electric current is employed. H. Kikuchi and M. Hirose, Japan. 9-17-40.

(25) 1,637,167. Electrical heating body for high temperatures especially for ceramic metallurgical processes and chemical processes. F. Weckerle, Germany. 7-26-27.

(25) 1,695,860. Electric annealing or heating furnace. W. Rohn, Germany. 12-18-28.

(25) 2,140,228. Electrically heated furnace for producing high temperatures. H. Henk, Germany. 12-13-38.

(26) 1,642,198. High-frequency furnace circuit. F. Gerth and W. Fischer, Germany. 9-13-27.

(26) 1,811,213. Furnace heated by high frequency coils, the use of which is increasingly warranted in carrying out metallurgical processes. W. Rohn, Germany. 6-23-31.

(26) 1,837,031. High frequency induction furnace or heating apparatus. V. Engelhardt and R. Gross. 12-15-31.

(26) 1,843,044. Induction furnace for melting, annealing and similar kinds of industrial heat treatment in which a part of the secondary circuit is designed as a heating element. E. Russ, Germany. 1-26-32.

(26) 1,818,341. Device for annealing of metal rings of magnetizable material. F. Linnhoff, Germany. 8-11-31.

(26) 2,041,333. Apparatus for producing carbon-free metals, alloys, and the like. H. Gruber and W. Rohn, Germany. 5-19-36.

(26) 2,090,074. Induction furnace for heating and stirring molten metal. W. Rohn, Germany. 8-17-37.

(27) 1,645,526. High-frequency electric furnace for heating or melting metals. F. Gerth, Germany. 10-18-27.

(27) 1,721,073. High-frequency induction furnace comprising a crucible and a primary coil inductively associated therewith. W. Esmarch, Germany. 7-16-29.

(27) 1,748,706. Electric induction furnace of the air-core type. W Esmarch, Germany. 2-25-30.

(27) 1,983,242. Induction furnace in which each individual coil traversed by a certain phase of the current is arranged between two coils through which the two other phases of the current are flowing. W. Rohn, Germany. 12-4-34.

(27) 2,184,741. High frequency smelting furnace. F. Hartmann, Germany. 12-26-39.

(29) 1,676,545. Induction furnace of the type in which one or a plurality of closed channels in communication with a hearth are surrounded by the transformer core or a plurality of cores. R. Gross, Germany. 7-10-28.

(29) 1,770,662. Induction furnace in which the bottom or hearth of the melting chamber is inclined and descends from the upper, smaller end of the channel to the lower,

larger end thereof. E. Russ, Germany. 7-15-30.

(29) 1,793,137. Electric furnace for the smelting of metals which have grooves filled with molten metal and terminates at the upper end in a hearth space. E. Russ, Germany. 2-17-31.

(29) 1,977,388. Electric induction furnace of the type having a pool for molten metal and walls forming a single submerged channel. H. Ilberg, Germany. 10-16-34.

(29) 2,166,734. Low-frequency induction furnace of the type having a vertical melting channel. R. Strube and W. Ewald, Germany. 7-18-39.

(31) 2,219,612. Electric reaction furnace operating under reduced pressure. B. Berghaus and W. Burkhardt, Germany. 10-29-40.

(31) 2,231,104. Electric reaction furnace having a sieve or filter provided in the gas inlet or gas outlet. B. Berghaus and W. Burkhardt, Germany. 2-11-41.

(33) 1,837,070. Apparatus for charging aluminum producing furnaces. E. Roth, Germany. 12-15-31.

(16) 1,928,854. Electrode suspension means adaptable to electrodes which are baked in the furnace in which they are used. Jean Grolee, France. 10-3-33.

(18) 1,613,212. Self-baking electrode which has a contact supplying electric current to the electrode without substantial loss of voltage. Jens Westly, Norway. 1-4-27.

(18) 1,691,505. Electrode which is baked in the furnace in which it is used, with a casing around the electrode outside the mantle, used as a mould for the electrode during the tamping. Martin Walther, Norway. 11-13-28.

(18) 1,686,474. Self-baking electrode with a shell structure. Carl Wilhelm, Soderberg, Norway. 10-2-28.

(18) 1,640,735. Process of making channeled continuous electrodes. Carl Wilhelm Soderberg, Norway. 8-30-27.

(18) 1,686,302. A means of distance handling of electrodes. Martin Walther, Norway. 10-2-28.

(18) 1,723,582. An attachment for use between the inserts and the electrode mass by giving the carbon inserts such a shape that the electrode mass may penetrate into or surround the single parts of the carbon inserts. Mathias Ovrom Sem, Norway. 8-6-29.

(18) 1,774,674. Electrode baked while in use in the electric furnace consisting of a baked and unbaked part. Mathias Ovrom Sem, Norway. 9-2-30.

(18) 2,193,434. Electrode with slide contacts. Mathias Ovrom Sem, Norway. 3-12-40.

(19) 1,639,007. Process of building up self-baking electrodes. Mathias Ovrom Sem, Norway. 8-16-27.

(19) 1,670,052. Electrode mass for self-baking electrodes. Carl Wilhelm Soderberg, Norway. 5-15-28.

(19) 1,675,674. Process for the production of carbon electrodes. Imre Szarvasy, Hungary. 7-3-28.

(19) 1,751,177. Process which avoids previous heating of the paste which is used in the manufacture of self-baking electrodes. Mathias Ovrom Sem, Norway. 3-18-30.

(19) 1,783,135. Carbon adapted for electrotechnical use and a process of manufacture thereof. Marcel Oswald, France. 11-25-30.

(19) 2,159,183. Process permitting the electrode to be lowered through its casing while in use. Mathias Ovrom Sem, Norway. 5-23-39.

(19) 2,224,739. Continuous electrode and method of supplying current thereto. Luigi Manfredini, Italy. 12-10-40.

(20) 1,734,536. Resistance type electric furnace suitable for thermic treatment of metals. Victor Sorrel and Louis Andre, France. 11-5-29.

(21) 2,089,022. Means for heating, fusing and/or casting articles made of substances having a high melting point in an electrical furnace. Henri George and Gaston Delpech, France. 8-3-37.

(21) 2,104,555. Single-phase furnace employing one or more electrical resistances which radiate heat upon the substance to be treated. Blaise Cousteix, France. 1-4-38.

(21) 2,104,557. Means for heating, fusing and/or casting articles made of substances having a high melting point in an electrical furnace. Henri George, Paris. 1-4-38.

(21) 2,214,123. Electrical furnace heated by heat radiation originating from electrical heating elements installed within the heating chamber and carried by its cover. Gaston Delpech, France. 9-10-40.

(23) 1,806,210. Electric furnace enabling the conductors heretofore used to be dispensed with and to employ the furnace casing as a conductor. Paul Louis, Joseph Migust, France. 5-19-31.

(23) 1,997,524. Electrical resistance furnace. Jean Kuntziger, Henri Delecourt and Joseph Raison, Belgium. 4-9-35.

(23) 2,304,016. Salt bath furnace for heat treatments of metals, with a view to tempering, cementation, cyaniding, annealing and the like operations. Ivan Psyches, France. 12-1-42.

(25) 2,253,981. Current supply device for resistors of electric furnaces. Ivan Psyches, France. 8-26-41.

(26) 1,743,956. Induction furnace consisting in disposing a few magnetic iron cores externally of the primary circuit. Paul Emmanuel Bunet, France. 1-14-30.

(26) 1,786,202. Apparatus for high-temperature treatment of ores and other substances. Marcel Fourment, France. 12-23-30.

(26) 1,885,966. Automatic rotary machine heating by induction. The products are heated during rotation of furnaces and ejected towards the end of each revolution of the machine. Pierre Viry, France. 11-1-32.

(27) 1,763,229. Apparatus for the treatment of gases at high temperature, with a view to obtaining a uniform temperature which can be controlled at will. Marcel Fourment, France. 6-10-30.

(27) 2,216,567. Centrifugal electric furnace plant intended for use in melting and casting or sintering in one single operation articles of ultra-refractory material. Robert Esnault-Pelterie, France. 10-1-40.

(28) 1,760,741. Magnetic-core induction furnace. Paul Emmanuel Bunet, France. 5-27-30.

(28) 1,805,469. Electric furnace of the type to be heated by high frequency currents. Rene Dufour, France. 5-19-31.

(33) 1,784,699. Automatic charging of electric furnaces. P. Miguet, France. 12-9-30.

(33) 1,807,090. Method of charging electrical furnaces and apparatus for carrying out said method. G. Pistor, Germany. 5-26-31.

(34) 1,756,457. Manufacture of objects consisting of refractory, insulating, abrasive, or like substances. M. Fourment, France. 4-29-30.

(This Feature To Be Continued in an Early Issue.)

DPC and Army Announce New Contracts

• • • **The War Department** announced Jan. 12:

Award of contract to John Bowen Co., Boston, for construction of buildings, grading, paving and utilities at Bedford Airport, Bedford, Mass. Estimated amount of the contract is $547,410. Work will be supervised by the Boston district office of the Corps of Engineers.

Authorization for construction of runway improvements, widening taxiways and extension of existing night lighting system at Brookley Field, Ala. The initial authorization is $500,000. Work to be supervised by the Mobile district office of the Corps of Engineers.

Authorization for runway construction at McClellan Field, Sacramento Air Depot, Cal. Initial authorization is $500,000. Work will be supervised by the Sacramento district office of the Corps of Engineers.

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

Tube Turns, Inc., Louisville, Ky., to provide additional equipment at a plant in Jefferson County, Ky., at a cost in excess of $145,000, making a total commitment of more than $2,000,000.

Motion Pictures Engineering Corp., Chicago, to provide equipment at a plant in Cook County, Ill., at a cost in excess of $25,000.

Higgins Aircraft, Inc., New Orleans, La., to provide additional facilities at a plant in New Orleans at a cost in excess of $3,750,000, making a total commitment of more than $29,800,000.

North American Aviation, Inc., New York, to provide additional plant facilities at Inglewood, Cal., at a cost in excess of $1,500,000, making a total commitment of more than $9,600,000.

Sun Oil Co., Philadelphia, to provide additional equipment at a plant in Toledo, Ohio, at a cost in excess of $950,000, making a total commitment of more than $7,300,000.

Ozark Ore Co., Cleveland, Ohio, to provide plant facilities at Iron Mountain, Mo., at a cost in excess of $1,000,000.

Renown Stove Co., Owasso, Mich., to provide equipment at a plant in Owasso, at a cost in excess of $45,000.

When a single hair is too thick! .

Copy restrictions forbid divulging the exact use made of these tiny springs but "electronics" conveys the idea. Wound from .018 stainless steel wire the one stumbling block to quantity production was the requirement of testing thousands daily as the allowable variation in length under load must be held to exceedingly close limits.

The device we employ—we made it ourselves—reads to one thousandth of an inch yet is so simple to operate that one girl without past experience now handles inspection with ease. Rejects are no longer a bugaboo. If *ingenuity* can help you—

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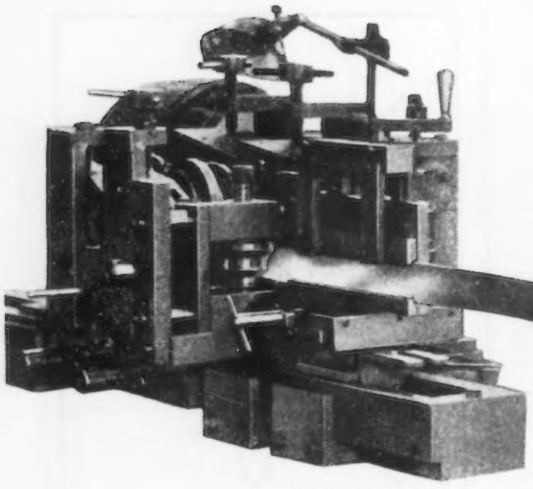

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ROEBLING FLAT WIRE pays off when it is formed, punched, sheared or drawn . . . pays off in the form of faster production, fewer rejects. It's the effect of holding dimensions *to strict tolerances,* of seeing that steel analysis is *right,* temper and uniformity *closely controlled.*

And flat wire is just one of a family of Roebling Wire Products that gets this custom-tailored treatment. With steel-making facilities, trained manpower and special production tools, we are ready to deliver either round, shaped, flat wires or strip steel that will help your fabricating machines do a better job.

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ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • FITTINGS • WIRE CLOTH AND NETTING • WIRE ROPE AND STRAND AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

New York WPB Conference Draws Big Attendance

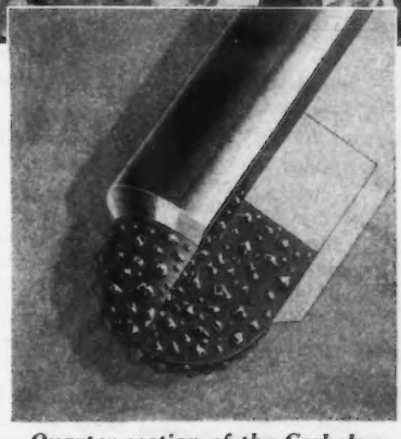
• • • **Over 1000 production engineers** and metallurgists attended the 11 industries panels held in connection with the War Production Conference held in New York, Jan. 14, under the sponsorship of the Engineering Societies Committee on War Production at the request of the WPB. It was the third and largest such joint meeting held in this area. Problems relating to metallurgy, foundry industries, welding, tool engineering, manpower utilization, chemical industries, transportation and safety were discussed. Capt. Eddie Rickenbacker was the dinner speaker. He related his experiences in visiting all world battle fronts.

Among some of the technical papers presented were several on non-ferrous foundry practice, including two on light metal alloys presented by R. E. Ward, metallurgist, and A. Cristello, foundry manager, Eclipse-Pioneer Division, Bendix Aviation Corp.; two papers on centrifugal castings, one on non-ferrous metals, by I. E. Cox, chief engineer, National Bearings Metals Corp., the other on ferrous metals, by S. D. Moxley, chief metallurgist, American Cast Iron Pipe Co., Birmingham. G. L. Ritcher, metallurgist, Farrel Birmingham Co., discussed cast iron foundry problems. The processing and selection of NE steels was the subject of a paper by Dr. N. E. Woldman, chief metallurgical engineer, Eclipse-Pioneer Division, Bendix Aviation Corp.

At the tool engineering session, Philip M. McKenna, president, Kennametal, Inc., described the progress made in the application of steel cutting carbides in recent years. He showed a high alloy steel aircraft wing hinge that had been milled at 660 ft. per min. with a chip load of 0.005 in., using a slotting saw with negative rake and negative helix angles. Surface speeds twice those commonly used for turning may be safely used for milling, Mr. McKenna said, and he indicated that a bed type miller, because of its more rigid construction, gave twice as many pieces per grind as a knee and column type machine.

Frank W. Curtis, consulting engineer, Induction Heating Corp., illustrated some ingenious fixtures designed to facilitate induction brazing and hardening of various small components. Transite, glass and plastics served very well for this type of fixture application since these materials are non-magnetic and non-conductors.

GET THIS EXTRA SERVICE FROM DIAMONDS WHEN DRESSING GRINDING WHEELS!



WHEN you use diamond-impregnated Carboloy Dressers you get extra service from every carat of diamond. Special matrix holds even extremely small particles securely. Makes possible the use of small stones—thus taking advantage of greater proportionate area of harder, tougher, outer-skin per carat. Each diamond keeps dressing right down to the last particle of usefulness—giving you as much as 90% utilization of diamond content. No need to switch to small jobs as the dresser wears. If required, you can use same dresser, throughout its life, on same size of wheel.

Carboloy Dressers give you these advantages plus elimination of all remountings—uniform, dependable results—and at least a 25% annual saving in diamond dresser costs. For rough, semi-finish, and finish dressings. Available in three sizes at $9.60, $12.60 and $15.35, including desired standard holder. Write for folder DR-100.

Quarter section of the Carboloy Dresser shown above. Fits all standard holders. No remountings necessary. To get a new cutting surface, simply give dresser a ¼ turn in holder. Long periods of continuous service. 2 minutes to "recondition" when required at infrequent intervals.

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CARBOLOY CEMENTED CARBIDE DIAMOND IMPREGNATED DRESSERS

For GENERAL USE ON GRINDING WHEELS

Re-Issued

WITH A

Distinctive New Feature

A revised edition of our Tool Manual is just off the press. It has been brought up to date and a new section added, called "Tool Wear Analysis."

Unique ways and means for determining how overall performance may be improved following visual inspection of a dull tool are described and illustrated by charts. The analysis is based on the premise that the best tool performance and maximum life between regrinds is realized when conditions are such that the dulling of a carbide tip due to edge wear and dulling due to top surface wear are maintained in balance, and at a minimum.

This new section of the Manual suggests that a check be made: First, of the prevailing grinding methods to see if they are in harmony with recommended practice; second, of the cutting speed used, to ascertain if it is within the prescribed general range for the particular material being machined. A chart is provided to show the proper relation between speed and feed, and how adjustment may be made in this respect for best results as to wear resistance on a particular job within the limits of a single carbide grade. Finally, characteristics of the several KENNAMETAL grades are given with charts provided to facilitate analysis and to determine if a change in grade would be advisable to effect improvement.

You will, of course, want this valuable manual with its distinctive new feature; it will help assure the continued efficiency of your KENNAMETAL tools. A copy will be forwarded upon request.

—●—

The revolutionary method of analysing tool wear discussed in the KENNAMETAL Manual is also available in form of a wall chart especially designed for shop and tool room use. Write for yours today.

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Trade Mark Reg. U. S. Pat. Off.

KENNAMETAL *Inc.*
144 LLOYD AVE.
LATROBE, PA.

SUPERIOR CEMENTED CARBIDES

Briefly Told—

• Cancellations during 1943 of orders held by General Electric Co. totaled more than $450,000,000, according to President Gerard Swope, while orders received amounted to $1,360,643,000. Orders during 1942 were 32 per cent higher, totaling $2,003,039,000. Unfilled orders on hand and assured business pending at the close of the year was equivalent to about a year's output at current production rates and prices, Mr. Swope said.

●

• The M9 anti-aircraft gun director, in addition to its tracker, consists of an electrical computer and a range finder, each separate but coordinated with each other. It tracks the plane, automatically calculates the lead of the guns to suit individual conditions, aims, and follows the plane flight electrically. Army officers hail the M9 director as "one of the greatest advances ever made in the art of gun fire control."

●

• With restrictions partially lifted on the Army's new M9 anti-aircraft gun director, it can now be revealed that its tracking device relies on a pair of mechanical type variable speed transmissions for accuracy in following the flight of enemy aircraft. Two modified Model 25 Graham built drives are used, one to rotate the tracker in azimuth and the other to control elevation.

●

• War plants in upstate New York have turned back nearly $25,000,000 of their war profits to the Government as a result of renegotiation of their contracts, according to Col. Frank J. Atwood, chief of the Rochester Ordnance District. In addition, the plants have paid back $9,000,000 in voluntary refunds. Excess profits developed largely because of the "difficulty in forecasting costs," according to Col. Atwood.

●

• Buffalo plants of Curtiss-Wright Corp.'s airplane division are completing contracts for P-47 Thunderbolts, reducing production of P-40 Warhawks and stepping up output of C-46 Commando cargo carriers. Despite reduction in P-40 output, more of these planes will continue to be built than in pre-Pearl Harbor days. The shifts in production are being accompanied by an increasing need for additional workers.

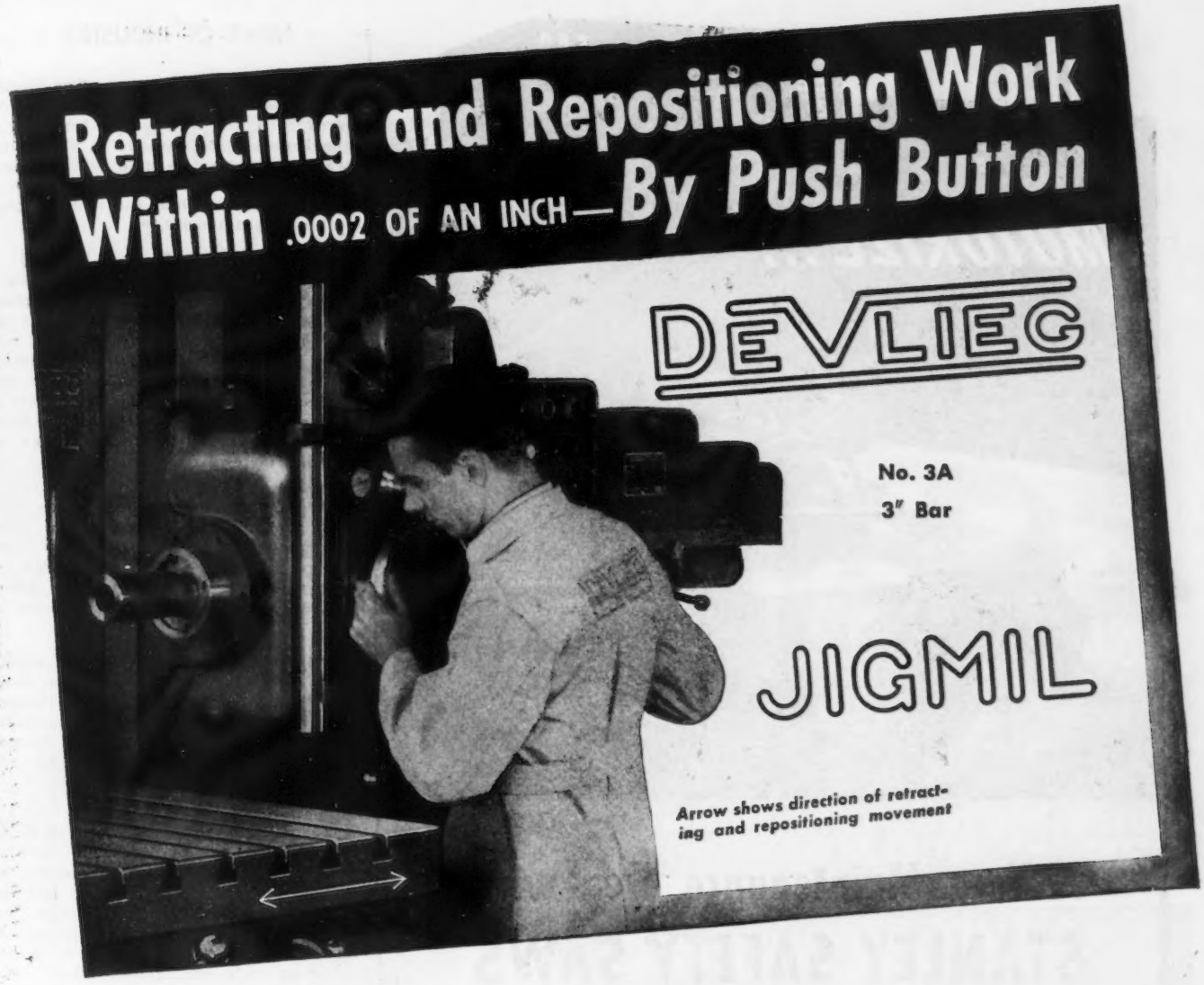
●

• Carnegie-Illinois Steel Corp. set a new production record of 22,743,000 ingot tons during 1943. New high marks in 16 blast furnace units and 25 steel-producing units were set during the year. There were also 33 new annual Carnegie-Illinois records made by rolling mills, 13 by miscellaneous producing groups and one by coke oven units. During December a new company monthly record production of over 1,150,000 tons of coke was established.

●

• In 1943 the Fore River Yard and Bethlehem-Hingham Yard launched 99 ships having a total value of $400,000,000. The ships ranged from destroyer

Retracting and Repositioning Work Within .0002 OF AN INCH—By Push Button



The most frequently needed function in a precision boring machine is that of retracting the work to facilitate measuring and tool setting.

In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

The DeVlieg Jigmil is a new type machine—has the spacing accuracy of a Jig Borer — Performance Qualities of a Milling Machine—Convenience and Flexibility of a Horizontal Boring Mill. All control is so centered and organized that the operator never has to take his eyes off the work.

Thus, the Jigmil fulfills the machine tool ideal—a powerful and accurate extension of the operator's hand.

Many machines show 75 per cent greater average daily productivity.

DE VLIEG MACHINE COMPANY

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DEVLIEG MACHINE TOOLS

...Your Maintenance Men with
STANLEY SAFETY SAWS

Maintenance crew undermanned and overworked? Give them the extra speed and power of the W8 Stanley Safety Saw and see the difference! Not only installation work, but such neglected jobs as replacement of worn stair treads, replanking of platforms and relaying floors will be brought up to date in a jiffy. The W8 Saw likes tough jobs – rips lumber up to 2¾" – balanced design and Duplex handle for use at any angle – swinging guard for continuous safety. Write for literature. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

STANLEY
TRADE MARK

STANLEY ELECTRIC TOOLS

escorts to aircraft carriers. The Bethlehem-Hingham yard produced more destroyer escorts than any other yard in the United States, while the Fore River was the only yard to build heavy cruisers. Peak employment approximated 51,000 at the two yards, while the monthly payroll averaged $16,000,000.

•

• In a letter to Premier Stalin pledging a 20 per cent production boost in 1944, residents of the Sverdlovsk district of the Urals said they boosted output 50 per cent in 1943 compared to 1942. One girl turned out 300,000 shells above her quota, it was said. Economies in fuel were made, including 88,000 tons of coke while increasing production. The Veisokogorsky iron mine saved 4,000,000 kw. in electrical energy.

•

• The Curtiss-Wright Corp.'s three manufacturing divisions produced 26 times as many warplanes, engines and propellers during the first 11 months of 1943 as during the corresponding period in 1939, an increase of 2500 per cent.

•

• More than a million American soldiers with imperfect eyesight have been made more efficient for military duties through an eye-correction program inaugurated by the Army two years ago and directed by the Surgeon General's office, the American Optical Co. said recently.

•

• To pay for the prize award of $4500 and expenses of the Museum of Fine Arts mural competition for a mural for the Museum library, the Van Norman Machine Tool Co., Springfield, Mass., recently presented the president of the Museum's trustees $5000. At a special ceremony at a Springfield Rotary Club luncheon, Charles Van Norman, chairman of the board of the company, turned over to Dr. William B. Kirkham, president of the museum trustees, Van Norman's contribution to the Museum's national competition won by Pvt. Sante Graziani, U.S.A.

•

• Thirteen thousand cases of reported sabotage, none directed by a foreign power, have been investigated by the FBI within the last two years. One case in ten was found to be actual, according to Fred Hallford, special agent.

•

• Conveyor belts tapping hitherto inaccessible mineral deposits, smaller power drives with higher efficiency, and high-pressure hose especially adapted to new x rays for trees and foliage lead the list of war-developed post-war possibilities in the rubber industry which are certain to alter peacetime America's industrial, agricultural and mining scenes, according to Goodyear Tire & Rubber Co.'s managers.

•

• With nearly 3,400,000 housing units thus far provided for essential war workers, the war housing problem has been mastered in the majority of the nation's crowded war industry centers, according to John B. Blandford, Jr., Administrator of the National Housing Agency.

•

• The late Dr. Charles Francis Brush was honored by the Navy Dec. 28, when a destroyer bearing his name went down the ways at the Bethlehem Steel Co. Staten Island, N. Y., shipyard.

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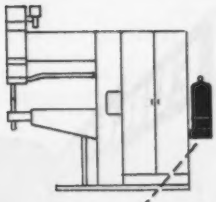
• Membership in the Gray Iron Founders' Society in December was at a new record high of 739 foundries in 42 states and Hawaii, according to W. W. Rose,

SCIAKY



announces a significant achievement in the field of electro-magnetic stored energy resistance welding . . .

a d-c current interruptor — *without arc*

DYNATROL

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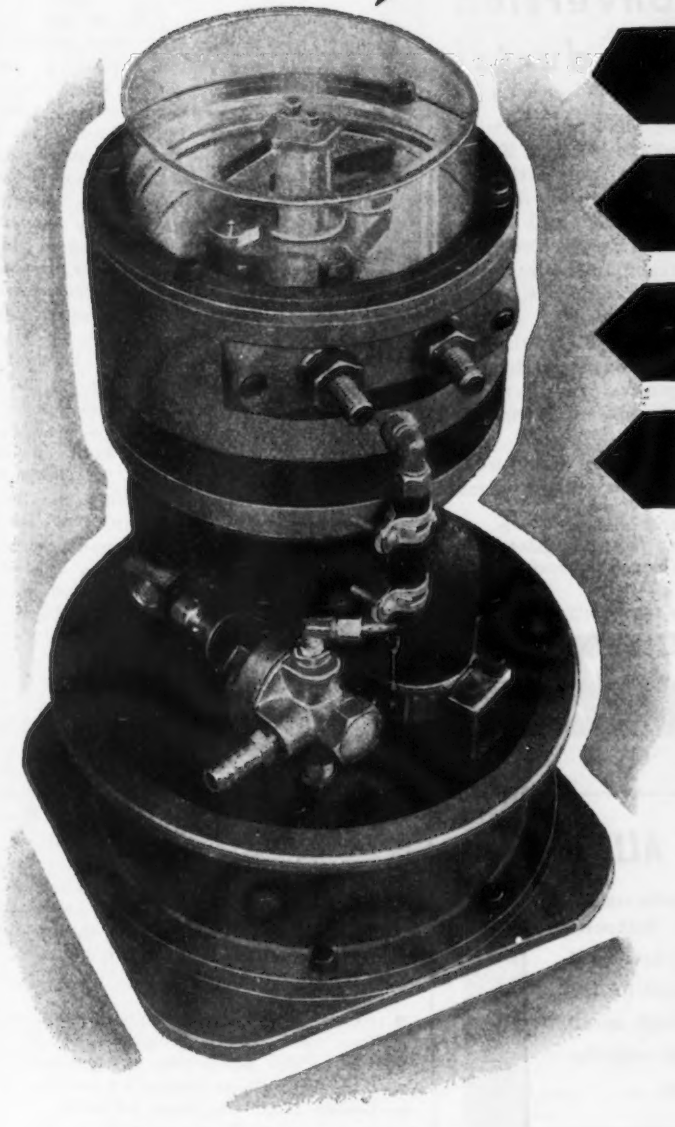

NO ROUTINE MAINTENANCE REQUIRED

ACCURATE CONTROL OF SECONDARY CIRCUIT DUE TO ABSENCE OF ARCING IN PRIMARY

INCREASED EFFICIENCY OF ELECTRO-MAGNETIC ENERGY SYSTEM — SHORTER CHARGING TIME

SPEED INCREASED 20% OVER MACHINES OPERATING ON CONTACTOR SYSTEM

THE SCIAKY DYNATROL provides the answer to contactor problems on electro-magnetic stored energy resistance welding equipment. This high-speed device performs the function of accurately interrupting the charging current to the reactor *without arc.*

The problem of interrupting a d.c. current in a highly reactive circuit has always been considered difficult because it is necessary to dissipate the electro-magnetic energy stored in the circuit in order to stop the flow of current. On former Sciaky machines, this was accomplished by a contactor unit, which together with an arc-blowing device, arc-laminating shields, etc., produced a highly accurate interruption of the charging current.

However, in industrial production, the continuous arcing finally results in a deterioration of the contact tips, requiring periodical maintenance and replacement. It was considered desirable to solve this problem in such a way that the same consistent welds be produced without any maintenance of the interrupting device. To this end, the DYNATROL was developed and was found to be not only a means of more accurate and efficient current interruption, but also, because of the shorter charging time, *actually increases operating speeds 20%.*

The DYNATROL is available on all Sciaky Stored Energy machines up to 50KW.

Descriptive bulletin 201-A ready soon. Write for your copy.

SCIAKY BROS.

Manufacturers of a Complete Line of A.C and D.C Electric Resistance Welding Machines

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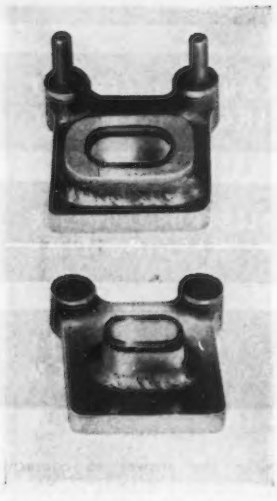
Eureka TOOL STEEL ELECTRODES

save vital tool steel for Victory

Eureka TOOL STEEL ELECTRODES

save time in Reconversion to Postwar Products!



RIGHT NOW we are all devoting 100% of our time to the winning of the war, and the Welding Equipment & Supply Company's Eureka Tool Steel Electrodes are doing their part by saving tons of *vital* tool steel, and countless man-hours. This savings is accomplished in the many industries where Eureka Tool Steel Electrodes are being used in the repair and maintenance of Tool and Die sections and the composite construction of new dies by welding.

When *peace* again prevails, Eureka Electrodes will play an equally important part in industry by helping to speed up the reconversion for postwar manufacturing by saving valuable time in the composite fabrication of new dies.

Illustrations at left show fabrication dies with Eureka Tool Steel Electrode deposits used as cutting edges.

★ *If you are making postwar plans now, we invite you to write us for complete information on Eureka Electrodes today.* ★

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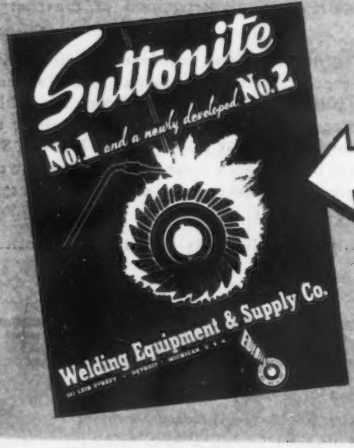


IT TELLS ALL!

For complete information on how to use Suttonite No. 1 and a newly developed No. 2, in your plant for the reclamation of high speed steel cutting tools, write for this folder today.

executive vice-president. This is a net gain of 111 during the past year.

■

• A. M. Byers reported gross sales increased 18 per cent to $24,157,136 in 1943 over the preceding year, but net profit dropped from $1,195,422 to $1,147,113 because of higher labor and material costs and taxes, which were $506,049 over 1942.

■

• A practical demonstration of foundry methods, from blueprints to finished casting, was devised recently by members of the Eastern Division of the Steel Founders Society of America and set up, together with a melting furnace in full operation, in the Hall of Prime Movers at the Franklin Institute, Philadelphia. Sample castings are poured at relatively low temperatures from the Ajax-Tama-Wyatt electric induction type furnace, and the various ways of applying gates and risers, as well as proper mold and core handling for steel and iron, are illustrated by representative castings, both finished and in the rough. Modern tool set-ups for machining iron, steel, and malleable castings are also explained.

■

• Republic Steel Corp. broke all basic producing records during 1943. Steel production averaged 100.4 per cent of capacity as compared with 99.6 per cent in 1942. Electric furnace ingot production, amounting to 1,085,000 tons, exceeded the 1,029,067-ton output of the entire industry in 1939. Republic's 1942 tonnage of electric furnace ingots was 916,000 tons. Coke output increased from 4,735,000 in 1942 to 5,109,000 tons in 1943. Pig iron output in 1942 was 5,316,000 tons and in 1943 was 5,548,000 tons. During the year Republic established 20 new steel ingot production records, 17 blast furnace records, and 22 coke records.

•

• An almost silent primer for the Mark V hand grenade has been developed, enabling American troops to throw grenades without revealing position. Development of the new primer from a shotshell primer was revealed by Winchester Repeating Arms Co., a division of Western Cartridge Co. The hand grenade primer merely sets off a fuse, whereas a shotshell primer, operating under high pressure, must ignite the smokeless powder in the shotshell. For this reason the "bang" of a shotshell primer has been reduced to a mild "plop" by a revision of the priming mixture formula. Increase in the use of grenades in close combat is focusing attention on this weapon. An article in a recent issue of *The American Rifleman* points out that considerable close combat is the order of the day. Close combat is encountered by infantry in consolidating ground gained and in jungle fighting. Grenades augment primary weapons such as the rifle in trench or foxhole warfare and where the enemy may be encountered at close quarters.

•

• WLB approved a company-wide incentive plan for Westinghouse Electric and Mfg. Co. permitting non-production workers as well as production employees to benefit from increased efficiency. The approval covers the company's 30 plants, and the plan was sponsored jointly by the company and the CIO United Electrical, Radio and Machine Workers of

"... and to my daughter, Abigail, I bequeath my good Brass skillet"

LIFE was earnest and frugal . . . inflation was a purely physical phenomenon . . . when the colonies were young. Implements of living were painstakingly made of the longest-lived materials, to last from generation to generation. And so it was, naturally, that good honest brass was wrought into kitchen utensils, warming pans, andirons, vises, tankards, table plate, and other basic necessities. These were heirlooms, often taxable, always specifically mentioned in wills, usually important considerations to dowry-minded wife seekers.

And the honest qualities that made brass a respected household servant, then, have made it a well-nigh universal servant since. To industry, in thousands of uses, brass has brought the otherwise impossible combination of advantages of strength, ductility, resiliency, with ready machinability and extraordinary durability . . . plus, when needed, a lasting decorative value that runs the spectrum from rich russet to corn-tassel gold. And it is a fact worth remarking that in many of these uses, no satisfactory substitute has ever been found for brass. For the simple reason that brass, like a faithful friend, *wears well* in every aspect of its character.

This is how brass has been regarded . . . and also how it has been made . . . for the past ninety-three years, in the mills at Bristol.

THE

BRISTOL BRASS

CORPORATION

Makers of Brass since 1850, Bristol, Conn.

STRENES METAL
IN FRONT LINE OF SERVICE

BEFORE THE WAR

Strenes can be cast to shape. Most of the usual machining time is saved. Redressing is reduced. That is why before the war Strenes scored heavily as forming and drawing die metal. In one case around 2,000,000 stampings were obtained and the die is still in good condition, ready to resume operation at the end of the war. Runs of 100,000 pieces up are not uncommon. Hundreds of the largest plants in the country used it regularly in their tooling programs. Want the names of pre-war users of Strenes?

IN THE WAR

Strenes today is being used for draw pots, draw pot inserts, draw rings for draw bench operation, for progressing upsetting dies—all in shell manufacture. Glad to identify all such users and many others.

AFTER THE WAR

After the war, refrigerator, stove, metal casket, grave vault, farm implement and other manufacturers will resume with Strenes metal forming and drawing dies. Many of the automobile, truck and tractor builders are extensive users, for body, fender and hood dies. Will name them to interested inquirers.

Look into the merits of Strenes metal—Try it, at least once.

THE
ADVANCE FOUNDRY CO.
DAYTON, OHIO
100 SEMINARY STREET

America. The plan is retroactive to April 8, 1943, and a company official said the retroactive bonus for the non-production workers would approximate $239.00 each. Non-production workers will receive no bonus until incentive workers efficiency reaches 115 per cent. At that point, they will be paid in a ratio slightly under one per cent of their basic pay for each two per cent of efficiency, above 115 per cent, reached by incentive workers in their plant.

•

• One of the Navy's newest possessions is a 10,000-k.w. mobile power plant delivered by the General Electric Co., to the Philadelphia Navy Yard for the Bureau of Yards & Docks. First of its kind, the mobile plant is one of two such units G.E. is supplying to the Bureau. It comprises six specially built railway cars housing a complete steam-turbine generating station as well as the switchgear and transformer apparatus for controlling and distributing the electric power it is capable of producing. The unit has no motive power of its own, but it can be transported quickly by rail to any point where additional or emergency power may be required and set up in 24 hours. Bunker C fuel oil is used to fire the boilers, and a sufficient supply is carried in the mobile unit for two hours operation. Generation is at 13,800 volts. The transformer included with the unit provides other voltages which correspond to those of the electric distribution system at any naval shore establishment where the unit may be needed.

•

• *An official Navy photograph made from one of the X-Ray plates taken in the case of the "human bomb," the sailor who carried an unexploded 20 mm. shell in his hip during a battle in the South Pacific, has been received by the Kelley-Koett Mfg. Co., X Ray manufacturers in Covington, Ky. Plainly apparent in the X-Ray photograph is the black and menacing outline of the 20 mm. anti-aircraft shell, which was lodged in the hip of Allen L. Gordon, Rock Island, Ill., a fire controlman. Gordon was given first aid then rushed to a Navy hospital on an island outpost. There two Navy doctors, working behind steel plate, removed the deadly missile. Navy officials report that the patient, no longer a "bomb," is recuperating satisfactorily.*

•

• The United States Rubber Co. is expanding production facilities of four major tire plants. These plants are located at Chicopee Falls, Mass., Eau Claire, Wis., Detroit and Los Angeles. More than $25,000,000 will be spent to increase the output of these plants and when completed in late 1944, tire production, in point of tonnage, will be increased more than 30 per cent above that of any previous time in company history.

•

• Production of the "chest-and-wing" section for the Navy's Corsair fighter plane has been more than tripled in the past three months by the aircraft division of Willys-Overland Motors. The increased output is due largely to the development of a half-mile station-to-station assembly line which permits rapid training of inexperienced aircraft workers. In exceeding Navy production quotas the Willys aircraft plant turned out twice as many wing sections in October as in the preceding month, and increased production an additional 50 per cent during November. The assembly line technique developed has made possible the training of new workers for specific jobs in a relatively short period, thus enabling the company to boost production.

•

• Consolidated Vultee Aircraft Corp., San Diego division, believing rivet distribution and control has long been neglected as an integral and vital part of the aviation production picture, has worked out a program of distribution which engineers estimate will save the company well over $1,000,000 annually in manpower and material. Involved are innovations in the field of packaging rivets, and personal distribution of required rivets to riveters, in contrast to older, wasteful methods wherein riveters left their work to obtain their own rivets.

•

• Canada's export trade in 1943 reached "the highest figure in history" and far exceeded imports. The total of domestic and foreign exports during the year attained the unprecedented figure of slightly more than $3,000,000,000. In other words, exports in 1943 were at the rate of $250,000,000 a month, or $10,000,000 per working day. The value of 1943 exports was more than three times greater than the value of 1939 exports, set at more than $935,900,000. Well over 70 per cent of these exports were materials used directly in the carrying on of this total war. While the great bulk of exports went to the United Kingdom and the United States, exports to the Middle East and to the Far East, both of them war zones, were enormous. Moreover exports of munitions to Russia were of unprecedented value. Exports of motor vehicles and parts, including trucks, gun carriers and tanks, showed an increase of from $26,000,000 in 1939 to $472,000,000 in 1943. Exports of guns, amounting to only a few thousand dollars in 1939, totaled $144,000,000 last year.

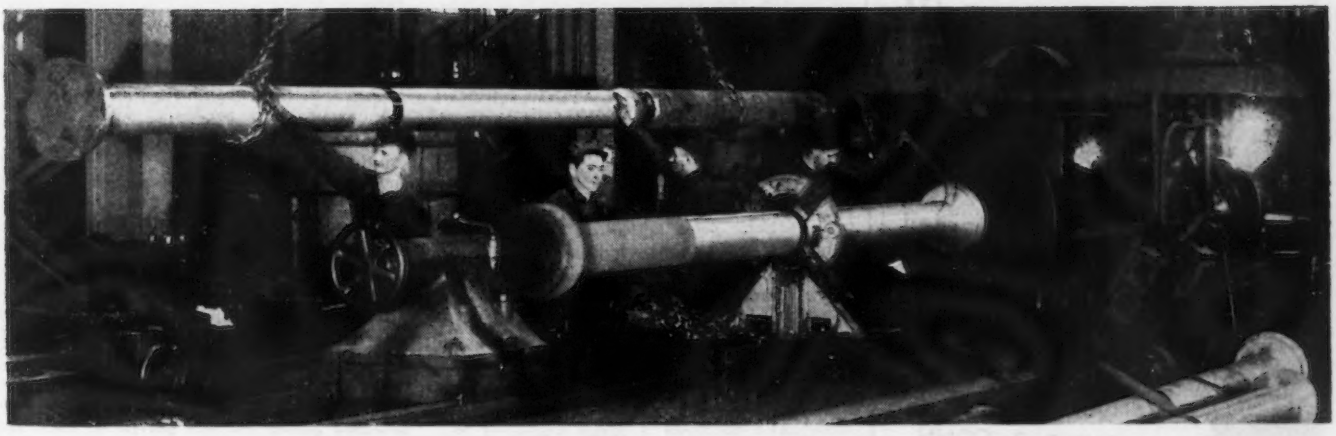
•

• National production figures for the aircraft industry for 1943, compiled by the WPB, show that Consolidated Vultee Aircraft Corp. is the world's largest producer of airplanes. Tom M. Girdler, chairman of the board, said that the company in 1943 delivered more airplanes by number and by weight than any other manufacturer. A telegram from the Aircraft Production Board, a unit of the WPB, congratulated the company on its 1943 output. The telegram disclosed that "Consolidated Vultee deliveries of more than 126,000,000 lb., including spares, compared with 115,000,000 lb. delivered by the second largest producer. The third largest producer delivered 73,000,000 lb." Mr. Girdler stated: "Consolidated Vultee delivered over 12 per cent by number and over 16 per cent by weight of all aircraft built in the United States."

•

• Prospecting for low volatile coking coal has been started on Lookout Mountain near Fort Payne in northeastern Alabama, according to Richard W. Smith, district engineer of the U. S. Bureau of Mines at the University of Alabama, Tuscaloosa. The area to be prospected contains about 140 sq. mi. If mineable quantities are found, it is expected that mines will be developed and that the coal will be used in place of that from the Pocahontas districts of West Virginia. The West Virginia

CHURNING THE SEAS *with* Barium Steels



THE first rotations of many Destroyer Escort propeller shafts occur on lathes in the shops of Barium, where such shafts are turned.

But before that, the steel itself was melted and refined in Barium's furnaces and forged under Barium's giant presses and hammers and scientifically heat treated.

Through the unified control of all these operations from the furnace to the lathe, Barium provides our fighters with propeller shafts and thrust bearings for destroyers and other vessels . . . with breech blocks and housings for light and heavy guns — all of super strength and finest quality — meeting the exacting specifications of the Armed Forces.

BARIUM

STAINLESS STEEL CORP.

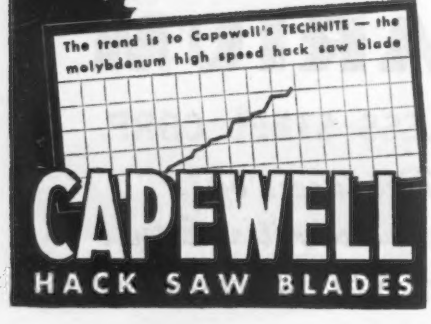
Producers of
Stainless and Alloy Steels

CANTON • OHIO

Capewell
HACK SAW BLADES
Cut Time FOR
TOOL MANUFACTURER
DOING WAR WORK

This manufacturer had difficulty finding a blade that would take the punishment of his high-speed production — six pieces of 3½" steel stock at a cut, 135 strokes. Then Capewell's Technite hack saw blade was tested. The result: orders and repeat orders. Have you investigated Capewell hack saw blades?

THE CAPEWELL
MANUFACTURING CO.
HARTFORD, 2, CONN.



CAPEWELL
HACK SAW BLADES

coal is brought into the Birmingham District for mixing with Birmingham coking coal, which is considered high volatile.

●

• A machine for bending and stretching metal parts for aircraft at a speed and economy never attained before has been developed for Goodyear Aircraft Corp. It has been put into operation at the Akron, Ohio, plant. The Roto-Stretcher, as it is called, forms parts without wrinkles due to the controlled force it exerts during operations. Costly handwork required by other methods are said to be unnecessary. One man operates the apparatus and the first machine installed at Goodyear is said to have paid for its development and cost in a single week's operation. Parts can readily be formed on the Roto-Stretcher that previously had to be formed in conventional mechanical dies. Springback, or change in shape after the part leaves the machine, is negligible, so that uniformity is assured. The Goodyear machine is being used to form parts with contours up to 360 deg., an operation thought impossible by stretch or bend methods.

●

• The Plastics Materials Mfgrs. Association reelected James L. Rodgers of the Plaskon Co. as president, and William Thiele of the Catalin Corp. as vice-president. John E. Walker will continue as secretary-treasurer of the association. The group also announced the expansion of technical activities of the association with the appointment of F. H. Carman as general manager. With a change in the by-laws of the association, a board of directors was elected for the year 1944. The members of the board are the president and vice-president and A. E. Pitcher, plastics division, E. I. du Pont de Nemours & Co.; J. C. Brooks, vice-president, Monsanto Chemical Co., plastics division; J. R. Hoover, plastic material division, B. F. Goodrich Co.; and Harry Dent, president, Durez Plastics and Chemicals, Inc.

●

• Representatives of 10 manufacturers of synthetic resin adhesives met in New York Jan. 13 and formed an association aimed primarily at "offering cooperation in utilizing synthetic adhesives for war products and unified industry action on industry-wide problems in dealing with the armed services and other government agencies. The group will be known as the "Resin" Adhesive Manufacturers Association" and includes a large share of the companies now producing synthetic resin adhesives for further sale or manufacture. The officers of the new association are: president, W. F. Leicester, vice-president, Casein Co., of America; vice-president, C. F. Hosford, Jr., president, Pennsylvania Coal Products Co.; secretary-treasurer, J. E. Waller. Mr. Leicester, the president, described the organization as a movement to coordinate the resources of the member firms in a common effort. The need for the new organization was recognized through the activities of the Plastics Materials Manufacturers' Association wherein the assistance to industry and the armed forces on those products indicated a similar service could be rendered in connection with the utilization of these adhesives. The new association includes those concerns whose adhesives are based on phenol, urea, resorcin, melamine, vinyls and alkyd resins. An important phase of the program instituted in the first meeting was the appointment of a Technical Advisory Committee including representatives of each member company.

●

• War expenditures by the United States in 1943 amounted to $85,135,000,000, as compared to the $52,406,000,000 expended in 1942, an increase of 62½ per cent, the WPB announced. The average daily rate of war expenditure in 1943 rose 61.4 per cent over 1942, from $169,100,000 to $272,900,000. The daily rate is based on the 310 days in 1942 and the 312 days in 1943 on which checks were cleared by the Treasury.

●

• Railroads handled in 1943 the greatest volume of export freight traffic on record, according to the Association of American Railroads. Export traffic is moving freely through the various ports, all of which are in a completely "liquid" condition. Cars of export freight, excluding grain and coal, unloaded at all ports in this country in 1943 totaled 1,401,186 compared with 893,576 cars in 1942. Export grain unloaded at all ports in 1943 totaled 53,204 cars compared with 30,315 cars in 1942. Coastwise freight unloaded at all ports in the past year totaled 7333 cars, compared with 30,951 cars in 1942.

●

• Aluminum will supplement but not replace steel in the postwar cars, Clinton Davidson, president, Management Planning, Inc., stated, commenting on a survey of the automotive field by the research department of his organization. The exponents of aluminum have overlooked the advantages of the new, light steels developed during the war, the details of which are a military secret. These steels are greatly superior to the heavier steels used before the war. One leading car manufacturer, according to the survey, said that no increased use of aluminum was in prospect, while another major manufacturer pointed out that they would not use more aluminum unless the price dropped to 11 or 12c. per lb., from the present price of from 15 to 20c. per lb. Twenty-five years ago experiments with aluminum bodies proved unsatisfactory and unduly expensive. Aluminum has many advantages and several major disadvantages. The factors of cost, strength and durability all favor the lighter steels in postwar cars.

●

• A total of 26,760,000 steel castings were produced during the last quarter of 1943, according to the WPB Steel Division. The divisions arrived at this conclusion by taking the total weight of all castings fabricated during the quarter—669,000 tons—and dividing by 50 lb., the estimated average weight of steel castings. Production of castings by weight over the past three years was as follows: 1941, 1,577,736 tons; 1942, 2,239,693 tons; and 1943, 2,742,604 tons.

●

• Delegation of authority has been made to the Aircraft Scheduling Unit of the Aircraft Resources Control Board to grant specific authorizations to deliver magnesium products going into aircraft and aircraft equipment. Heretofore, authorizations were granted by the WPB Aluminum and Magnesium Division on the recommendation of the Aircraft Scheduling Unit. This authority was delegated by the issuance of directive 34.

Canada's Reduced War Production Permits Manufacture of Civilian Goods

Toronto

• • • **Slackening tempo** is indicated in Canada's war production program, and is now accompanied by a swing to civilian manufacturing. Improvement in the anti-submarine campaign reduced Canada's program for the construction of frigates and corvettes. No new contracts are expected to be let for these types of craft. However, it was pointed out that the downward revision of the program will have comparatively little effect in 1944, since ships for which keels already have been laid will be completed. New contracts now being negotiated may replace work that has been cut off, but no new corvettes or frigates will be started. Last year production of cargo ships was curtailed when contracts involving upwards of $50,000,000 were cancelled. The effect of the revision will be felt gradually through 1944 and no large layoffs of men are anticipated immediately, since a large part of this year's program is already underway.

Donald Gordon, chairman of the Wartime Prices and Trade Board stated in Ottawa that limited manufacture of washing machines and home electric irons has started again in Canada and the whole field of household utensils is under examination by the board. Officials of two major washing machine companies in the Toronto area said that permits for resumption of production had been issued in December. Under present schedules output will be about 15 per cent of the 1941 total.

Restrictions on manufacture of low pressure welded steel boilers for steam or hot water heating have been lifted. Copper and brass rod may now be used in the manufacture of certain articles of plumbing equipment, and four types of pumps in five sizes, originally banned, may now be manufactured.

W. P. Bayley, secretary-treasurer of Page-Hersey Tubes Ltd., producers of wrought, black and galvanized pipe, tubes, etc., announced that the company has again entered the export markets and fair tonnages have been booked for shipment to British Empire countries. It is expected that this export trade will increase this year.

Among the Week's Trade Notes

B. F. Goodrich Co., Akron, Ohio, announces that soon after Jan. 1 it will establish manufacturing operations in DuBois, Pa. The new unit will manufacture products in which rubber and textiles are employed. The company also announced that a new manufacturing plant will be built in Miami, Okla.

•

Bethlehem Steel Co. has acquired the plant and business of Atlas Steel Barrel Corp., Bayonne, N. J. It will be operated as a division of Bethlehem Steel.

•

Oceco Division, Johnston & Jennings Co., Cleveland, has appointed General Meters & Controls Co., Chicago, as its representative in the Chicago territory.

•

Master Tool & Machine Co., 279 Public Service Building, Milwaukee, has been organized by Oscar Peterson, John Salo and Leo Zehren.

•

Irrgang Engineering Co., 744 Broad Street, Newark, N. J., has been formed by L. Irrgang to assist manufacturers as consultant engineer.

•

Precision Paper Tube Co., Chicago, has expanded its facilities to allow for increased production.

•

Edward Valve & Mfg. Co., Inc., East Chicago, Ind., has appointed Eshelman & Potter, Birmingham, Ala., and Charlotte, N. C., as its representative in the Southeastern section of the country.

•

E. D. Jones & Son Co., Pittsfield, Mass., is closing its foundry after 80 years of operations.

Ransome Machinery Co. is now a wholly owned subsidiary of Worthington Pump and Machinery Corp., Harrison, N. J. Ransome Welding positioning equipment is now available to industries through Worthington district office in all principal cities.

•

Davis Engineering Co., Worcester, has devised an automatic strut-bending and forming machine that combines three formerly separate manufacturing operations.

•

B. F. Goodrich Co., Akron, Ohio, announces that its Industrial Products Sales division has been granted national distribution rights of the Punch-Lok hose clamp and method of applying it to hose of all types, electric cable, and wire or textile rope.

•

N. A. Woodworth Co. has purchased the Suprex Co., manufacturers of precision gages, ground thread taps and form tools.

•

International Harvester Co. has created a separate motor truck division to have entire control of design, production, and distribution of International trucks. P. V. Moulder, former assistant to the second vice-president of the company, has been appointed general manager of the new division.

•

Walker Mfg. Co., Racine, Wis., has purchased the former factory building of the Jacobsen Mfg. Co. in that city as part of its postwar planning program.

•

Michigan Tool Co., Detroit, will now have factory service and sales in district offices at 1217 Grant Building, Pittsburgh 19, and 1109 Fletcher Trust Building, Indianapolis 9.

HOW TO DEGREASE MAGNESIUM PARTS

FASTER with

SPECIALIZED OAKITE MATERIALS

Are you applying Dow surface treatments or other protective coatings to magnesium airplane parts? Then you know that complete removal of dirt, grease, fabricating oils and other foreign matter is a prime requisite to the proper ADHESION and DURABILITY of the finish.

How can you obtain these essential CHEMICALLY CLEAN surfaces quickly and economically? By using Oakite Test X or other recommended Oakite material. After cleaning, microscopic examination will show that surfaces are free of ALL deposits. Moreover, SAFE Oakite wetting-out and emulsifying action will not etch, pit or abrade surfaces . . thus assuring protective coatings of maximum effectiveness.

Send for *FREE* Data!

For complete war-data on this or any other production cleaning job, write TODAY . . . no obligation, of course!

OAKITE PRODUCTS, INC.
34E Thames St., New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE Buy Bonds for Victory
Specialized cleaning
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

PERSONALS

K. E. SUTTON, manager, Wright Aeronautical Corp.'s Wood-Ridge, N. J. factory.

• **Lee Bergstrom** has been made Los Angeles representative of Joseph T. Ryerson & Son, Inc., Chicago. Mr. Bergstrom started in the steel business in Seattle at the age of 13.

• **Floyd C. Lowell,** formerly branch manager and sales engineer of the Buffalo office of Henry Prentiss & Co., Inc., is now associated with the Buffalo Machinery Co., Inc., Buffalo, as sales manager.

• **Grant Davis** has been appointed sales manager of Standard Steel Corp., Los Angeles. Previously Mr. Davis was with Lima Locomotive Works and the Koehring Co.

• **A. N. Swanson** has been appointed chief process metallurgist in the Chicago metallurgical division, Carnegie-Illinois Steel Corp. He is succeeded by **C. J. Hunter,** formerly coordinator of armor plate products in the Pittsburgh general office.

• **R. L. Sullivan,** of American Can Co., has been made vice-president in charge of the Atlantic division; **W. J. Wardell,** comptroller, named vice-president and comptroller, and **W. C. Stolk,** vice-president in charge of sales. All three executives have served most of their business careers with the company.

• **K. C. Plasterer** has been named manager of the Oldsmobile shell plant, Kansas City. He succeeds **Maynard T. Murray,** who returns to Lansing in direct charge of all shell and shot production. **Russell Trapnell** has been named plant superintendent of shell plant No. 1 in Lansing.

• **K. E. Sutton,** associated with the Wright Aeronautical Corp. since 1929 as assistant factory manager, production manager and general superintendent of its plants in the Paterson, N. J., area, has been named manager of the Wood-Ridge warplane engine plant. **A. M. Scheerer,** experimental engineer with the organization for the past eight years, has been appointed engineering manager of the same factory. Mr. Sutton replaces **A. Amundsen,** named to the same position last September.

• **W. S. Richardson,** general manager of the chemicals division of the B. F. Goodrich Co., Akron, Ohio, has been elected vice-president of the Hycar Chemical Co. Mr. Richardson succeeds **Raymond W. Albright.**

• **W. O. Lawrence, Jr.,** plant engineer of the Universal Atlas Cement Co. at Leeds, Ala., has been named assistant plant manager. Mr. Lawrence took his first post with Universal Atlas, a U. S. Steel Corp. subsidiary, in 1933.

• **A. M. Donze,** factory manager of Timken Roller Bearing Co., Canton, Ohio, has become vice-president in charge of production. At the same time, **H. M. Richey,** assistant factory manager, was promoted to factory manager.

• **Walter G. Hildorf,** recently became director of Metallurgy of the Timken Roller Bearing Co., and is the first to occupy that newly created office. Mr. Hildorf was formerly Timken's chief metallurgical engineer, a position now held by **Ralph L. Wilson.**

• **James E. Ashman** has been appointed procedure supervisor of the accounting department of Carnegie-Illinois Steel Corp., Pittsburgh. He formerly held a similar position with American Steel & Wire Co.

• **Roy E. Ward,** district manager of the Austin Co., at Los Angeles since 1925, and **Frank W. Maynard,** the company's district manager at Oakland, Cal., since 1937, have been named vice-presidents of the company.

• **Charles O. Guernsey** has now resumed his position as vice-president of the J. G. Brill Co., New York. For the past 20 months Mr. Guernsey had been serving in an administrative capacity with the Philadelphia ordnance district.

A. M. SCHEERER, engineering manager of Wright Aeronautical Corp.'s Wood-Ridge, N. J., warplane engine factory.

• **H. W. Erler,** formerly superintendent of No. 1 open hearth, Gary works, Carnegie-Illinois Steel Corp., has been appointed superintendent of No. 4 open hearth replacing **S. L. Moffatt,** resigned. **W. G. Hoffman** has been promoted to superintendent of No. 1 open hearth succeeding Mr. Erler, and **Ross Sibley** replaces Mr. Hoffman.

• **P. V. Moulder,** former assistant to the second vice-president of International Harvester Co., Chicago, has been appointed general manager of the newly created truck division of the company. **W. D. Reese,** has been made manager of engineering of the truck division, and **V. A. Guebard** has been named manager of manufacturing.

• **Henry F. Schippel** has been named manager of the aeronautical section of the field engineering department of the tire division of B. F. Goodrich Co.

• **Raymond Diaz,** formerly treasurer of Benner Chemical Co., Chicago, has been appointed supervisor of district offices of the Diamond Alkali Sales Corp.

• **Herbert L. Rawlins,** of the East Pittsburgh Works of Westinghouse Electric & Mfg Co., has been named manager of the protective devices engineering department, replacing **L. R. Ludwig,** who has been appointed manager of the motor division. Also **A. W. Hill,** design engineer, has become manager of power circuit breaker engineering.

PAUL S. KILLIAN, purchasing agent for Bethlehem Steel Co., as announced in the Jan. 20 issue, p. 86.

• **Albert Bradley**, executive vice-president of General Motors Co., has been appointed chairman of the Distribution Policy Group, which has been under the jurisdiction of **R. H. Grant**, retired vice-president.

• **R. C. Hardy** has been made district manager of General Electric's Central Station division, Cleveland. Mr. Hardy succeeds the late **Erle F. Whitney**, who had been manager for 14 years.

• **J. H. Tice** has been made district sales manager of Jones & Laughlin Steel Corp., at Tulsa, Okla., succeeding **R. J. Woods, Jr.**, who has been transferred to the Frick-Reid Supply Corp. as district manager of tube sales in Tulsa. **C. T. Hapgood** has been transferred to Pittsburgh as assistant manager of tubular products sales in charge of oil country goods, and **D. J. Ambrose** was appointed assistant district sales manager at Cincinnati.

• **L. H. Brandt**, formerly with the national ammonia division of du Pont, has joined the technical service department of the Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

• **W. E. Mackley**, of American Steel & Wire Co., has been appointed manager of the manufacturers sales department of the New York office. **F. E. Ward** succeeds Mr. Mackley as manager of sales at Buffalo, N. Y.

• **Carl L. Zak** has been appointed manager of tubular sales for Pittsburgh Steel Co., Pittsburgh. He had been secretary of the Seamless Steel Tube Institute, Pittsburgh, since 1941.

• **Charles R. Cox**, president of the National Tube Co. and of Tubular Alloy Steel Corp., both U. S. Steel subsidiaries, has been elected president of the Western Pennsylvania Safety Council. He succeeds **Raymond A. Tucker**, who continues as a director of the organization.

• **E. A. Green** has been named general assistant to the manager of General Electric's motor division.

• **Robert W. Worley** has recently been appointed to the position of chief engineer of the union drawn steel division of Republic Steel Corp., Massillon, Ohio.

• **Eugene Mowlds, Jr.**, was appointed contracting manager at Philadelphia, and **Joseph W. Small, III**, for the same position at Baltimore by American Bridge Co., a U. S. Steel subsidiary. Mr. Mowlds succeeds **Charles Rieder, Jr.**, who retired after more than 50 years of service.

• **G. W. Dolan** has been elected president of the Mathieson Alkali Works, Inc., following the retirement of **E. M. Allen**. Mr. Allen will continue to hold his office as chairman of the board of directors of the company. Mr. Dolan joined the Mathieson organization in 1930 and has held various positions of responsibility. In 1941 he was elected executive vice-president of the company.

• **Harry L. McClees**, formerly secretary of Crucible Steel Casting Co., has been elected president and **Harry Bloodsworth, Jr.**, formerly sales manager, has been elected secretary of the company.

HENRY ROWOLD, vice-president, Mack-International Motor Truck Corp.

• **Henry Rowold** has been appointed vice-president of Mack-International Motor Truck Corp., New York. Mr. Rowold joined the Mack organization in 1919. He was placed in charge of national account sales in 1939, and as vice-president will continue in that capacity.

• **W. C. Shull** has been made manager of National Battery Co.'s account sales. He succeeds **J. C. Hammond**, who leaves the battery industry to become sales manager of the Franklin Transformer Mfg Co.

• **Lt. Col. Cecil P. Young**, U. S. A., Ret., has been appointed executive vice-president of the Wickwire Spencer Aviation Corp., a subsidiary of Wickwire Spencer Steel Co.

OBITUARY...

• **George E. Hardy**, vice-president of William A. Hardy & Sons Co., Fitchburg, died Jan. 12.

• **Leonard A. Burton**, sales representative of the George F. Wright Steel & Wire Co., Worcester, since 1911, died suddenly on Jan. 11. He was born in Worcester 52 years ago.

• **Alexander O. Hoeftman**, electrical engineer and cable expert and formerly on the staff of the American Steel & Wire Co., Worcester, died at St. Petersburg, Fla., Jan. 12.

• **Clement R. H. Cunningham**, president of Crucible Steel Casting Co., Lansdowne, Pa., which he founded in 1905, died Dec. 5.

• **Albert D. Troth**, director of purchases of Sharon Steel Corp., Sharon, Pa., died Jan. 19.

• **John B. Madden**, 59, Buffalo agent for several large industrial concerns, died Jan. 9 at his home in that city. He was a former manufacturer of engineering specialties and high-pressure valves.

• **Lyle B. Yeaton**, former secretary of the Wholesale Metal Dealers Club in Los Angeles and for 24 years statistician for the Iron & Steel Warehouse industry, Cal., died at the age of 56 in his home at Los Angeles.

• **Edward E. Staley**, 72 years old, chairman of the board of directors of the Baker Mfg Co., died on Dec. 23, 1943, at his home in Springfield, Ill., after an illness of several years.

MACHINE TOOLS

. . . News and Market Activities

W. & S. to Make Bakewell Tapper

Cleveland

• • • **To prepare for postwar** markets, the Warner & Swasey Co. announces the purchase of manufacturing rights for the Bakewell tapping machine from the Bakewell Mfg. Co., of Los Angeles. To be known as the Warner & Swasey precision threading and tapping machine, its production is being transferred to the company's Cleveland plants and its sale will be handled by the same branch offices as handle Warner & Swasey turret lathes.

In the Bakewell tapper the lead screw is integral with the spindle and is engaged by two stationary brass shoes or guide fingers which are cut and re-cut by a hob of the same pitch on the upper part of the lead screw. The fingers are actuated by a solenoid mechanism. The unit is capable of cutting threads accurate to Class 5 fits on a mass production basis. Prolonged tap life is assured by a safety clutch which is adjustable for various types of material being threaded. These include plastics, aluminum, magnesium, bronze, nickel and stainless steels.

•

Machine Tools Sales to U. K. Being Put on Cash Basis

Washington

• • • **With Great Britain** tooled up for war, certain capital goods shipments to that country for peace time use are being removed from lend-lease and placed on a dollar cash basis. Included in this group are machine tools and machinery. It is said that so far exports on this basis have been relatively small and are expected to be so long as Great Britain is so greatly occupied with war conditions.

The lend-lease agreement between Washington and London is being revised to include a recently stated policy of Leo T. Crowley, head of the Federal Economic Administration, of which lend-lease is a part. Mr. Crowley maintains that Great Britain is well supplied with industrial war equipment and should pay dollars for some types of capital goods which previously were shipped under lend-lease for military production.

•

Plan A.S.T.E. Annual Meeting At Philadelphia in March

Detroit

• • • **The annual meeting** of the American Society of Tool Engineers has been scheduled for March 27 and 28, in Philadelphia, with headquarters at the Bellevue-Stratford Hotel. Technical sessions are scheduled for both morning and afternoon on the 27th and 28th as well as the evening of the 27th. The annual banquet will be held Tuesday evening, March 28.

In contrast with the last two years, no exhibition is scheduled. It is unlikely as a matter of fact that any shows will be held by the society prior to the termination of European hostilities. Plans are being projected, however, for the holding of the largest exhibition in history of production equipment, tools and machines approximately 90 days after the end of the war in Europe.

•

Postwar Clinic Held

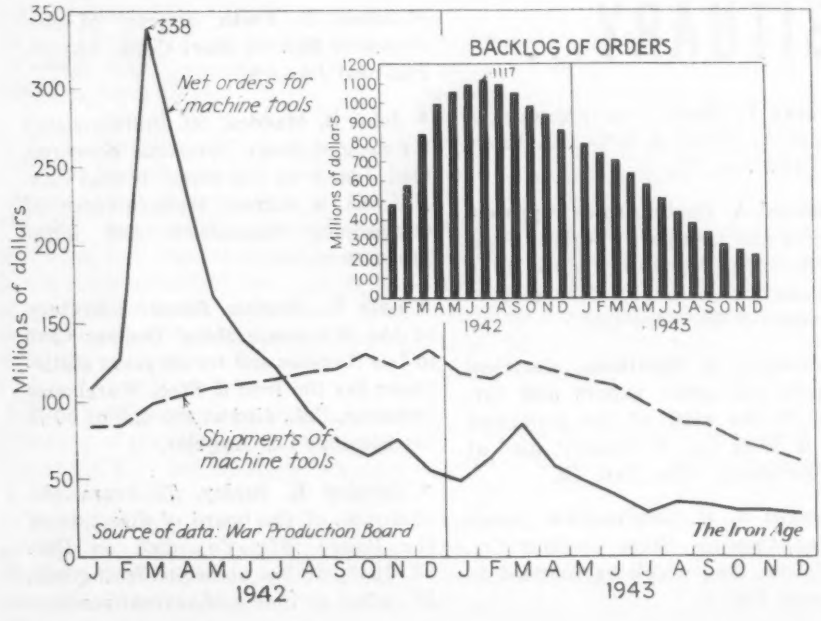
Cincinnati

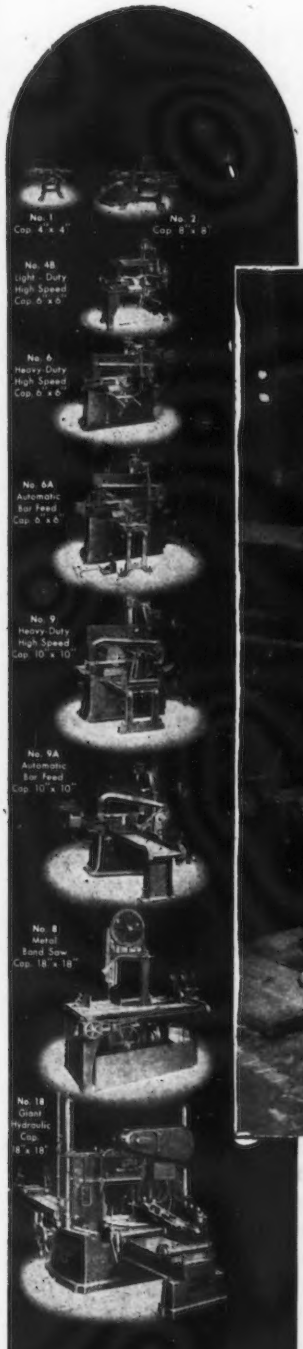
• • • **Much attention** during this present week was attracted by a war and postwar clinic being conducted under the auspices of the Cincinnati Association of Credit Men. Beginning on Tuesday of this week the clinic was to run during the afternoon and evening of that day, with the first address to be given by Frederick B. Geier, president of the Cincinnati Milling Machine Co., who is also chairman of the Hamilton County Committee for Economic Development.

Business as well as the machine tool industry is giving quite a bit of attention to this clinic, which was to discuss the entire gamut of business enterprise and taxes, with some attention given to postwar electronics and possible new items. Conversion to subcontracts for job work as well as the manufacture of complete war products is also being pushed rapidly among machine tool men in this area. A number of plants are now contracting for machine work on a job basis and the greater number of the plants are doing other than straight machine tool manufacture.

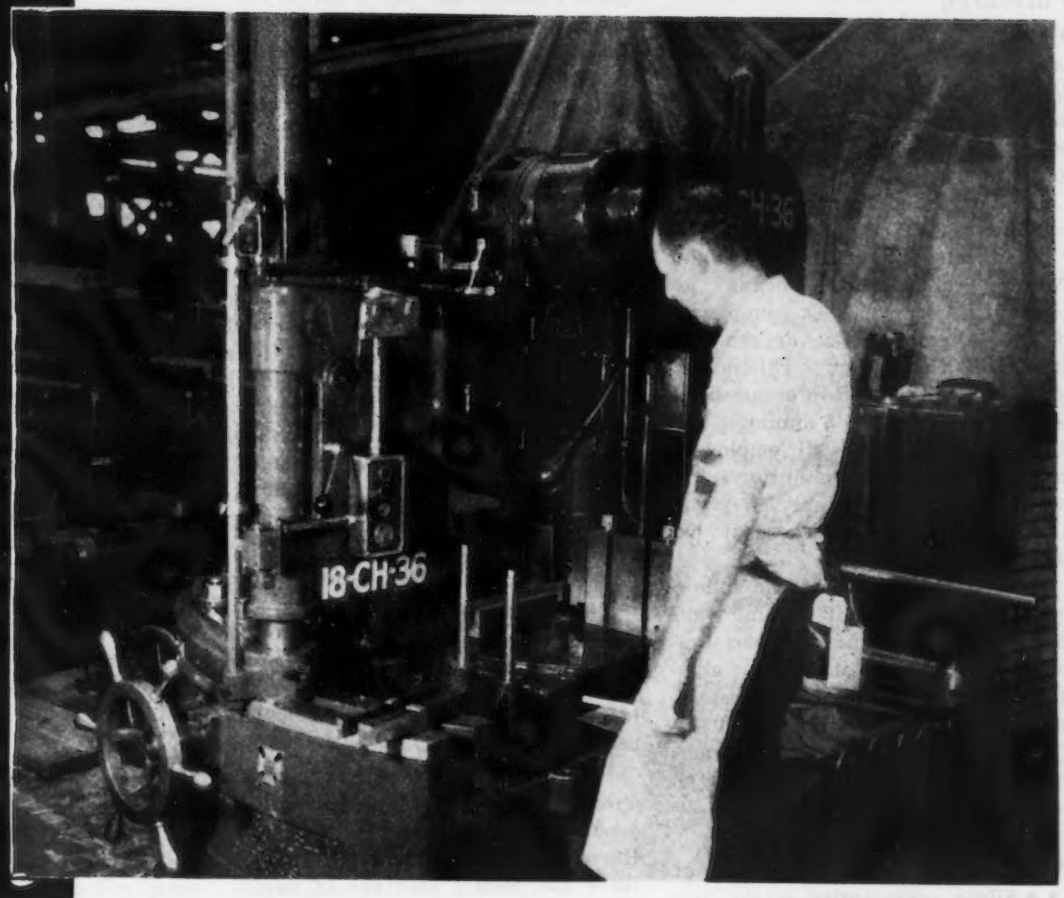
Machine Tool Backlog Dropped 14 Per Cent

The backlog of unfilled orders at the end of December totaled $211,751,000, or 14 per cent less than the November backlog of $246,509,000. Shipments of machine tools during December totaled $60,680,000, a decrease of more than 15 per cent from the November shipment value of $71,811,000, according to the WPB Tools Division. Total firm orders received in December were valued at $33,746,000, or approximately 10.5 per cent less than the November total of $37,705,000. Cancellations of orders in December were $6,942,000, or 16 per cent more than the $5,979,000 November cancellations. Net December orders were $26,804,000.





MARVEL SAWS



(ABOVE.) The MARVEL No. 18 Hydraulic Hack Saw shown in action at the Philadelphia Navy Yard cutting a test piece of heavy plate.

For Thin Tubes or Heavy Plate!

Two shipbuilding jobs—one at the Philadelphia Navy Yard and one at the New York Shipbuilding Corporation—demonstrate the wide variety of jobs that can be performed on MARVEL Sawing Machines. Producing a clean 45° mitered cut in tubing of thin cross-section, or sawing through thick sections of heavy plate are just two of the many jobs that can be turned out with speed and economy on MARVEL Saws.

Take advantage of MARVEL Free Technical Service! At your request a competent MARVEL Engineer will study your metal-cutting problems and make recommendations for increasing your metal sawing efficiency to meet the increased demands of defense production.

(AT RIGHT.) At the New York Shipbuilding Corporation, a MARVEL No. 8 Universal Tool Room Sawing Machine finds wide application in cutting bars, tubes, etc., either straight through or at any desired angle up to 45°. The machine will accommodate one or more pieces of stock up to 12" square in cross-section.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office: 225 Lafayette St., New York

NON-FERROUS METALS

. . . News and Market Activities

CIO-AWA Demands Retroactive Wages

Pittsburgh

• • • **The Aluminum Co.** of America, last week, turned down the CIO's request for a retroactive date on any wage adjustments that might be subsequently granted. The union immediately called upon the War Labor Board to decide this issue without delay.

Meanwhile, the CIO Aluminum Workers of America began negotiations for 60,000 employees of the Aluminum Co. of America throughout the country. Elimination of the North-South differentials is asked. In addition to a minimum 15c. per hr. increase for all employees, the union also wants a uniform hiring rate of 95c. per hr. in every Aluminum Co. plant where it has contracts.

Other demands include the following: Establishment of a joint wage scale committee to bring about uniformity in the wage structures; elimination of an incentive bonus system; an annual wage guarantee of 40 hr. a week; a 15-day sick leave program; and other working condition factors.

•

Peak in Silver Use

• • • **Silver consumption** in the arts and industries of the United States set a new high record of 125,000,000 oz. in 1943, an increase of 10,000,000 oz. or about 9 per cent over the previous high of 115,000,000 oz. used in 1942. In Canada approximately 4,000,000 oz. were consumed, Handy & Harmon stated in their 28th annual review.

United States consumption during the past year was more than four times the average annual amount for the five-year period prior to 1941, which was the first year in which there was any appreciable use of silver in war industries.

Of the silver consumed in the United States during 1943, about 65 per cent went into war production or for purposes classified as essential by the War Production Board. Largest single use was for photographic film, following in order of quantity by silver brazing alloys and silver-lead solders, airplane engine bearings, electrical contacts and parts, military insignia, silver-plated eating utensils for the Army and Navy and, in considerably less volume, by medical and dental products.

Production of silver-lead solders increased greatly during 1943 in order to conserve tin in the lead-tin soft solders ordinarily employed in the canning industry.

The price of silver to manufacturers increased during the past year and a half from the prewar level of 35c. an oz. to 45c. an oz., and for many purposes to 71.11c. The higher figure was established in September, 1942, by OPA for domestic silver, and in July, 1943, the Green Act raised the price to that level for Treasury silver.

The Green Act, in addition to increasing the selling price of Treasury silver to 71.11c. an oz., restricted the leasing of Treasury silver for use within the United States for a period limited to six months after the present war and permitted the use of loaned silver as backing for silver certificates.

Passage of the Green Act to make Treasury silver available came at a most opportune time, the Handy & Harmon report pointed out, because there had been a shortage of newly-mined metal for several months and the situation appeared to be getting progressively worse. In the case of foreign silver, priced at 45c., the shortage was the direct result of a decline in imports caused by Mexico's retention for increased coinage.

On July 29, WPB, acting under the terms of the Green Act, published the necessary regulations to release Treasury silver for industrial consumption. M-199 which had been amended on Feb. 25 to extend its provisions to cover domestic silver and establish monthly quotas of 50 per cent of the average used in either 1941 or 1942 for the non-essential use of such silver and amended again on May 10 to place quotas on a quarterly basis, was further changed to add Treasury silver. Three lists classified according to end use were created for foreign, domestic and Treasury silver. End-use lists were: List A (foreign silver) for medicines, photography, electrical contacts and certain priority-rated orders; List B (domestic silver) for uses considered non-essential; List C (Treasury silver) for engine bearings, brazing alloys, solders and official military insignia.

Authorization to charge the same price for semi-fabricated products made of Treasury silver as for those made of domestic silver was granted by OPA in July and during August the price increase was extended to cover solders, babbitt metal, specified mixed metals such as silver-lead solders, and scrap produced by suppliers in the course of their operations.

The higher price level for Treasury and domestic silver has created an inventory risk, the report stated, which would be lacking in normal times. Although the Treasury Department has promised to prepare an agreement whereby manufacturers will be permitted, subject to reasonable limitations, to resell to the government the Treasury silver remaining in inventory, no such protection against loss exists in the case of inventories of domestic silver.

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Copper Scrap Prices Revised

• • • **Ceiling price changes**, designed to facilitate the movement of copper scrap and copper alloy scrap to ingot makers and copper refiners were announced Jan. 20 by OPA.

Decreases in ceiling prices on the following grades of scrap on sales to copper refiners and ingot makers were announced:

Brass pipe scrap, reduced to 7.50c. a lb., f.o.b. shipping point, from 8c.

Old rolled brass scrap, reduced to 7c. a lb. from 7.75c.

Admiralty condenser tubes, reduced to 7.50c. from 8c.

Muntz metal condenser tubes, reduced to 7c. from 7.50c.

Plated rolled brass sheet, pipe and reflectors, reduced to 6.50c. from 7.50c.

These reductions are applicable only in sales to copper refiners and ingot makers.

At the same time, OPA announced specific maximum prices for two grades of copper scrap not previously priced. They are: No. 2 copper borings, 8.75c. a lb., f.o.b. shipping point, and contaminated gilding metal solids, 8.50c. a lb. Previously, these two grades had to be sold as refinery brass at ceiling prices averaging less than 8c. a lb.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

New England Brokers Predict Scrap Shortage in 1944; WPB Argues, "No"

Boston

• • • **Yardsmen and brokers** stress the dwindling supply of scrap and likelihood of a scarcity during the first half of 1944, at least. Such reports are not substantiated by the WPB and figures compiled by the Boston office of that agency bear out the contention that New England has done exceptionally well in the matter of scrap shipments to consuming mills, and will, it is believed, continue to do so.

The WPB's Boston office admits, however, that New England shipments to mills during the past year and a half have fallen below quotas, a fact ascribed to a growing shortage of labor in certain New England states brought about by the shortsightedness of yardsmen themselves, and not to a shortage of scrap.

Connecticut yardsmen, the Boston office says, "were right on the ball" so far as labor goes, long before the "little steel" formula came into being. Apparently they sensed Government regulation of wages. They raised wages far above the then prevailing rates and by so doing held their supply of labor to a nearly normal basis when Government regulation started. Elsewhere in New England, and especially in Massachusetts, yardsmen took no such precautions and labor shortages have resulted, according to the WPB.

From July 1 to Dec. 31, 1942, New England shipped to consuming mills 856,480 gross tons of steel scrap, whereas its quota for that period was 848,000 gross tons. From Jan. 1 to June 30, 1943, shipments were 832,467 gross tons, as against a quota of 833,000 gross tons. For the last half of 1943 the quota jumped to 947,500 gross tons. Shipments for July, August and September were 420,481 gross tons, and for October, November and December (estimated) 405,000 gross tons, making the total for the last half of 1943 approximately 825,866 gross tons.

Thus for a period of a year and a half New England shipped about 2,515,000 gross tons of scrap to consumers, down something like 113,000 gross tons from that period's quotas of 2,628,500 gross tons. In addition, 200,000 net tons of non-ferrous metal scrap were shipped, to say nothing of many tons of tin cans, rubber, paper and other waste materials.

New England automobile wreckers from February, 1942, to Dec. 31, 1943, produced and shipped 265,000 tons of iron and steel scrap and many hundred tons of non-ferrous metal scrap. Based on quotas, they were in fourth place for tonnage of scrap steel shipped in July, August, September, October and November.

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Consumption Totals 55,900,000 Tons

Boston

• • • **Consumption of iron** and steel scrap in 1943 reached the record-breaking total of approximately 55,900,000 gross tons. This computation is based on actual figures of the Bureau of Mines. This total was 4 per cent greater than the previous peak of 53,807,000 gross tons consumed in 1942. It compares with the peacetime top of 38,006,000 gross tons in 1937, and is more than double the best year of the first World War, which was 26,800,000 gross tons in 1917.

This 55,900,000 tons of scrap was melted in various types of furnaces with 53,856,000 tons of pig iron almost entirely for the war effort.

The 1943 melt of 55,900,000 tons of scrap breaks down into 32,100,000 tons of "home scrap," and 23,800,000 tons of purchase or open market scrap.

From 1940 through 1943, representing the defense and war period to date, consumption of iron and steel scrap was 202,358,000 gross tons, more than the entire period of 1930 to 1937, inclusive.

The melt of scrap in 1943 represented an average of 860 pounds for every person in the United States.

Lieut. Thomas R. Allen, Jr., son of Thomas R. Allen of Continental Iron & Steel Co., New York, has been reported missing in action over Germany while piloting a Consolidated Liberator bomber. Graduated at Blytheville, Ark., on July 28, 1943, he was transferred to England last November.

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BOSTON—Supply of production scrap continues to fall off and yards are handling comparatively little other material. A check by the Boston & Albany Railroad on yards it serves shows that rail shipments are less than 50 per cent of normal. Demand for cast in general is many thousand tons short of supply. One Boston foundry alone is in the market for 3000 tons. Supply of breakable cast has hit an all-time low level.

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BIRMINGHAM—No pickup in demand for material is noticeable in this district. Even special foundry and electric furnace grades originating in the Birmingham switching area cannot be sold at present to Birmingham consumers.

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CINCINNATI—The market in this area is spotty, with but a few grades in fair demand. Cast grades and rails for melting are receiving a good bit of attention from consumers, but dealers declare that the volume of business is off considerably. Some modest demand, a trifle above the market average, is indicated in industrial types of scrap and, by and large, dealers indicate that demand, so far, is being met.

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CLEVELAND—Local buying has practically stopped, but substantial tonnages are moving to Youngstown, Warren, Farrell, and the Canton-Massillon area. Inflow to yards is poor. Some blast furnace scrap is moving locally. A railroad embargo on scrap has taken the present major consumer of turnings out of the market for an undetermined length of time.

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PHILADELPHIA — Demand for open hearth grades has increased substantially this past week as inventories of several mills have gone down to low levels. Low phos sales continue weak and sales have been made in some instances at 75c. per ton below the ceiling price. In spite of WPB's order releasing some alloy grades for carbon steel production, no consumers have been taking the alloys permitted.

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BUFFALO—The district's leading consumer was in an easier scrap position this week because of allocations from Michigan, Pennsylvania, and New England. This consumer has been operating on a three-week reserve for some time. Yards were busy as a result of getting 80 per cent of the district's record-breaking industrial salvage for processing before delivery to consumers. Truck loads remain negligible. Wickwire was out of the market for a week owing to a shutdown of all open hearths.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.00	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles: No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.; at Memphis, 50c.; Great Lakes ports, $1; New England, $1.25. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.00	24.00	24.25	24.50
Chicago, Philadelphia Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21 00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.105
Type 5*	0.135	0.115

*Per lb. of scrap material.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Jan. 25, 1944	Jan. 18, 1944	Dec. 21, 1943	Jan. 26, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Jan. 25, 1944	Jan. 18, 1944	Dec. 21, 1943	Jan. 26, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)	Jan. 25, 1944	Jan. 18, 1944	Dec. 21, 1943	Jan. 26, 1943
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 141-153.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Jan. 25, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[3]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[2]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50} Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75} Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)		(Weirton = 2.80¢)				2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢a	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢g	2.10¢		(Bethlehem = 2.10¢)			2.45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.972[8]	$5.018a	$3.922	$4.772	$3.605	$3 666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3 758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.114	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.811[3]	3.811[3]	3.761[3]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.59	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10c	$2.00	....	....
NE 1335	.33/ .38	1.60 1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	....	....	....	.10	2.00	....	....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15 00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ 60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	....	....	....	.40	8.00	....	....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80 2.20	....	....	....	.40	8.00	....	....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80 2.20	.10/ .25	....	....	.65	13.00	....	....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	....	....	.65	13.00	....	....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15 00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1 25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30 .60	.08/ .15	.75	15.00	1.25	25 00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25 00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ 60	.08/ .15	.75	15.00	1 25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16 00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(*Per lb. base price, f.o.b. Pittsburgh*)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

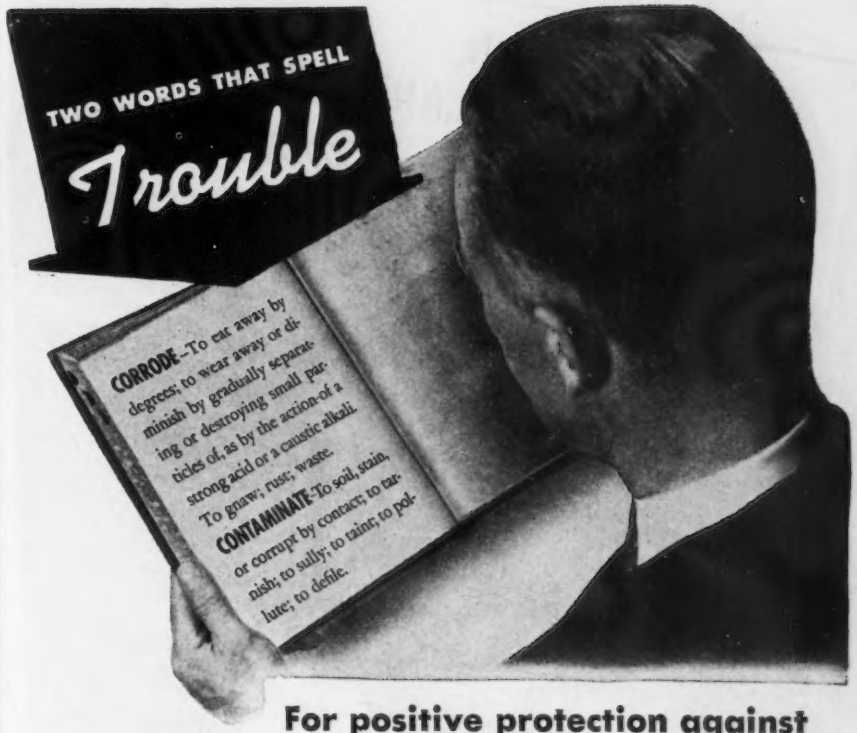
Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.



For positive protection against

CORROSION & CONTAMINATION

Amercoat Plastic Coatings!

Delays, expense, waste . . . that's the price paid in many a business when corrosion attacks critical materials and equipment, or contaminates vital war and food supplies. These costly hazards are eliminated by Amercoat, the approved thermoplastic coating for metal, wood or concrete. Amercoat provides *dual* protection. It protects tanks, tank cars, machinery, buildings, floors, walls, equipment and containers of many types from corrosion by acids, alkalies, chemicals, brine, water, air and other corrosive agents. Amercoat also protects foods, beverages, gasoline, oil and many other essential supplies from contamination by the products of corrosion.

Amercoat is odorless, tasteless, chemically inert. It adheres tightly, is hard and impenetrable. Resists abrasion, withstands moderate expansion, contraction and vibration without checking or cracking. Dielectric; low water absorption.

If you have a corrosion or contamination problem, get the facts about Amercoat. Write for booklet describing its many uses.

EASY TO APPLY

Amercoat is quickly sprayed or brushed on metal, wood or concrete

PARTIAL LIST OF INDUSTRIES USING AMERCOAT

Chemical	Beverage	Photographic
Sewage Disposal	Dairy	Fishing
Wine	Maritime	Transportation
Soap	Mining	Brewing
Hospital	Petroleum	Distilling
Food	Construction	Shipbuilding
	Laundry	Concrete

Amercoat

Division of AMERICAN PIPE AND CONSTRUCTION COMPANY

P. O. BOX 3428, TERMINAL ANNEX • LOS ANGELES, CALIF.

Canadian Dist.: Gunite & Waterproofing, Ltd., Montreal, Quebec.

HOW AN AUTOMOBILE PLANT CONVERTED *from Cars to Cartridges*

HERE'S another plant conversion in which A-F Conveyor Engineers cooperated with a deep feeling of pride and achievement.

To convey the component cartridge parts in tote boxes to remote restricted areas, an A-F Overload Conveyor System, over 12,000 feet in length, was installed. A similar, but shorter, A-F Conveyor System also conveys cartridge links.

This "Scientifically Planned" A-F Overhead Conveyor System frees valuable floor space and aisleways for other purposes, while constantly supplying employees with parts "from the air" in an endless stream.

Equipped with 7 synchronized caterpillar drives, such a conveyor system can be increased to almost indefinite lengths by adding additional drives, all operated from a central station.

★ WHEN *YOUR PLANT CONVERTS BACK TO* PEACE-TIME PRODUCTION—*WRITE A-F*

Since 1901, our engineers have helped hundreds of leading plants to convert to war, then back to the production of their regular or new peace-time lines. Let us help you obtain peak post-war production quickly and efficiently with an A-F Scientifically Planned Conveyor System and A-F Metal Products Cleaning and Finishing Equipment. Write today.

THE ALVEY-FERGUSON COMPANY, 708 Disney St., Cincinnati 9, Ohio

Affiliated Corporation, The Alvey-Ferguson Co. of California, 2300 East Slauson Avenue, Post Office Box 396, Vernon Branch, Los Angeles 11, California

CONVEYING EQUIPMENT

A-F CONVEYING MACHINERY **Alvey-Ferguson**

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $34.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	Pacific Ports
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	Pacific Ports
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

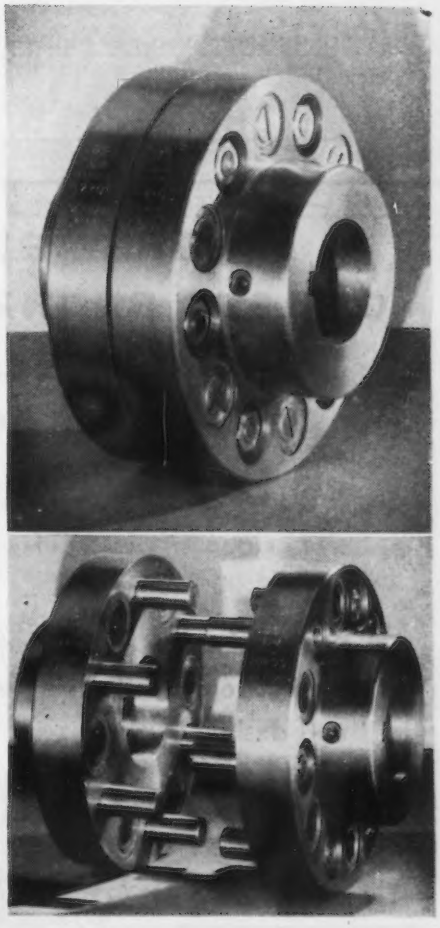
F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

Try This For Ten Seconds

Just take a couple of pencils right now and try to hold them in perfect alignment without touching each other while you count 10.

This will quickly show you why a good flexible coupling is essential when connecting driving and driven shafts to prevent excessive bearing wear due to unavoidable misalignment.

Ajax Flexible Couplings have been doing this job for 20 years. They do it without lubrication because of their rubber bushed, graphited-bronze bearings and interlocking drive studs. Write for the facts on Ajax Flexible Couplings.



ARMY E NAVY

AJAX Flexible Coupling Co.
Incorporated 1920 WESTFIELD, N.Y.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston (3)	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (5)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass (3)	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (4)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company. Effective Feb. 1, 1944, Mystic Iron will be sold without the above OPA price relief grant of $2 per ton.

(4) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(5) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21½ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

BRONZE BEARINGS
OILLESS BRONZE BEARINGS
GEAR BLANKS
MACHINED BRONZE PARTS

S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

Our equipment and manufacturing methods enable us to meet the most exacting specifications and design.

INDUSTRIAL BEARINGS

S. & H. Bearing and Manufacturing Co., Inc.
340-344 North Avenue, East
Cranford New Jersey

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

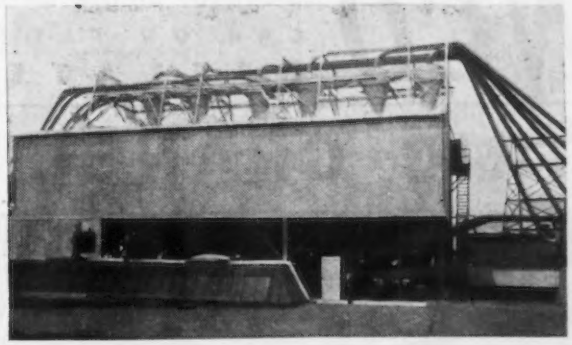
RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	$3.15
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham: spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports: tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



CORK STORAGE BINS, 18 hoppers of No. 10 ga. steel, kept weather proof by a 54'x81'x30' corrugated enclosure . . . System, including structural supports and conveyor ducts designed, fabricated and erected by Brandt.

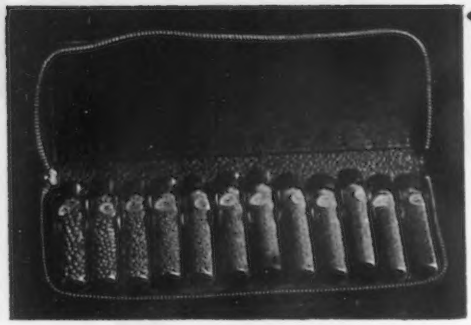
Big Installations or Small Parts—

Call **BRANDT of Baltimore**

for Precision in Heavy Plate and Sheet Steel Work

Here, at your command, is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Address: Charles T. Brandt, Inc., Baltimore-30, Md.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*



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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our **shot** and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

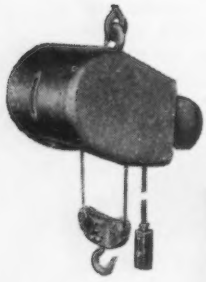
HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .

● **Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.**



Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

Builders Of Conco Torpedo Electric Hoist

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher or 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

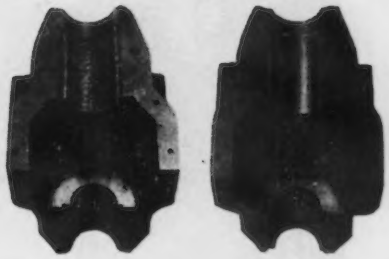
Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. producer's plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. or more	$1.90
Ferrovanadium, 30-35%, contract basis, f.o.b. producer's plant, usual freight allowances, any quantity, per lb. contained vanadium.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroborom, contract basis, 17.50% borom minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$6.25
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.
Less ton lots	9.75c.

Yes

Our customers make machinable Arc Welds on CAST IRON



Before machining. After Machining. After being welded with PHILLIPS "600" Electrode this cast iron housing was machined through the fusion zone.

This book tells what procedure is best for *your* cast iron welding.

Send for your copy TODAY

PHILLIPS "600" Electrode, a non-ferrous, flux-coated rod, produces deposits that are of the color of cast iron and are *fully machinable through the line of fusion.* It can be used in all positions with A.C. or D.C. and maintains a steady and quiet arc without excessive spatter. This electrode is salvaging many valuable castings daily in hundreds of foundries and machine shops. Complete procedure information is contained in our 12-page book on "4 Ways to Salvage, Reclaim and Conserve Iron Castings by Electric Arc Welding." A copy is yours for the asking.

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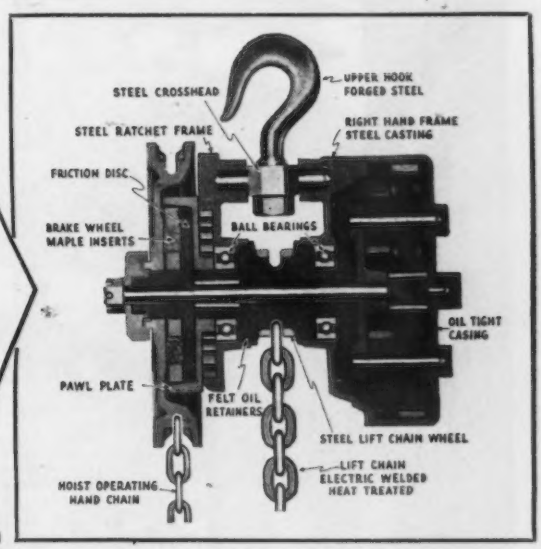
MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES

Here is the **Chain Hoist** *for your job*



● Cutaway view of a Reading Multiple Gear Chain Hoist. Capacities from ½ to 20 tons.

READING CHAIN HOISTS are *engineered* to provide easy, safe lifting. Maintenance is simple, can be handled by an unskilled mechanic. *All the gears in your* Reading Chain Hoist *operate in a bath of oil.*

If you would like more information about these chain hoists that are engineered to *stay on the job,* drop us a line. We will be glad to send you a free copy of Catalog No. 58 which describes Reading Chain Hoists. Send for your copy *today!*

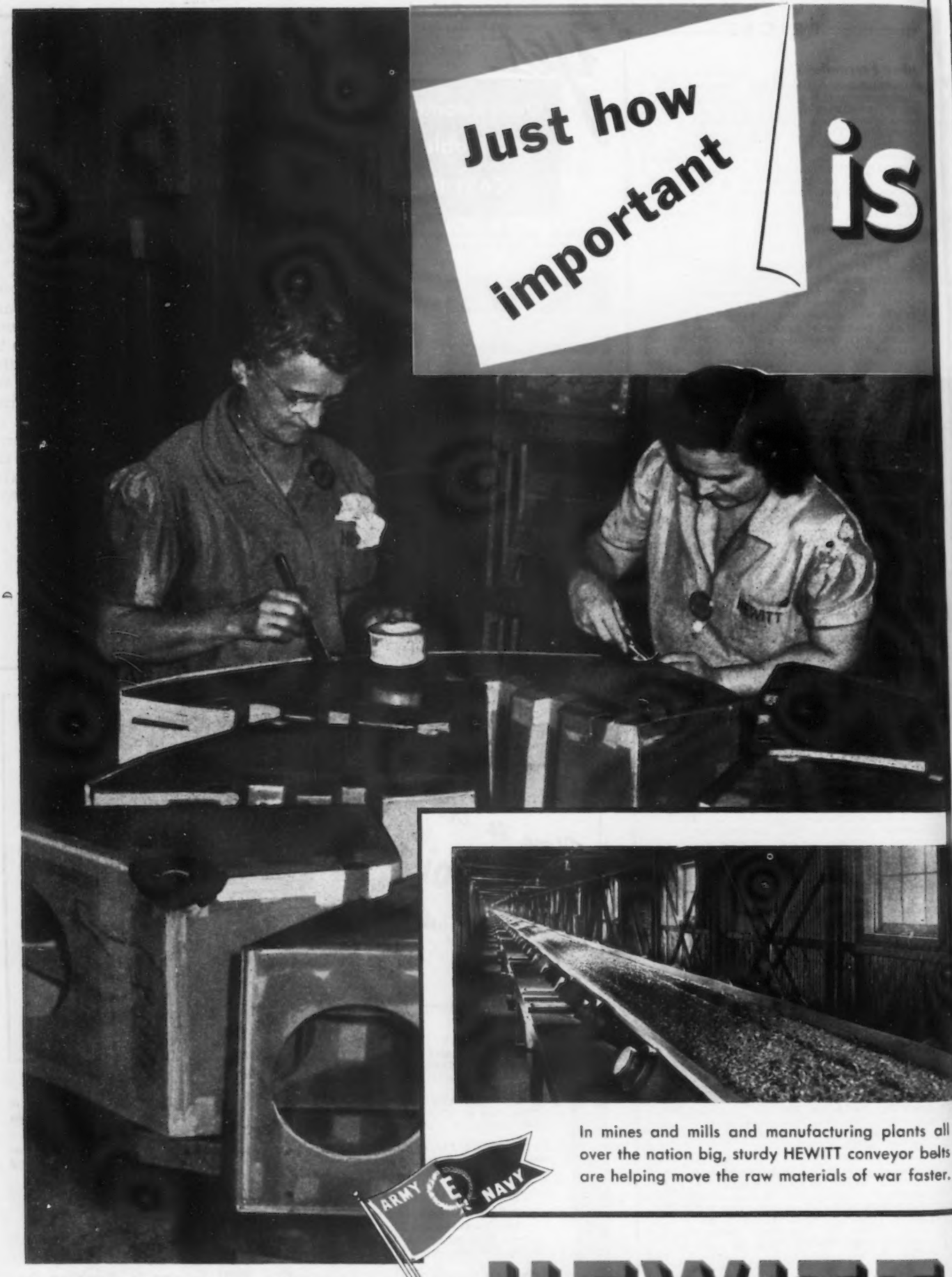
READING CHAIN HOISTS

Multiple Gear Hoists—½ to 20 tons; Army-Navy Type Hoists—½ to 10 tons; Differential Type Hoists—½ and 1 ton; Extended Chain Wheel Hoists—½ to 5 tons; Low-Head Hoists—2 to 12 tons; Quick-Speed Multiple Gear Hoists—up to 1 ton; Twin Hook Type Hoists—½ to 5 tons; Worm Geared Hoists—½ and 1 ton.

Reading Chain & Block Corporation, 2101 Adams St., Reading, Pa.

READING CHAIN HOISTS-ELECTRIC HOISTS OVERHEAD TRAVELING CRANES

Just how important is



In mines and mills and manufacturing plants all over the nation big, sturdy HEWITT conveyor belts are helping move the raw materials of war faster.

ARMY E NAVY

Shown here in the process of manufacture are some of the famous HEWITT bullet-sealing fuel cells that save the lives of our fighter pilots every day.

HEWITT

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IRON AGE

ESTABLISHED 1855

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FEB. 3, 1944

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Seattle

The Overhanging Surplus

CAPITAL goods manufacturers in our country are faced with the problem of doing postwar business in the face of a probable carryover of government owned equipment amounting to several billion dollars. In addition, they face the hurdle of privately bought and owned equipment inventories tremendously swollen by war manufacturing activity.

Plans are being sought whereby the impact of this carryover may be lessened, particularly with regard to the government owned share of it. Some of these plans contemplate setting up Soviet, Chinese and other credits so that these countries could take over a large part of our unwanted machinery which they themselves will need for reconstruction of domestic economies. In return we would take back raw materials not obtainable here and other products which would not compete seriously with American labor.

Other plans now being considered by Congress and others contemplate freezing the competing surplus for a period which would allow our manufacturers time for conversion and others contemplate setting up regulations which would restrict the flow of this equipment from government to private ownership in a way least likely to disrupt postwar activity and employment. Extreme measures also have been suggested, such as dumping this equipment in the ocean or remelting it for scrap.

No doubt something will come out of all of this thinking and talking when the time comes. But to my way of thinking, the time is now and the place is at home.

The difference is between the expression "God help us," which means FDR and Congress and "God help those who help themselves," which means us.

Why depend on these outside agencies, terrestrial and celestial, when the remedy is largely within our own hands?

By this time we should have learned that the most powerful factor which adds to the scrap pile of capital equipment is obsolescence.

The best way to put a competing machine on the scrap pile, whether it is one of your own make or that of a competitor is to produce something decidedly better. Government cannot do that for you.

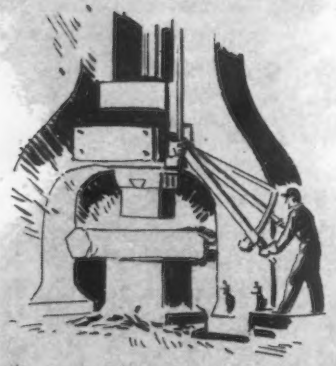
With the advances in design and metallurgical techniques which have been promoted by the war, there is no excuse for anyone offering a "just as good" product to the postwar market. You could not make a living at it if you tried. A "just as good world" is not what the American people want.

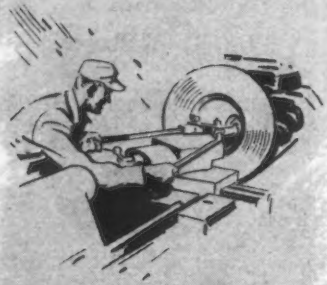
If you will get busy and put into your product the improvements that have been made available during the past two or three years, during which peace time redesign has stood still because of the preference of war for existing products, you will not have to worry much about this overhanging surplus.

It will have been, as the saying goes, "spurlos versank."

Design—

For Workability With Inland Steel





Steel offers designers and manufacturers the maximum in workability. It can be formed and fabricated by all practical production methods, keeping shop costs down. It can be formed either hot or cold. It can be easily spun or extruded into many useful shapes. Steel can be deep drawn to such extremes as in the manufacture of steel cartridge cases. It can be machined, sheared, bent, seamed, welded, and brazed. And steel is available in extreme ranges of sizes and shapes, and chemical analyses; this offers a wide scope in the design of parts, and also simplifies shop procedure, reducing wastage to the minimum.

For half a century Inland has been studying the needs of industry, working with designers and production men, to make steel more useful—to give it the workability that simplifies production and assures economical fabrication. From such close contact with field problems, Inland has given industry Ledloy, the lead bearing, faster machining steel—Hi-Steel, the low alloy, high strength steel of exceptional workability—Form-Cote, the galvanized sheet which withstands severe forming—Paint-Tite, the specially treated galvanized sheet to which paint and enamel readily adhere—and many other kinds of steel that offer numerous advantages to the designer, the production man and the consumer.

Inland engineers and metallurgists are at your service to help you design, select steel, and fabricate products for today or for the post-war period.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Illinois

Milwaukee Detroit St. Paul St. Louis Kansas City Cincinnati New York

The IRON AGE
FEB. 3, 1944

NEWS FRONT

► Although official quarters have been mum, continued availability to the United Nations of Bolivia's tin on the present scale has been touch and go since the coup d'etat.

Not even severance of Axis relations by Argentina has squelched the constant threat to non-ferrous metal imports to this country from South American nations.

► Carbon refractories for blast furnaces, used extensively in Europe, have never been used in the U. S. However, interest in this usage is increasing here with the realization that long economical performance out-weighs high initial cost.

Machine parts and highly finished tools can be dipped in ethylcellulose plastic, which protects them against the severest of handling and corrosive conditions. The parts can be stripped by slitting and peeling.

Boron introduced into the coating of monel welding electrodes appears to behave as a flux, permitting thorough binding between the monel and cast iron, giving an excellent weld.

► On Feb. 1, the Bethlehem-Hingham Yard eliminated its 11 p.m. to 7 a.m. shift; 10,000 workers will be discharged.

► A noticeable segment of opinion in the National Automobile Dealers Association leans toward state licensing of factories or factory representatives as a means of protecting retail outlets. Such legislation would, of course, apply to many fields beyond the automotive industry.

Auto dealers have a full-fledged campaign under way in Washington to assure that they will be the channels through which surplus Army automotive goods will flow after the war.

► The fusing together of Lend-Lease and Office of Economic Warfare into F. E. A., under the direction of Leo Crowley, has resulted in a great deal of turmoil. The flood of resignations has been very great and the top-side absentee management has done little to cope with inter-departmental friction.

However, exporters are more optimistic about this set-up than about any of the predecessors. About 3000 export licenses are coming out of Washington every day. And, the percentage of Lend-Lease to total exports is beginning to fall off.

► One authoritative British magazine commenting on the slow progress of troops in Italy says, "the truth is that since it got away from desert conditions our army has been undeniably sticky".

German rocket-firing aircraft are slowed 50 to 70 miles an hour in speed due to wind resistance on projectiles and carrying frames. The Germans, however, seem satisfied as they are using more and more rockets, and even employing them for night interception.

► Despite extensive publicity of a year ago that defective steel caused ship failures, the failures have continued. Representative Magnuson claims constructional defects are at fault, while Admiral Vickery states that improper loading is the culprit.

► To replace ore carriers sunk by submarines, Bethlehem Steel Co. is building four larger and faster ships. Those lost carried 20,000 tons at 11 knots top speed, while the new ones will carry 24,000 tons at 16 knots.

Because of equipment shortages, Bethlehem has done little to improve Venezuelan ore properties during 1943, but this year expects to carry out extensive improvements as materials and equipment become more readily available.

► The Budd Mfg. Co. all-stainless steel airplane will have a regular crew of three, but can be handled by two men. The craft will carry 6 tons of cargo about 700 miles. Cargo space measures about 25x8x8 ft.

Budd production will soon be about three daily. The Navy will acquire the first 25. The Rubber Development Corp. expects to get two in March for jungle freight routes in Brazil and Bolivia.

► OPA, after assurances by the War Department that its trial production contract for axles from the Timken-Detroit Axle Co. would not encourage inflationary tendencies, released the company from price control. Recently Timken sued the Washington Post for allegedly libelous statements in an article on renegotiation.

Isothermal Quench Baths

By HAROLD J. BABCOCK
Research Engineer,
Ajax Electric Co., Inc.,
Philadelphia

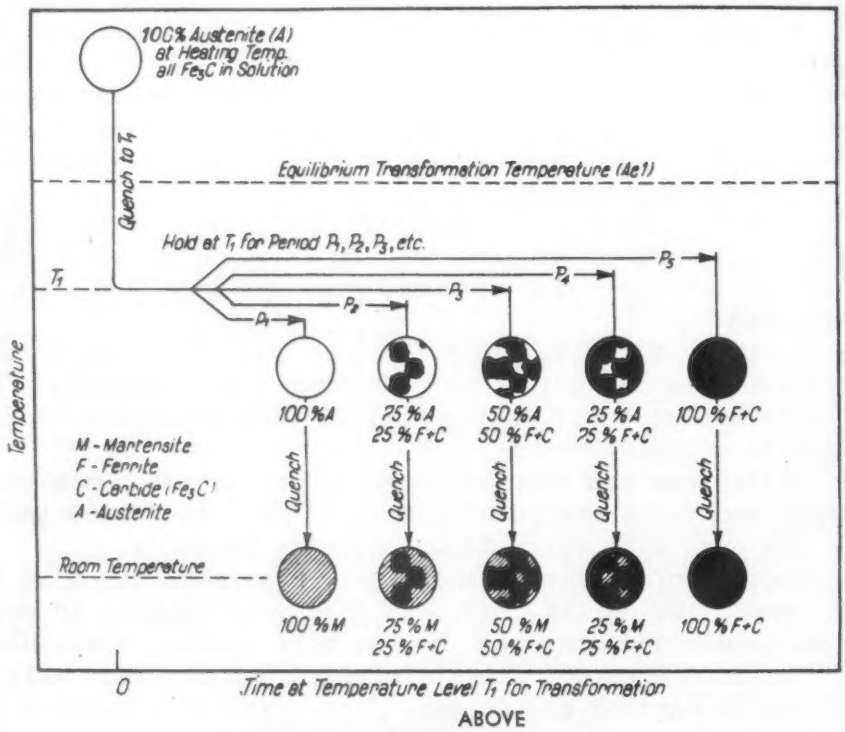
o o o

IN various technical publications there have appeared, during the past 10 years, an increasing number of articles giving information on various studies of the effect of time and temperature on the transformation of austenite in carbon and alloy steels when cooled (quenched) to various sub-critical temperatures. The procedure in these studies was first described in 1932 by E. C. Bain and E. S. Davenport of the U. S. Steel Corp. The data presented in the form of "S" curves or Time Temperature Transformation (TTT) curves are of value in determining the rate of cooling and the time required to obtain a desired structure as well as the temperature at which these structures are obtained.

But all these articles are based on work done under conditions of the metallurgical laboratory. It is the purpose of this article to point out in relatively non-technical language, some of the fundamentals of this procedure which is known as isothermal transformation of austenitized carbon and carbon-alloy steels. The data now available in the form of TTT curves form a valuable guide to practical methods to improve the physical properties of commercial steel products. The result of their application will be illustrated by description of equipment for treating steel by this method. The success of their application depends upon the use of a molten salt quenching bath capable of cooling steel at a high rate while the bath is maintained constantly at selected temperatures in the range of 450 to 1350 deg. F.

The heat treater, the metallurgist and others concerned with the heat treatment of steel are quick to adapt to their commercial need new methods that offer to improve its properties. Ever since iron was first smelted and formed into useful articles, the process of improving its physical properties has depended upon the development of new procedures. Thus alloying of iron with carbon, then with various agents as silicon, manganese, nickel, chromium, molybdenum, etc. provided the present steels. It has been learned that the chemical content of the steel, the mechanical work done on it and the maximum cross-sectional area influence the physical properties that are imparted to it by any given heat treatment. But, fundamentally, the whole process of heat treatment of carbon steels depends upon the rate at which the steel is cooled from temperatures above its critical points to room temperature.

The time honored blacksmith, with forge fire and water cask, knew that hot steel quenched in water was made hard and brittle. He knew also, that this hardened steel if gently heated to "straw temper" lost its brittleness, yet was hard and tough enough "to hold an edge" when sharpened. The modern heat treater has refined the method of heating and uses brine, and oil as well as water for the quench. The quenching procedure involves not



ABOVE

FIG. 2—Schematic representation of progress of isothermal transformation of austenite by the metallographic method. (Davenport)

o o o

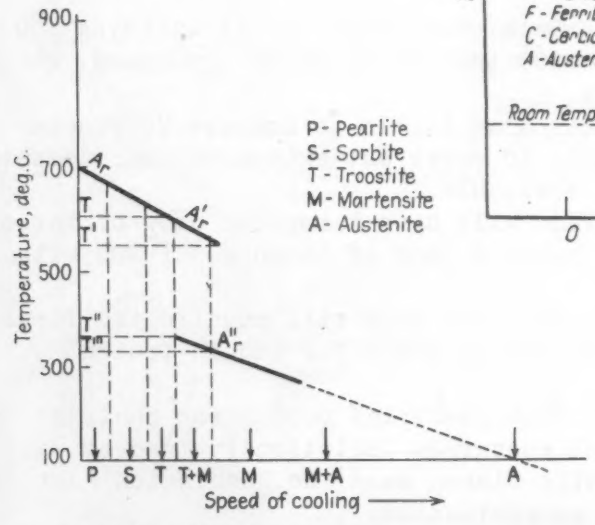


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FIG. 1—Relationship between cooling rate and microstructure, after Sauveur.

Applied to Commercial Practice

. . . Time-temperature transformation curves can be invaluable aids in improving physical properties of steel products. In this, the first part of a two-part article, the author compares the information obtainable from equilibrium diagrams and TTT curves. Isothermal transformation curves of several carbon and alloy steels are also examined.

merely immersion, but manual or mechanical movement of the piece in the liquid during cooling or agitation of the quench bath liquid by mechanical devices or the use of fixtures through which jets of the fluid are forced against the pieces being quenched. All such modifications are for the purpose of controlling the rate of cooling of the steel being treated.

Quench and Temper Method

Prior to 1930, the interpretation placed upon the change in structure that occurs during the cooling of steel was expressed in equilibrium diagrams. A conventional diagram to show the relationship between cooling rate, and structure is shown in Fig 1.[15] It assumes that the steel has been heated at a temperature just high enough to cause the various components such as carbon, carbides, etc. to go into solution in the iron forming stable austenite. If the steel is then quenched with increasing rates of cooling, the austenite is transformed to structures described progressively as primary pearlite, sorbite, and troostite, respectively. It will be noted that, as the cooling rate increases, the temperature of transformation drops suddenly and the product formed is martensite. This is the critical cooling rate. It is a rate rapid enough to prevent any transformation to higher temperature structures, but slow enough to prevent the retention of untransformed austenite. If the steel is cooled at or above the critical rate, thus forming martensite, the hardest structure is produced. Any rate of cooling slower than this produces progressively softer structures which are tougher and more ductile.

It is also well known that when fully hardened steel is reheated to temperatures above 350 deg. F, the martensite is transformed to structures that are progressively softer and tougher. This reheating procedure is referred to as tempering (drawing). The temperature and time used in this operation determine the type of structure produced and the products are designated progressively as secondary troostite, sorbite and pearlite, respectively.

Those familiar with heat treating practice will recognize such procedure as the conventional "quench and temper method" universally applied to impart desired conditions of hardness and obtain physical properties suitable to the use required of the steel. There are many factors influencing the results of this treatment such as grain size, per cent of carbon and of metallic alloying elements and the chemical state of the alloying components.

Under practical conditions information obtained from the equilibrium diagram has certain limitations due to the fact that operations normal to heat treatment involve continuously varying factors of time and temperature. The conditions presented in the diagram are fixed, that is, equilibrium is assumed. Consequently the influence of time and of temperature could not be evaluated in terms of their effect upon structure during the continuous cooling of steel.

At the present time, thanks to the

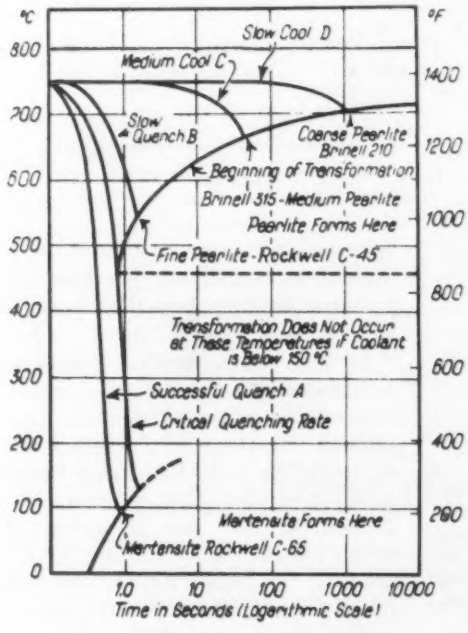

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FIG. 3—Diagram presented by E. C. Bain at the AIME Howe Memorial Lecture showing relation between cooling rate and temperature of initial austenitic transformation.

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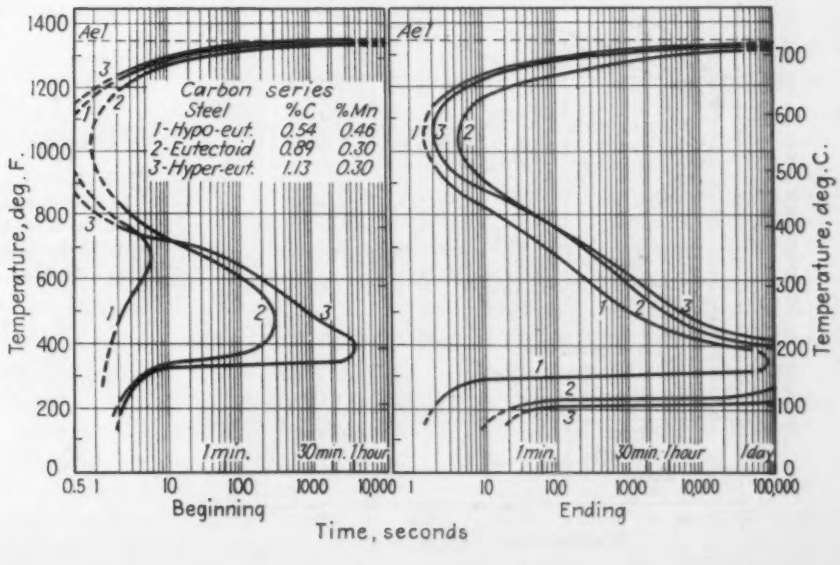
BELOW

FIG. 4—Typical isothermal transformation curve showing influence of carbon. (Davenport)



work done by Bain, Davenport and others, a new procedure has been developed that helps greatly to disentangle the influence of these two factors. As stated by Edmund S. Davenport in the Fourteenth Campbell Memorial Lecture[6], delivered before the ASM annual meeting in October, 1939, "The principle of the method is shown schematically in Fig. 2. Individual specimens of suitably small dimensions are first rendered austenitic, then rapidly transferred to a liquid bath maintained at the particular temperature level (T_1) under investigation, held at that constant temperature for a predetermined period of time (P_1, P_2, P_3, etc.), withdrawn and immediately quenched in cold water or brine. The specimens are subsequently sectioned, polished, etched and examined microscopically. The essence of the method resides in the fact that any untransformed austenite remaining in a given specimen at the end of its sojourn in the constant temperature bath appears as martensite after this final quench."

Isothermal Transformation

In examining Fig. 2 for information that the heat treater can put to practical use, it is noted that during the period of time P_1, the unstable austenite did not transform while in the constant temperature bath, so when again quenched (but this time in water or brine), it all appears as martensite. As the period during which the successive test pieces are held in the constant temperature quench bath is progressively lengthened, the unstable austenite is transformed increasingly to ferrite and carbide structures until finally no martensite appears in the piece when quenched at the end of the test. In other words, a piece of steel is cooled rapidly to a temperature below its critical temperatures by quenching in a bath maintained constantly at a predetermined temperature. If held in this bath a sufficient length of time, a complete transformation to a structure identified with this temperature of transformation will occur. Such a procedure is called isothermal transformation.

In the Howe Memorial Lecture, delivered by E. C. Bain before the AIME in 1932, there was presented the diagram reproduced in Fig. 3 to illustrate the relation between cooling rate and the temperature of initial transformation of austenite. The line marked "beginning of transformation" should be noted. If the steel, cooled to about 1000 deg. F. at the rate shown as "slow cool B" or in about 1.5 sec., had been quenched immediately in cold brine at that point, all the untransformed austenite would be found present as martensite. It would be a condition like that shown schematically in Fig. 2 at the end of period P_1.

But suppose instead the steel is held in a constant temperature bath at 1000 deg. F. long enough to transform all the austenite and then is quenched immediately. A tough, ductile structure of the nodular pearlite type would result, wholly without formation of any martensite. If samples of any carbon or alloy carbon steel were subjected to a series of isothermal transformation treatments at numerous constant temperature levels under similar conditions, it would be found that at the various temperature levels the time before the transformation of austenite began varied from a fraction of a second to 30 min. or more.

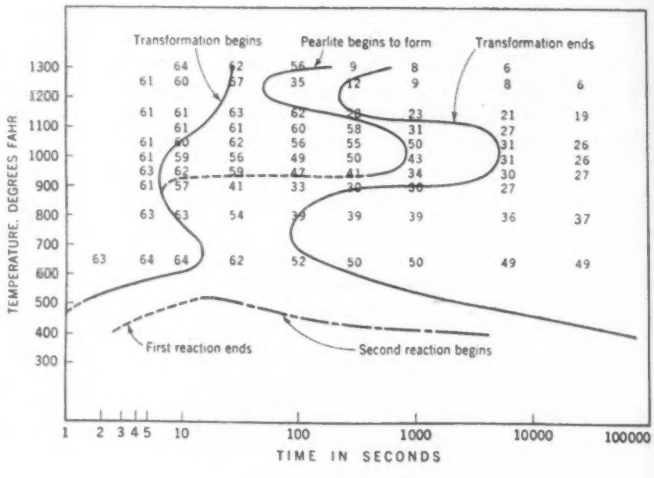


FIG. 6—Time-temperature reaction curve for chromium-molybdenum 4140 steel, from the Climax - Molybdenum Co.

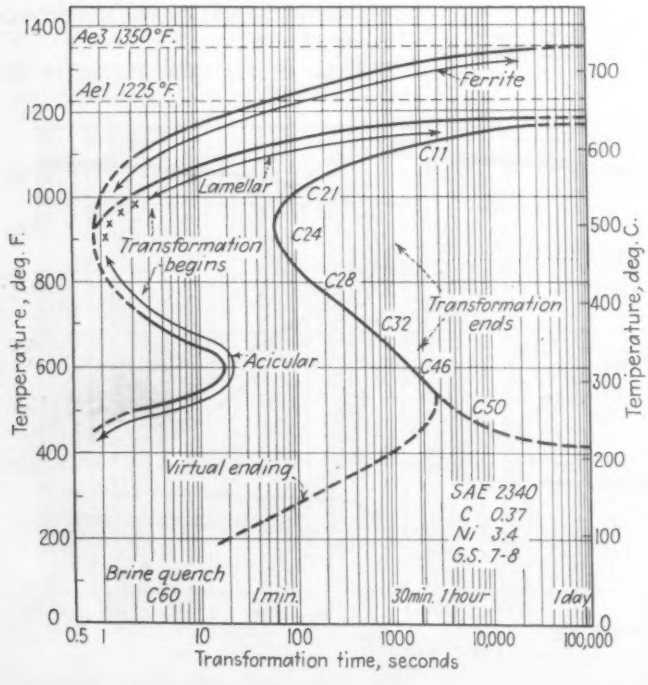


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FIG. 5—TTT curve of carbon steel alloyed with nickel, SAE 2340. (Davenport)

Likewise, the lapse of time from beginning to completion of transformation varied from less than 5 sec. to several days.

In Fig. 4, a typical isothermal transformation curve for carbon steels is reproduced from the paper entitled "Isothermal Transformation of Steels" by E. S. Davenport (Trans. ASM, December, 1939, p. 852). It is divided into two sets of curves, one group (on the left) recording the time to reach the beginning and the other (on the right) the time to reach the end of the austenite transformation.

Cooling Rate Affects Hardness

In examining these curves, it is noted that the curve marked 2 in Fig. 4 cuts the 1000 deg. F, temperature line (left side of the figure) at a point showing about 0.9 sec. of time. What does this mean? Simply that this 0.89 carbon steel must be cooled

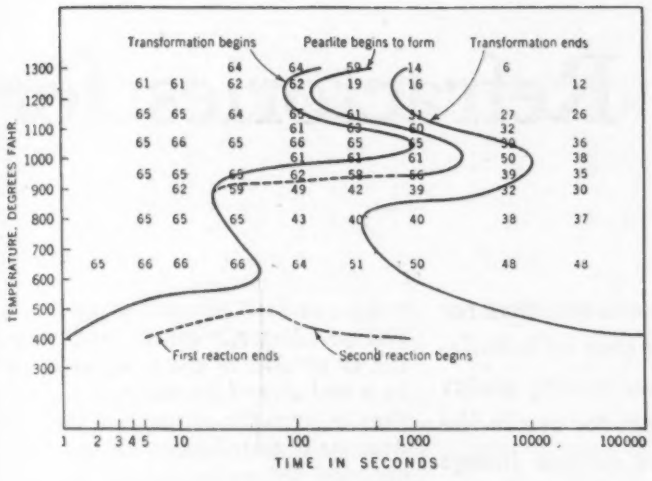


FIG. 7—Time-temperature reaction curve from chromium - molybdenum 4150 steel, from the Climax-Molybdenum Co.

(quenched) at such a rate that its temperature will be lowered from 1340 deg. F. to below 1000 deg. F. in not more than 0.9 sec. and to below 200 deg. F. in not more than 2 sec. if the structure of greatest hardness is to be obtained. The curve on the left, marked 2, where it intersects the 200 deg. F. line, indicates the beginning of transformation of the austenite. Where this line intersects the curve on the right side, marked 2, indicates the end of this transformation. Thus if the quench bath was maintained at 200 deg. F. and the steel kept in it for 20 sec., practically all the austenite would be transformed to martensite.

If the steel is quenched in a bath at higher temperatures, 1000 deg. F., for example, the time to complete transformation will be shorter but the product softer. Following the 1000 deg. F. line to its intersection with the curve marked 2 on the left, it is found that the quench bath must possess a cooling rate which will lower the temperature of the steel to that of the bath in not more than 0.9 sec. when transformation of the austenite begins. Now, following the 1000 deg. F. line to its point of intersection with the curve on the right side, marked 2, it is seen that if the steel is held in this bath for 5 sec., transformation will be completed.

Since, at the end of 5 sec. all austenite will have transformed to a structure identified with this temperature, the steel may be cooled at any rate, even by quenching in water and will be found to retain a fine pearlite structure. No martensite will be formed.

Curves 1 and 3 for steels with 0.54 carbon and 1.13 carbon respectively indicate that they would have to be cooled below 1000 deg. F. in much less than ½ sec. if full hardness is to be obtained. A very drastic quench such as brine would have to be used to obtain maximum hardness and highest physical properties. In all cases it is assumed that the pieces of steel are of such thickness that they can be cooled throughout in the time indicated.

The isothermal transformation curves of a few types of alloy carbon steels have been selected from the large number of curves prepared for various steels that have been published in trade magazines and technical papers. (See bibliography.) They illustrate the effect produced by nickel and nickel-chromium-molybdenum alloy elements. In Fig. 5, is shown a curve for SAE 2340 steel (by Davenport). In Figs. 6 and 7 curves are shown for SAE 4140 and SAE 4150 steel (from "Molybdenum in Steel," published by Climax Molybdenum Co.) respectively. They should be compared with the curves in Fig. 4. In them the curves for beginning and end of the transformation are drawn on the same diagram for ease in reading and interpretation.

The critical cooling rate is retarded progressively as alloy content increases, until, in the SAE 4150 steel, the piece can be fully hardened if cooled at a rate that will lower its temperature below 875 deg. F. (that is pass to the left of, not through the "nose" of the "S" curve) in about 20 sec., in contrast to the 0.89 carbon steel which had to be cooled in less than 0.9 sec.

The beginning of transformation for these steels in a constant temperature bath at 1000 deg. F. is retarded a progressively increasing lapse of time; 500 sec. for SAE 4150 compared to 1 sec. for SAE 2340. The end of transformation at 1000 deg. F. requires almost 10,000 sec. for SAE 4150 and 60 sec. for SAE 2340. The numerals close to the "end of transformation" curves show the Rockwell C hardness of the isothermal transformation structure.

The above theoretical information is presented merely to indicate how the data now made available in such curves may be used by the heat treater to assist him to obtain certain results under practical commercial conditions.

Ed. Note: Next week, the author continues with a discussion of cooling rates of various quenching media and design and construction of the bath as well as several commercial applications of the TTT curve.

Three Metals Plated Simultaneously

CERTAIN copper or brass parts of aircraft instruments that carry high-frequency currents must have high surface conductivity because of high-frequency current skin effect. Nickel, normally used to provide anti-corrosion protection, has high electrical resistance. Gold plate, which is a good conductor, is too costly.

Electrochemists at Westinghouse finally evolved an answer that disposed of this particular worry and provided a plating technique valuable in many applications unrelated to the original need. Special plating anodes are made of an alloy of copper, tin and zinc. With these soluble anodes, copper and brass parts are plated using standard plating practices.

The results are more than satisfactory, according to Westinghouse engineers. The plated surface has the necessary electrical conductivity for high-frequency applications and is far superior to nickel in corrosion resistance. Further, the finish is mirror-like, being surpassed in this respect only by silver itself. As to abrasion, the surface is roughly twice as good as the usual nickel coating. The new plating is entirely non-magnetic (not true for nickel) and is easily soldered, a fact of great value in many electrical applications. Furthermore, the new plating process has great "throwing power." In other words, deep interior surfaces (in objects with cavities) are plated much more uniformly than is possible with nickel.

. . . Carbon Refractories for B

. . . The use of carbon refractories in the blast furnace has thus far been limited to European practice. Although initial cost of installation is high, their long life and the elimination of inner cooling plates among other benefits make carbon linings economical for use in the United States. Herein, the advantages of various carbon linings over the conventional firebrick are discussed in detail.

REFRACTORY practice in Continental Europe is similar to that in the United States. Raw materials of practically identical composition are used for the manufacture of firebrick, silica, basic refractories, and super-refractory materials. The preparation of bodies, molding, drying and firing differ only insofar as differences in labor and market conditions justify the application of methods in one country that would be uneconomical under the changed conditions in another. Chemical, physical and technological test methods differ to some extent in details, but have fundamentally the same aims. Construction of kilns and furnaces is similar and so are specifications for refractory materials used in their linings.

Thus, for instance, magnesitic or dolomitic ramming mixes are used in the hearths of basic open-hearth furnaces; magnesite, chrome-magnesite or dolomite refractories in the structure above the slag line, and silica brick in the roof. In Europe and in the United States, considerable effort has been made to replace silica brick in the roof by basic refractories, but no definite solution has as yet been found to this problem. On both continents electrocast refractories are the recognized lining for large glass melting tank furnaces. Silicon carbide refractories are used almost exclusively both in this country and abroad in enamelling muffle furnaces; lightweight refractories have become the most important material of construction for most heat-treating furnaces of the metal industry. Chemically bonded basic refractories have begun to replace in Europe and in America the high-alumina lining of rotary kilns for burning cement. High-grade firebrick with an alumina content of more than 40 per cent and fired to cone 16 or higher are not traded as super-duty brick in Europe, but they are used in boiler settings, coal fired furnaces, malleable iron furnaces and many other structures to the same extent as in the United States.

In view of this similarity of trends, the fact that there exists a single but highly important difference between European and American refractory practice is rather surprising. In Germany, France, Belgium, Italy, Sweden and Russia, and probably also in some of the small countries, which are not important producers of iron, carbon refractories have been used in blast furnace linings for many decades. Approximately 80 per cent of Germany's pig iron and probably at least 60 per cent of the iron produced on the European continent is smelted in carbon linings and the trend to replace fireclay blocks in the hearth and the bosh of the furnace by carbon refractories seems to be increasing. Not a single furnace of the Western Hemisphere, on the contrary, is lined with carbon.

The reasons for this difference in practice are not readily apparent. A blast furnace is built for a campaign which lasts years and its lining has to deliver 1,500,000 or more tons of pig iron. Obviously, a blast furnace operator will eschew the idea of using an unfamiliar refractory material in the lining. But technical progress always has involved risks of this very nature and America's industry has proved often enough that it can take them. Nor can the fact that the carbon lining is more expensive than the fireclay explain why carbon refractories have never been used in the United States. The relation between the prices of firebrick of blast furnace quality and machined carbon blocks is approximately 1:2.5 per unit of weight, or 1:1.7 per unit of volume in Europe. Nevertheless, the carbon lining is considered the more economic by a majority of European producers. Finally, even the assumption that the American metallurgist is not acquainted with carbon refractories does not hold true. Rammed monolithic carbon linings as well as molded and fired carbon blocks are consumed in large quantities in the manufacture of aluminum, and large carbon blocks form the linings in ferrosilicon and ferromanganese furnaces. Considerable quantities of carbon refractories are, moreover, consumed by other industries, as for instance, in the manufacture of phosphorus, phosphoric acid and calcium carbide. These carbon refractories are manufactured in this country and their chemical, physical and technological properties are to all practical purposes identical with those of the European blast furnace block.

Properties of Carbon Refractories

One of the fundamental properties of refractories, that is, of materials of construction which serve to confine heat and high temperature to given spaces, is their melting point. Pure carbon does not melt under atmospheric pressure; it volatilizes at approximately 6638 deg. F. No exact data are available on the effect of impurities on the behavior of carbon at this extremely high temperature. Carbon refractories contain approximately 6 to 8 per cent of non-combustible matter, which undoubtedly has some influence on the volatilization temperature. Still, these carbon blocks or rammed linings do not even soften at temperatures which would cause the melting not only of super-duty brick, but even of pure thorium oxide, the most refractory of all industrially used super-refractory materials.

A high melting point is only one of the important characteristics of refractory materials. Even more critical than the melting point or pyrometric cone equivalent is the highest temperature at which a refractory construction material still retains satisfactory structural strength. Ordinary firebrick softens under a load of 50 lb. per sq. in. at temperatures of 2370 to

Blast Furnaces . . .

By DR. JOSEF M. ROBITSCHEK
Director of Research, U. S. Stoneware Co., Akron, Ohio

2550 deg. F. Super-duty firebrick will support a load of 50 lb. per sq. in. at temperatures of 2800 deg. F. or more. This improvement of the load bearing capacity of firebrick, achieved within the last 20 years, is undoubtedly one of the factors responsible for the increase of the life of blast furnace linings from an average output of 750,000 to 1,500,000 tons of pig iron. High-alumina refractories, silica brick and modern basic refractories begin to soften under a load of 50 lb. per sq. in. at 2900 to 3250 deg. F. Even at 3700 deg. F., carbon refractories have still approximately the same mechanical strength and load bearing capacity as at ordinary temperatures.

Next in importance to refractoriness and structural strength at high temperatures is physical stability over the temperature range in which the refractory is used. The fact that any one constituent is subject to crystalline changes accompanied by volume changes does not exclude a structural material from its application as a refractory. However, certain safety precautions must be taken. Refractory life may be shortened and its application limited by the construction or the operation of the furnace. In this respect again, carbon refractories are not inferior to any other refractory material. No physical changes that might cause a sudden expansion or contraction and thus necessitate special caution in heating or cooling take place in carbon refractories under industrial conditions.

Not only sudden volume changes, caused by transformation of crystalline constituents, but also the reversible thermal expansion of refractory materials may be responsible for a sudden destruction or a slow deterioration of furnace linings by dilatation stresses. In linings which are heated from one face only, internal stresses, which tend to cause a mechanical spalling of the refractory, are directly proportional to the coefficient of thermal expansion and inversely proportional to the coefficient of heat conductivity of the refractory. Again, carbon refractories are superior in this respect not only to that type of firebrick which they replace in the blast furnace lining but also to most other refractory materials. Over the range of 100 to 2900 deg. F. the coefficient of thermal expansion of carbon blocks is 1.9×10^{-6} compared with approximately 5.0×10^{-6} for firebrick. In addition, the thermal expansion curve of carbon refractories approaches a straight line over this interval. Finally, the coefficient of heat conductivity of carbon blocks is approximately 10 to 15 times that of firebrick. Aside from its favorable effect on the resistance to thermal stresses, the extremely high heat conductivity of carbon blocks is obviously of special importance in a structure that is cooled from the outside.

In their industrial application, refractories are exposed not only to mechanical and thermal stress, but also to chemical attack by solid, liquid and gaseous substances. At the high temperatures reached in the hearth and bosh of the furnace, firebrick will readily react with alkalies, lime, magnesia, iron oxides and other constituents of the blast furnace slag. Without very intensive cooling, this chemical action would probably destroy the firebrick lining within a few days. In spite of water jacket and cooling plates, the reaction results in an erosion of bosh and hearth and is responsible for the loss of iron through the furnace hearth and for the formation

TAPPING a blast furnace at the plant of Colorado Fuel & Iron Co.

and growth of the salamander. At very high temperatures, reactive carbon will reduce most of the oxides present in blast-furnace slag to metals or react with them to form carbides. Carbon refractories will, however, not react chemically with any constituent of the slag under any temperature and pressure to which they may be exposed in the blast furnace. Molten pure iron or low-carbon steel will dissolve carbon and therefore pick up carbon from a carbon lining, until it reaches saturation. In the blast furnace crucible, however, the iron is saturated with carbon from the coke and will not attack or dissolve the refractory lining.

Thus, carbon is a refractory material which at industrial temperatures does not melt, soften or collapse under load, does not suffer sudden volume changes and does not react with oxides present in fuel ashes and in metallurgical slags. Were it not for the fact that carbon may not be exposed to oxidizing atmosphere at temperatures above 650 deg. F., carbon refractories would form the really ideal lining for all kilns and furnaces whose linings deteriorate rapidly under the action of high temperature, mechanical stresses and chemical attack. The combustibility of carbon linings which excludes their wide application is, however, of no importance in the oxygen-free atmosphere of the blast furnace.

The Carbon Lining

Two different types of carbon linings—monolithic and block—are used at present for hearth and bosh of blast furnaces up to the mantle.

The rammed lining seems to have been first used in Germany's industrial district of the Ruhr and the Lower Rhine. Some of the largest furnaces built in this district during the last decade before the war have monolithic bottoms and boshes. German blast furnace operators brought this practice to Russia, where quite a few furnaces of this type were built. To the writer's knowledge, monolithic carbon linings were rather the exception in other European countries. Information about the current number of furnaces operated with rammed linings is not available. Reports from single plants seem to indicate a tendency to abandon the monolithic structure in favor of the large fired and machined carbon block. Still some operators consider the rammed lining, which is by far less expensive than the carbon block lining, as the most economical installation.

Coke and tar are the raw materials from which prefired carbon refractories as well as ramming mixes are made. High-grade foundry coke of low ash content is used because its dense structure makes for higher mechanical strength and lower combustibility than gas or blast-furnace coke. It is crushed and ground to a grain size which corresponds approximately to that of the U. S. Standard Sieve No. 18. Crushers and grinding devices of various construction are used for this operation. Coke grain must not contain excessive quantities of fine dust. The coke has to be dried thoroughly before or after grinding to prevent formation of water vapor in the paste during preparation or molding. Coal tar with a high content of non-volatile carbon, which yields a coked residue of high density and good mechanical strength, forms the binder for the ground coke. Like the coke, it has to be free of water. To increase density and strength of the refractory, pitch, petroleum asphalt and other bituminous substances of high melting point are dissolved in the hot tar before it is mixed with the coke.

Pastes from which monolithic linings are made contain usually five to six parts of coke to one part of the tar-pitch mixture. The raw materials are heated to about 250 to 300 deg. F. and mixed either with spades or worked in steam-jacketed kneading mills. The temperature of the paste has to be kept within fairly close limits during mixing and during its use. Unhomogeneous lining of low strength will result from mixing too cold materials, while a brittle, non-workable paste and a brittle lining of unsatisfactory abrasion resistance will be obtained if local overheating causes loss of volatile substances or partial combustion. Immediately after mixing, the hot paste is rammed into place in layers 1½ to 2 in. thick. Wedge-shaped iron rammers which are kept hot during the operation are used. Starting from the firebrick base of the furnace, a solid jointless hearth 5 to 7 ft. high is thus built up. Fireclay blocks are then laid to form the taphole since carbon would be destroyed at that point by oxidation. Then the crucible is built up in the same way as the hearth, the monolithic lining being brought around the tuyeres up to the mantle. Since carbon-lined furnaces operate without cooling-plates in the bosh, no provisions for these plates need be made. Hearth and bosh linings are exposed to oxidation after the furnace has been blown in and as long as the crucible has not been filled with iron. To protect the carbon refractory during this initial period, its interior surface is covered with one course of firebrick.

The installation of this monolithic lining is slow and unpleasant. The men have to be provided with respirators or gasmasks to protect them against the pungent and noxious fumes which arise from the hot paste. Heated tools and hot paste make this measure especially inconvenient and only skilled and reliable men are capable of ramming a good lining under such conditions. If, however, this work has been done expertly, a lining which is free from laminations, cracks and joints will result. Such a lining can outlast considerably the best firebrick lining and is much less expensive than a carbon lining built of prefired and machined carbon blocks.

Carbon Block Lining

The second type of carbon lining which is used at present in most of Europe's blast furnaces is a prefired lining built of large machined blocks. These refractories are produced by manufacturers of carbon electrodes and by large producers of fireclay refractories, who have taken up this production as a protection against the loss of an important volume of output. The original carbon block, which was approximately the same size as the standard blast furnace fireclay block, has almost disappeared. Since carbon bodies have no drying shrinkage and their firing shrinkage is considerably lower than that of fireclay bodies, they lend themselves admirably to the manufacture of especially large shapes. This fact constitutes an important advantage in their application as blast furnace hearth blocks. Key-shaped hearth blocks in lengths of 7 ft. or more, weighing about 3000 lb. each, and smaller blocks of 800 to 1000 lb. each for the lining of the crucible are generally used at present.

The paste used in the manufacture of these prefired blocks is again coke and tar. Both materials are mixed in heated apparatus and the mix is molded immediately. Small blocks of standard shapes are either pressed or extruded. Large blocks are rammed into molds with heated tools. The green ware attains sufficient strength to be handled on cooling. Small blocks may be set into the kilns 24 to 48 hr. after having been molded, while a cooling time of 4 to 6 days is sufficient even for the largest pieces. Most blocks are fired in periodic downdraft kilns. Obviously, oxidation of the refractory has to be avoided during firing. Muffle walls of fireclay slabs are, therefore, built around the blocks and all interstices between single

blocks and between blocks and walls are filled with crushed coke. Then the blocks are covered with an 8 to 10 in. thick coke layer which is covered with with a tight layer of firebrick. Because of the difficulties encountered in setting large and heavy blocks through kiln doors, special muffle kilns with removable roofs have been constructed by several manufacturers. Firing schedules depend in some degree upon the size of the blocks. Temperatures of 1922 to 2012 deg. F. have to be reached inside the muffle and the blocks have to be soaked at these temperatures for several hours to bring about complete carbonization of their bond. On the average, the kiln is preheated slowly for about 48 hr., during which time most of the volatile constituents of the tar are driven off. The maturing temperature may then be reached within another 48 to 72 hr. and held for 6 to 12 hr. After this heat treatment, the refractory has no appreciable shrinkage even if exposed to temperatures of more than 3000 deg. F. The fired blocks are cut to size, machined and numbered, so that they may be laid with tight and impervious joints. The use of mortar or paste to fill the joints is eliminated. Some technological properties of a German carbon block, made by this method, are listed in Table I.

For all practical purposes, a lining built from these prefired machined blocks may be considered jointless. Its advantages over the rammed monolithic lining are a higher mechanical strength and a higher heat conductivity. In its outer parts the monolithic lining never attains those temperatures necessary to carbonize its bond. After a partial volatilization of the hydrocarbons, therefore, it remains porous and soft where it was not directly exposed to heat. More important, however, than higher mechanical strength and better heat conductivity is the speed with which a hearth consisting of three layers of large, machined and numbered blocks can be built when compared with the slow and tedious task of ramming single thin layers of hot carbon paste, which form a monolithic carbon lining.

Carbon vs. Firebrick Lining

American authors have several times expressed the opinion that the successful application of carbon linings in European furnaces is due to the fact that continental Europe has no flint clay deposits and that the European blast furnace fireclay block is, consequently, of lower quality. A comparison of chemical composition and technological test data for an American fireclay block A* and a Czechoslovak blast furnace block C in Table II does not confirm this opinion.

Because of the lack of flint clays, the European manufacturer of blast furnace blocks has to use bodies which consist of 93 to 94 per cent of hard fired grog together with only 6 to 7 per cent of bond clay. To produce from such bodies refractories of sufficiently dense structure, the grog has to be carefully graded; bond clays of high alumina content selected; the body rammed with pneumatic tools into collapsible iron molds, and the blocks fired to temperatures above cone 16. The result of these rather expensive operations is a brick which contains less fluxes and has a higher pyrometric cone equivalent than the average American block.* The refractoriness-under-load of the European brick is, moreover, very satisfactory. A direct comparison of this property of the American and the European block is not possible because of the difference in test procedure. Result of the European test method is not the deformation which the brick suffers at a specified temperature, but that temperature at which a sample that has been cut out of the block shows the first signs of softening under load, and that temperature at which it begins to collapse rapidly. Still, neither these figures nor the values for chemical

H. M. Kramer, "Refractories Service Conditions in the Blast Furnace." Journ. Amer. Ceram. Soc. 25 (1942), p. 312.

**It is, however, to be noted, that European standards for the determination of the pyrometric cone equivalent of firebrick call for samples that have been cut out of the brick, while the test cone is molded from a finely ground sample according to ASTM Standard Test Method C24-42. In single instances the European method will yield slightly higher results than the ASTM test.*

• • BLAST furnaces and stoves at the plant of Carnegie-Illinois Steel Corp.

TABLE I

Properties of German Blast Furnace Carbon Block

Bulk density, grams per sq. cm.	1.35
Water absorption, per cent	22.0
True porosity, per cent	30.0
Carbon content, per cent	89.5
Compressive strength, lb. per sq. in.	4,000
Transverse strength, lb. per sq. in.	1,500
Modulus of elasticity, lb. per sq. in.	820,000
Coefficient of thermal expansion	1.9×10^{-6}
Heat conductivity, B.t.u. per sq. ft. per in. per deg. F. per hr.	40

composition, porosity and P.C.E. justify the assumption that the European blast furnace operator has to use carbon refractories because of an inferior quality of those fireclay blocks which are at his disposal.

It is difficult to judge the performance of blast furnace refractories on the basis of the total output of the furnace. The iron content of the ore, the design of the furnace, the number and length of shutdowns during one campaign, grading and sintering of the ore, the quality of the coke, wind pressure, stock distribution and other factors will affect the total output of the furnace. The necessity of major repairs on the mechanical equipment or the destruction of inwall refractories above the mantle by the action of alkalies, by carbon deposition and by abrasion may cause the end of a campaign at a time when bosh and hearth might have still produced 100,000 tons or more of pig iron. Still, a production of 2,000,000 tons from one lining of an 800 to 1000-ton furnace can be attained or surpassed only if hearth and bosh of the furnace have been lined with the best quality blocks available. This 2,000,000 ton mark has been reached during the past few years not only in quite a few American furnaces but also in several European furnaces that were lined with good fireclay refractories. Considering that the average iron content of European ores is lower than that of the American ore and that consequently the quantity of slag, which is the most important destructive factor in the bosh, is higher per ton of iron in Europe, the statement that there might exist any appreciable difference in the quality of fireclay refractories which might justify their exclusive use in the United States and exclude them from application in the large furnaces in Europe cannot be upheld.

It is equally difficult to compare the performance of carbon-lined and fireclay-lined furnaces without regard to factors other than furnace output. To the writer's knowledge, at least two 1000-ton furnaces with monolithic carbon lining were under fire in Germany in 1939 after having each produced 3,000,000 tons of pig iron. At the same time several furnaces, some of them with rammed linings, others with carbon block linings, were in operation at the Lower Rhine in Belgium and in Russia with production records well over the 2,000,000 mark and with life expectancies near or over 3,000,000 tons. On the other hand, German, Russian and French carbon lined furnaces had to be torn down without having reached the 2,000,000 ton goal; the end of the campaigns being brought about, however, by causes outside of the hearth and bosh lining.

Even though carbon-lined furnaces are known to have produced in one campaign more iron than any firebrick lined furnace, no proof is available for the statement that the carbon lining considerably lengthens the life of a blast furnace. With our rather incomplete knowledge of the mechanism of wear of blast furnace linings, such proof cannot be furnished even from very complete data on campaigns of carbon-lined furnaces. Expectations of longer campaigns could not, therefore, be sufficient to induce a majority of European iron producers to abandon the fireblock lining in favor of the more expensive carbon. The carbon lining offers, however, a series of other very important advantages and the sum of these advantages seems definitely to outweigh the increase of initial installment cost.

Probably ranking first among these advantages is the safety and reliability of a lining which has none or at least considerably fewer joints than the fireblock lining; which is not corroded by slag or metal and which, due to its high heat conductivity, may be cooled very intensively. With the increases of hearth diameters, losses of iron through the hearth have become more frequent and more severe. The carbon lining eliminates these losses almost entirely. Shutdowns, loss of metal, loss of time and accidents are avoided and this safety, which cannot be expressed in tons of molten iron, may in itself compensate in single instances for the higher cost of the lining.

Perhaps no less important from purely economical reasons is the fact that, because of the high heat conductivity, the exceptionally high strength at elevated temperatures and the chemical inertness of the refactory, the carbon lined parts of the furnace need to be cooled on the outside of the shell only. No cooling plates are used inside of the carbon lining and in comparing the prices of fireblock and carbon linings, the costs of installation and maintenance of the copper cooling plates have to be considered for the firebrick lining only.

Chemical destruction of the fireblock hearth causes the formation of a salamander, which especially in the present large diameter hearths attains considerable dimensions and usually eats deeply into the concrete founda-

TABLE II

Comparison of American and European Blast Furnace Fireclay Block

Ultimate analysis, per cent:	A	C
SiO_2	52.3	53.2
$FeO + Fe_2O_3$	1.8	1.4
Al_2O_3	41.0	42.1
CaO	0.2	0.3
MgO	0.4	0.1
TiO_2	2.4	1.3
$K_2O + Na_2O$	1.4	1.6
Specific gravity	2.720	2.695
Bulk density, grams per sq. cm.	2.29	2.28
True porosity, per cent	15.4	15.4
Compressive strength, lb. per sq. in.	..	13,500
Pyrometric cone equivalent	32½	34 to 35
Refractoriness under load, 2 kg. per sq. cm.		
Beginning of deformation, deg. F.		2,786
Sudden softening, deg. F.		2,948

tion of the furnace. The expenses and the loss of time resulting from the tearing down of the lining, the removal of the salamander and subsequent relining increase considerably the initial cost of the firebrick lining. Although carbon refractories do not react with slag and metals, mechanical erosion and abrasion of the carbon lining take place and the iron does become embedded in the carbon hearth. A salamander in the carbon lined furnace, however, does not even reach the firebrick base on which the carbon lining was laid and losses of iron through the hearth into the foundations are, therefore, entirely avoided.

The initial difference between the costs of the fireclay and the carbon lining is further decreased not only by savings in time and labor when the furnace has to be rebuilt and by the easier removal of the large carbon blocks than the corroded and slag and metal saturated fireclay blocks, but also by the salvage of entirely unchanged or only slightly damaged carbon refractories.

These economic advantages together with a simpler, smoother and safer operation are the reasons why most blast furnace men, once having operated a carbon lined furnace, decide in favor of the expensive carbon lining. Undoubtedly, a carbon lining has a much longer life than the fireblock lining. The life of the carbon lined furnace is not limited, therefore, by the life of its hearth and bosh, and exceptionally long campaigns with extraordinarily high total production have been and will be obtained, if shutdowns for reasons other than destruction of hearth and bosh can be avoided.

In peacetime the iron industry of the United States consumes more than one million dollars worth of blast furnace refractories annually. In one campaign single blast furnaces produce 2,000,000 tons or more of pig iron. The average life of a blast furnace lining is, however, far below this figure and the life of hearth and bosh is one of the factors determining this limit. The use of carbon as a blast furnace refractory offers one means to increase this average. Therefore, the carbon lining which has proved the most economical in large European blast furnaces, but has never been tried in this country, deserves earnest consideration by the American iron industry.

Bibliography

Wernicke, "The Manufacture of Refractory Materials of Construction," Berlin, 1921, p. 181.

Geiger, "The Use of Carbon Blocks in Blast Furnace Operation," Stahl und Eisen, Vol. 32, 1912, pp. 1685-1690.

Uraloff and Ryshik, "Carbon Blocks: Their Manufacture and Properties," Ogneupory, Vol. 1, 1933, pp. 4-10.

Uraloff and Berezhnoj, "Carbon Blocks," Ukraj. Instit. Ogneup., Bull. No. 31, 1934.

Gussinskij, "Refractory Products in Germany," Ogneupory, Vol. 3, 1935, pp. 60-64.

Carlier, "The Manufacture of Carbon Refractories," La Céramique, Vol. 39, 1936, pp. 69-73.

Klesper, "The Use of Carbon Blocks," Feuerungstechn, Vol. 24, 1936, pp. 44-46.

Weinges, "Ramming Hearth and Bosh of a Blast Furnace with Carbonaceous Material," Stahl und Eisen, Vol. 56, 1936, pp. 845-847.

Singer, "Carbon Linings for Blast Furnaces," Metals and Alloys, Vol. 10, pp. 104-108.

Vosburgh, "Carbon Linings for Blast Furnaces," Metals and Alloys, Vol. 10, 1939, pp. 133.

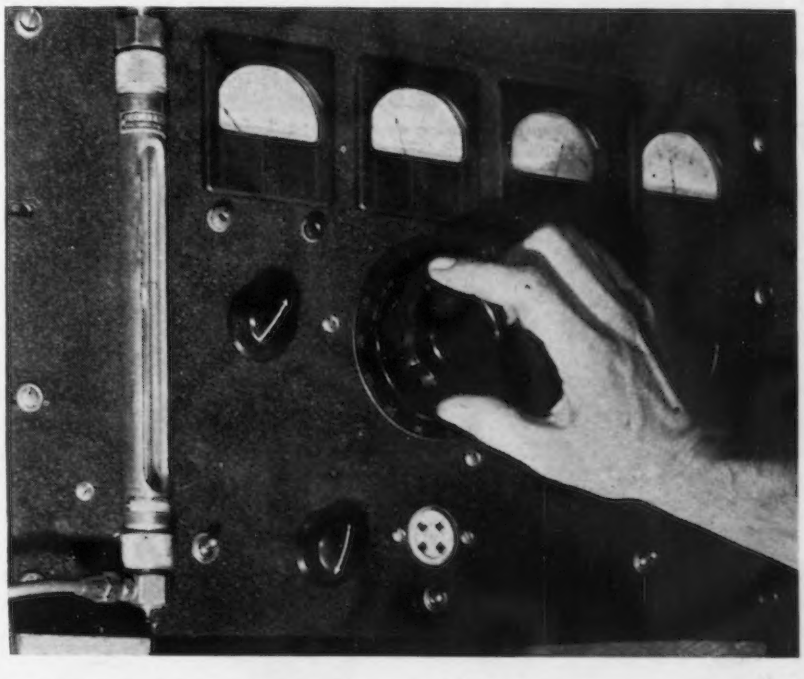
McLain, "Present Application and Possible Future Development of Blast Furnace Refractories," Bull. Amer. Ceram. Soc., Vol. 19, 1940, p. 64.

Vosburgh, "Carbon, A Refractory Material," Steel, Vol. 112, No. 14, 1943, p. 106-110, 145; No. 15, p. 118-125, 146-147.

Electronic Device Detects Oxygen in Furnace Gases

ONE way of detecting the presence of unwanted oxygen and water vapor in heat-treating atmospheres is by passing the gas over a cool surface and by noting the temperature at which condensation occurs. This temperature of condensation (dew point of the gas) varies between =40 and =70 deg. C. depending upon the requirements of the process. Even skilled operators differ in their estimates of dew-point temperature, especially when it is of the order of =40 deg. or lower. Furthermore, the process is not continuous and requires the operator to take periodic samples of gas to make the test.

An experimental device developed by Westinghouse utilizes electrons to do the detecting. Oxygen and water vapor are ionized by electron bombardment, whereas constituents of furnace gases are not. The arrangement draws a sample of the gas mixture past an electron gun. As long as the gas is free of impurities, the electron current is constant. However, when oxygen or water vapor are mixed with the gas, some of the electrons are utilized in forming negative ions. This causes a measurable decrease in electron current. Although most electron tubes are vacuum devices, the tube employed here is essentially a diode tube which operates with both ends open. The electron emitter and the plate continually operate in a stream of hot furnace gases and provide a continuous indication of gas quality. At present the new development is strictly a laboratory instrument and is not commercially available. Applications of the dew-point indicator will probably be restricted to certain types of furnace gases.



CLOSE-UP view of operating panel for new Westinghouse dew-point indicator. The device detects presence of oxygen and water vapor in furnace gases.

Plastic Dipping for E

By HARRY FORSBERG
President, Japan Co., Cleveland

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THE extraordinary rigors to which war supplies are subjected in transit and in landing have resulted in a series of very stringent packing specifications. There is no question that such safeguards are necessary, for equipment shipped abroad may be attacked by salt air, salt spray, unusual humidity and extremes of heat and cold; it may be tossed overboard for the tides to deliver to some remote shore and may lie under the burning tropic sun for days; it may be exposed to engine room heat on the way to an arctic region where its temperature will drop 100 degrees upon landing.

Such conditions have been combatted by dipping metal parts in various types of grease and wax, by wrapping them in waterproofed papers, and by packing them in waterproof containers. There are several distinct methods of doing this, but they all have one thing in common—they slow down the flow of supplies to the fighting front.

A new method of preparing metal parts has been developed for export shipping which is fast and efficient. This method, which is described by the Ordnance Department as "compound protective ethylcellulose stripping," has not yet been given blanket approval by any of the armed services, but it has passed muster and authorities in a number of specific cases, notably in the preparation of spark plugs for shipment overseas. For the time being, those wishing to adopt it should make a separate application to the government for each job under consideration.

Compound protective ethylcellulose stripping consists of dipping the parts to be treated in a molten plastic material, from which they pick up a thin, completely enveloping film (See Fig. 1). This film cools in about 4 sec. to form a tough, waterproof, abrasion-resistant corrosion-resistant coating which will withstand temperatures over 300 deg. F. without melting and sub-zero temperatures without becoming brittle. No wrapping and rewrapping, and no use of paper or similar materials are involved. Once coated, the parts can be boxed for shipping without delay.

Although the film applied fits the treated parts like a skin, it has no adhesion and can be stripped off in a few seconds simply by slitting it from top to bottom with a pocket knife (See Fig. 2), leaving the protected parts clean and ready for use. Thus it is a time saver at both ends of the war supply line.

Compound protective ethylcellulose stripping is suitable for protection of a variety of different parts. It is particularly suited for such things as machined surfaces of axle shafts,

RIGHT

FIG. 2—The plastic film being stripped off. The film comes off without sticking, even though it encased the part so closely that every thread of the shaft left a perfect impression in the film.

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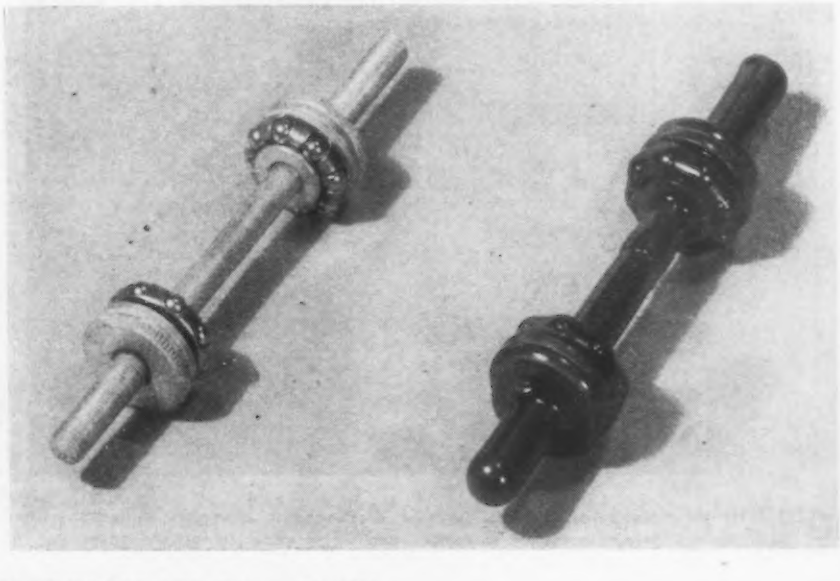
BELOW

FIG. 1—A small axle shaft with a bearing on either end, before and after being coated with ethylcellulose stripping material.



Export Shipment

complete axle assemblies, camshafts, connecting rods, gears, intake and exhaust valves, and the like. In treating parts with large holes, care should be taken to plug the holes before dipping, although there is no reason why interior surfaces cannot be coated, so long as there is adequate room to strip the film off. Small blind holes are bridged satisfactorily by the film, although it is not possible to say exactly how small a hole will be bridged or how large a hole will not. Experimental dipping has been found necessary in many cases.

Coating of very thin parts is not recommended, because the metal may act as a knife to cut through the film. The film will withstand considerable pressures without appreciable flow or cutting through, although extremely heavy parts with small or narrow bearing surfaces should be cushioned with soft packing or supported with blocks to increase bearing surface.

No change in metal clearing standards is effected by the use of this plastic stripping materials. Fingerprints will cause rust under it just as they will under any other form of coating. Surfaces are prepared as outlined in "Instructions for Cleaning and Preserving Ordnance Material M-406 (TM-38-305)." In fact, with this method, there is the additional possibility that dirt on the parts will contaminate the melt, and therefore parts must be cleaned with care.

. . . All types of machine parts may be dipped in ethylcellulose plastic, which affords complete protection to the point of delivery. The coating is transparent and may be stripped off with complete ease.

The simplicity of this method indicates that it will remain in use for export shipping in time of peace, and at least one other important use has been suggested for it. At present, the film applied is somewhat cloudy and varies in color, but it probably will be possible to produce it in transparent form. It could then be used instead of grease, paper wrapping, cloth bags and other protective encasings for domestic shipping. A film-protected metal part such as an engine valve, with its identification number in plain view through the film, could be placed in a stock or supply room and when the need for it arose, could be stripped in a few seconds for immediate use without cleaning.

To return to the present, it is not supposed that compound protective ethylcellulose stripping will supplant in every case the standard methods now in use. These procedures are planned to meet U. S. Army specification 100-14A, U. S. Navy specification 39P16A, and U. S. Engineers specification E. M. 100.

Titanium Pre-Dip Process Increases Life of Zinc Coatings

MILLIONS of dollars have been spent on paints, finishes, and treatments to delay the inevitable rusting or oxidation of metals. Conspicuous success has been achieved by treating metal surfaces with phosphoric acid solutions to increase paint adhesion and thereby improve corrosion resistance.

Zinc remained stubborn and would not take the phosphate coating evenly. Early in this work a curious phenomenon was discovered by Westinghouse engineers. If the zinc surface is wiped with the hand, a brush or a cloth before it is treated, excellent phosphate coating results. Just why this happens is not altogether clear. Nevertheless, many methods of wiping the zinc surface before treatment were attempted. In production, however, uniform wiping is difficult even on plane surfaces; on irregular objects it is impossible.

In manufacturing zinc plated frames for outdoor-type watthour meters this problem of preparing the zinc surface to take the secondary protective coating of paint became serious. A young Westinghouse chemist proposed doing the wiping chemically instead of mechanically. Countless dips were tried with indifferent and inconsistent results. One day disodium phosphate was tried, with excellent results that could be duplicated as long as that particular batch of phosphate lasted. With the next lot of disodium phosphate the result was a failure, although ordinary chemical tests revealed no difference. Finally in desperation a more critical test was made and a faint trace of titanium—one part in a million—was found. Herein lay the answer. For some reason a mere whisper of titanium is the magic that makes the pre-dip solution of disodium phosphate work as a chemical wipe on zinc for subsequent and final phosphating treatment.

The process is now being applied extensively on a commercial scale for protection of hundreds of zinc-coated machine parts for both war and peace. Certain war products receive a layer of zinc only 0.0003 in. thick. When given the titanium pre-dip and the normal phosphate coating they are able to meet the 100-hr. salt spray test with ease. Without the titanium pre-dip, corrosion appears in an hour or two.

The titanium pre-dip has several signal advantages for phosphate anti-corrosion treatments that are otherwise conventional. It secures a protective coating on zinc and provides a finish that does not necessarily require further coating. In some cases, to meet the salt spray test, parts were made corrosion-resistant by electroplating first with copper and then applying a baked black enamel finish. Phosphating with titanium pre-dip is much faster, less expensive, requires no critically short copper and is many times more protective.

The pre-dip can also be used for phosphating of steel. While the resulting improvement in corrosion resistance is not always so marked as with zinc, it reduces the time required to form the protective coating.

Boron Treated Electrode Coatings Aid

Cast Iron Welding

. . . Boron introduced into the coating of Monel welding electrodes appears to behave as a flux, permitting thorough binding between the monel and cast iron, giving an excellent weld.

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By DR. J. A. NEUMANN
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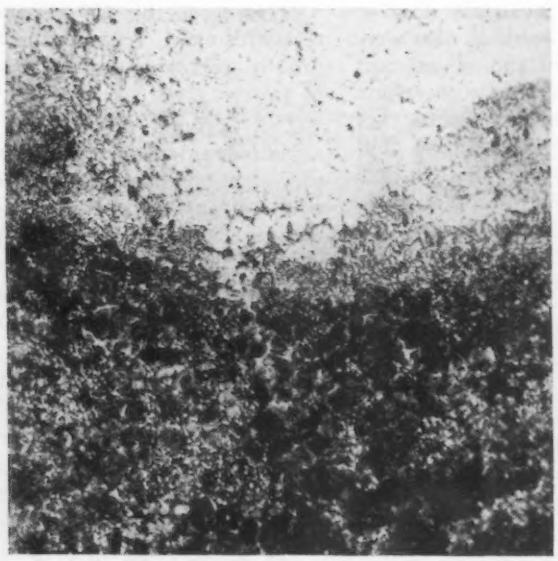
THE welder of cast iron realizes that the success of this work depends upon full knowledge of the behavior of the welded piece under the heat of the arc and after cooling. Familiarity with the stresses that occur and a knowledge of the electrodes applied are further requirements for successful cast iron welding. The metallurgist, on the other hand, is responsible for what the electrode will do, and, through research, for the final achievements.

For welding cast iron without preheating — and where machinability after welding is essential — non-ferrous nickel-copper (Monel) electrodes are used, since these alloys do not harden and do not absorb free carbon from the molten pool. The monel electrodes are heavily coated, but the coating composition until recently has never been regarded as very important. Nevertheless, the coating is important to a great extent in influencing fluidity, soundness, binding properties, and penetration. Furthermore, in combination with applied heat, the coating can practically eliminate the narrow martensitic hard zone found between the monel deposit and the fused cast iron.

This fusion line, when it results from welding with a mild steel electrode, causes the carbon to be absorbed and the ensuing hardness is in the range of self-hardening steels with carbon contents of 0.9 to 0.7 per cent, as shown in Figs. 1a and 1b. When welding with Monel electrodes with a fluxing coating, this range is still present, although to a lesser degree because of the lower melting point of the Monel metal and because of its immunity to carbon. To eliminate these hardened zones entirely, a study was made of what occurs during the heating and cooling, and the possible control of the chemical processes of the fusion line.

The chemical composition of cast iron is responsible for its mechanical properties, and the chief ingredients, apart from iron, are carbon, silicon and manganese. The carbon content is usually between 2.5 and 4 per cent. As



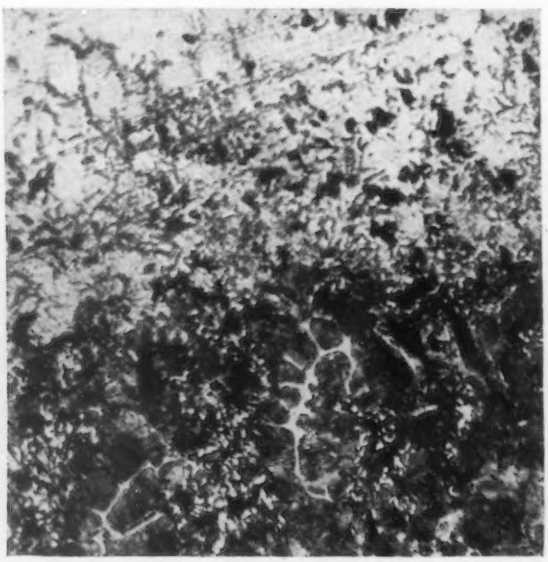


Fig. 1a (Left) — (100 diameters, nital etch)
Fig. 1b (Right)—(300 diameters, nital etch)

This microstructure of the weld fusion line shows dendritic structure and grain formation in nickel rich areas. The pearlitic zone contains spots of cementite close to graphite flakes.

the silicon content is chiefly responsible for keeping the carbon from turning into solid solution with the iron to form cementite, the silicon content is largely dependent upon the carbon content, but it is not lower than 0.75 per cent.

The hardness of gray cast iron will normally range from 130 to 200 Brinell and possesses good machinability. Small additions of nickel usually increase the hardness. Hence, it has been found that 1 per cent nickel at 3.5 per cent carbon and 2.6 per cent silicon results in a hardness of about 220 Brinell in the cast iron; while 2 per cent nickel with the same carbon and silicon content yields an iron running about 260 Brinell. By decreasing the silicon content, the hardness would also increase.

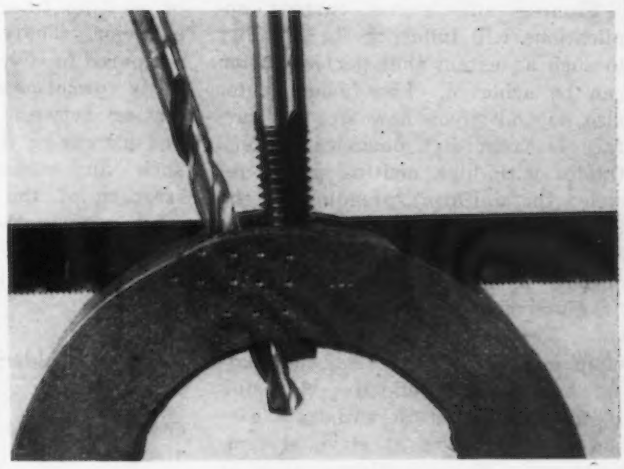
Alloy Effects

Summarizing the effect of the alloys in cast iron, it can be said that the graphite formation is promoted by the alloying elements silicon, nickel, copper, aluminum, titanium, zirconium, and boron; while the cementite formation is furthered by chromium, manganese, molybdenum, vanadium, sulphur, and oxygen.

Because Monel contains 67 per cent nickel and 29 per cent copper and does not contain cementite promoting alloys, it is obvious that this alloy has been chosen to make weld deposits on cast iron. From a chemical point of view this was promising, but cast iron heated to melting temperature and then chilled can be changed from the ferritic to a pearlitic matrix. And, since the solidification shrinkage is also associated with the formation of the grain size, segregation can be brought about where the carbon gets into solid solution to form small particles of hard cementite.

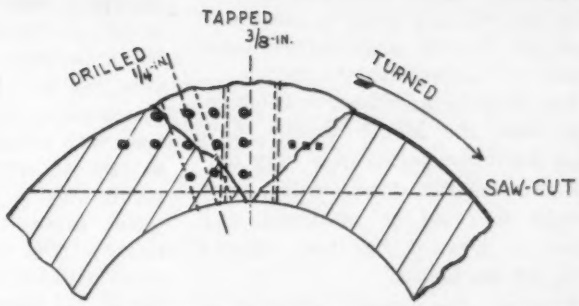
When the molten drops of Monel are deposited on the cast iron surface, which is cold and behaves as if it is not wetted, the surface tension of the liquid metal prevents thorough binding and the weld has not sufficient flowing power to wet and fuse with the surface. With increasing carbon, the cast iron has a higher surface tension than steel and one much higher than Monel.

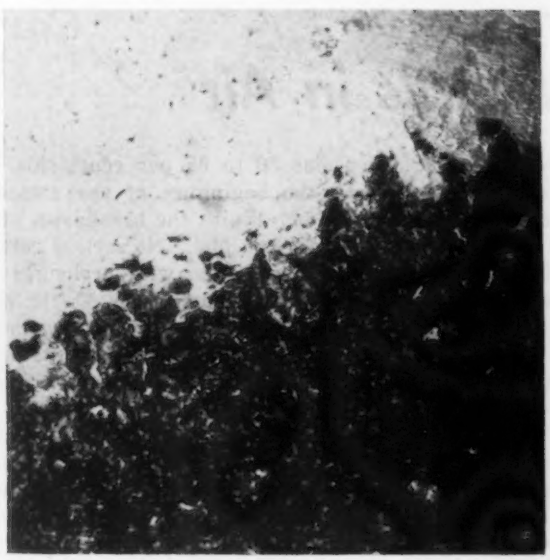
Fig. 3a—(Tested weld)



This 4-in. ring with an 0.75-in. wall thickness was welded with a Monel electrode designed to impart boron through its coating. No hard spots were found in the weld, and drilling, tapping, sawing, and turning were performed without difficulty.

Fig. 3b—(Position of tests in weld)





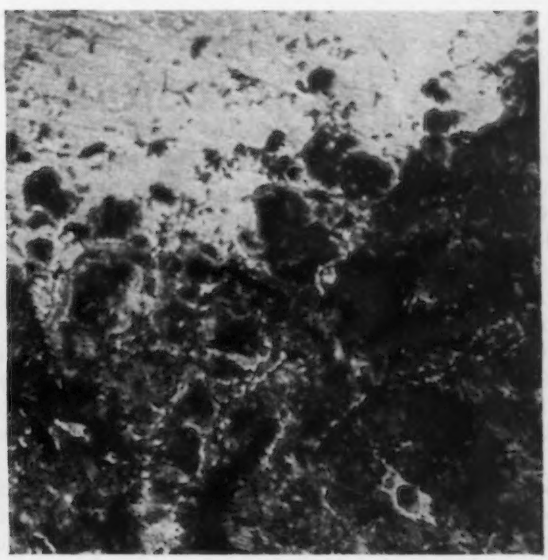


Fig. 2a (Left—(100 diameters, nital etch)
Fig. 2b (Right)—(300 diameters, nital etch)

A sharp distinction indicates the junction of the weld made with Monel electrodes, the coating of which was boron treated. Carbon diffusion is not visible and no change occurred in the cast iron.

Fluxing and higher current applications will influence the liquidity to such an extent that perfect fusion can be achieved. The fusion factor also depends upon how free the surface is from dirt particles or oils. Oxides with high melting points restrict the uniform spreading of the fluid metal and thereby decrease binding qualities. To avoid such conditions, a strong refiner, such as titanium or zirconium must be present. Ferro-titanium or ferro-zirconium is added to the electrode coating for the most effective cleansing of the metal and to withdraw carbon from solution at elevated temperatures. These additions melt at 2370 deg. F., and dissolve quickly in cast iron leaving a deoxidized metal ready for fusion with the monel.

Yet all these additions, in combination with the Monel deposit, have none the less resulted in a very narrow martensitic zone, which, even though it could be machined, still shows a marked hardness against filing or machining.

Through the small addition of boron in the form of ferroboron, a remarkable change takes place. The martensitic hard zone disappears as definitely shown by the micro-photographs, but the explanation for such an occurrence is not yet quite satisfactory. It appears as if boron behaves as a flux, permitting thorough binding between the Monel and the cast iron, washing aside the graphite flakes and wetting the surface. It may be possible that the temperature or wetting time also influences this behavior. The whole process may be compared to silver solders, which suddenly spread over larger areas, penetrating between the graphite flakes and increasing the binding surface to such an extent that the tensile strength of the connection becomes much greater than the welded area, thus obtaining 100 per cent safety for the weld. This is shown in Figs. 2a and 2b.

Welded Cast Iron

In practical application, Figs. 3a and 3b show a cast iron ring 4-in. in diameter and with an 0.75 in. wall thickness that was welded with a monel electrode designed to impart boron through its coating. The outside gap was held to 0.5 in. with a distortion of but 0.0625 in. After the weld was completed, it was turned in a lathe at ordinary speed with commonly used high speed steel, no unusual precautions being taken. The collar of the weld was originally the same with the exception that some of the Monel from the weld spread over the joint line. The weld was then etched to make the fusion zone more visible. The figures close to the impressions depicted show the distribution of hardness, such as between 160 and 170 Brinell for the cast iron base and between 120 and 132 Brinell for the monel weld deposit. The fusion zone itself was measured with a diamond indentor on the Rockwell "C" scale. Fig. 3b shows clearly where these indentations were made. The figures, converted to Brinell, show also 130 Brinell for the monel and 170 Brinell for the cast iron portions. No harder spots could be found.

When drilling a ⅜-in. hole through the center of the weld and a ¼-in. hole through the fusion line, no difficulties whatsoever were encountered. Furthermore, no difficulties showed up when the ⅜-in. hole was tapped and the welded section sawed with a metal handsaw. The position of each of these operations can be observed in Fig. 3b, which is a cross sectional drawing of the original sample. These results plainly prove that the weld was soft, dense, easily machinable and before etching hardly different in color or appearance than the cast iron.

The welding of cast iron without preheating is generally employed in machine shops where gears, levers, valves, and other important parts are used. This method of repair quite frequently saves not only the machine parts, but prevents undue delays and losses of valuable production time. As such castings are brittle and the danger of breakage is always present, sufficient stocks of the boron type electrode and knowledge of its use can be advantageous to the shop. Of course, a knowledge of the technique of welding cast iron with these electrodes is essential, because each job presents its own problems. The welder experienced in repair work of cast iron will perform many successful repairs on large and small castings with the specially coated boron electrode that with other types of rods might not prove nearly so successful or might even be failures.

Corrosion of Metals in Air

IN reviewing some of the results achieved in corrosion investigations at the National Physical Laboratory, England, W. H. J. Vernon in *Chemistry and Industry* points out that contrary to popular belief a clean iron surface will rust freely in an ordinary room atmosphere of low relative humidity.

Rusting proceeds from sporadically distributed centers having no relation to any factor connected with the metal itself. The number of centers increases with time. Specimens exposed in a muslin cage remained entirely free from rust while control pieces exposed immediately outside rusted freely. Nuclei for the rust centers were therefore provided by disperse particles in the atmosphere. The rate of attack due to disperse particles at low relative humidities falls off as the available unattacked areas become reduced. At increased humidities a point is reached at a relative humidity of 70 per cent when an enormous increase in the rate of rusting occurs.

Specimens were inoculated with particles of ammonium sulphate, others with silica, and others with charcoal and then exposed either to purified air or to air containing a little sulphur dioxide. The relative humidity was gradually raised to 99 per cent in 32 days, at which it was kept for 68 days more. The weight increments due to rusting were measured. Although the system was below saturation for the whole period, the first critical humidity occurred in about 20 days at a relative humidity at 50 to 65 per cent; this indicated the beginning of the attack on the metal with the breakdown of the air formed film. No serious corrosion occurred even with prolonged exposure at this humidity. At the secondary critical humidity, approximately 8 per cent, a relatively large increase in corrosion occurred with the production of ordinary red rust.

Particles of ammonium sulphate are effective in promoting attack with no sulphur dioxide in the atmosphere while charcoal has no intrinsic effect but does become very active in the presence of traces of sulphur dioxide.

No evidence has been found to support the belief that carbon dioxide permits corrosion to go on indefinitely; on the contrary, atmospheric carbon dioxide has a marked repressive effect.

Reclamation of Cutting Oil

By ADAM T. KROL
Chief Research Chemist, Matam Corp., Long Island City, N. Y.

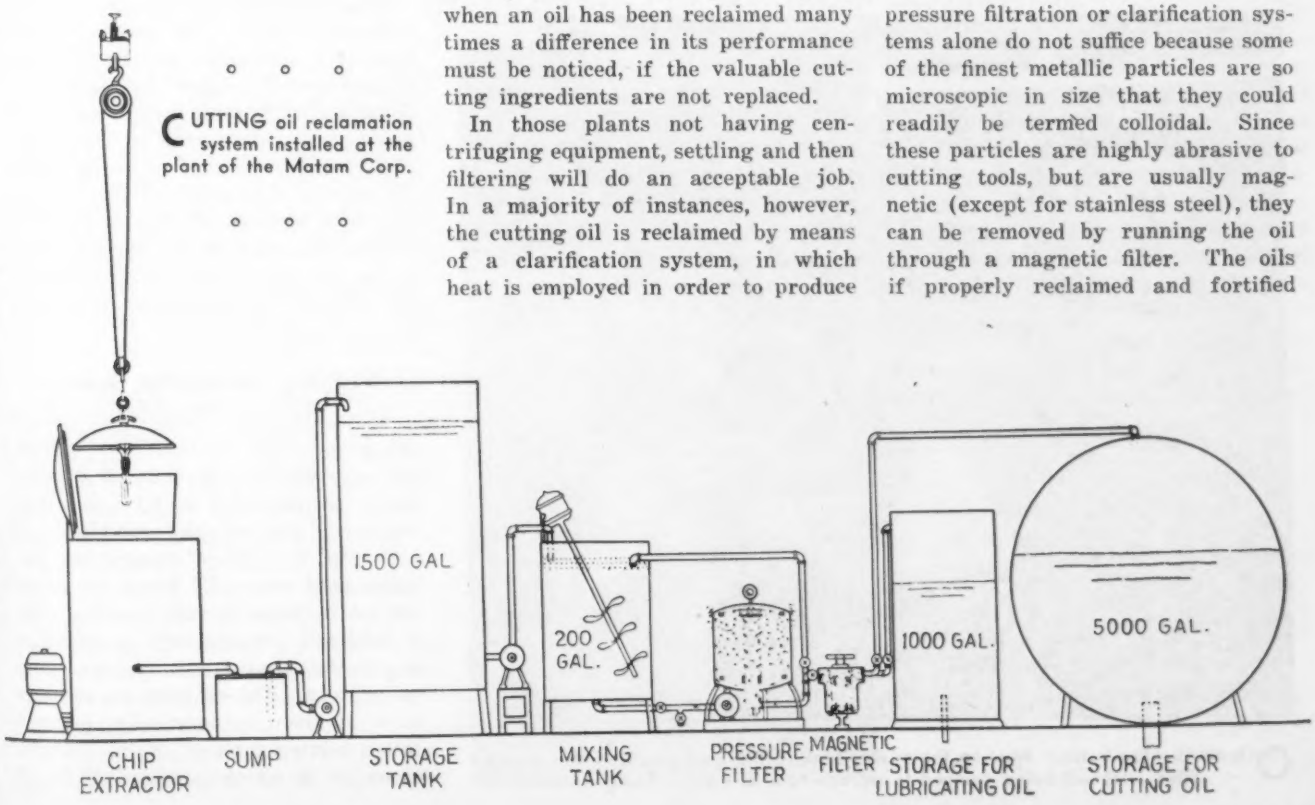
OIL reclamation is not only very vital in normal times but is particularly so in war time because of the savings made possible in raw materials, factory space, tool life and finished products, not to forget the manhours tied up with all these factors and in the production of oil otherwise necessary to make up this loss. As much as 30 per cent of the cutting oil in a machine may be removed with the chips. The amount so removed depends upon the viscosity and the stickiness of the oil and upon the nature of the chips. Fine or "hair" chips remove very little cutting oil; wide and tightly curled chips remove maximum amounts.

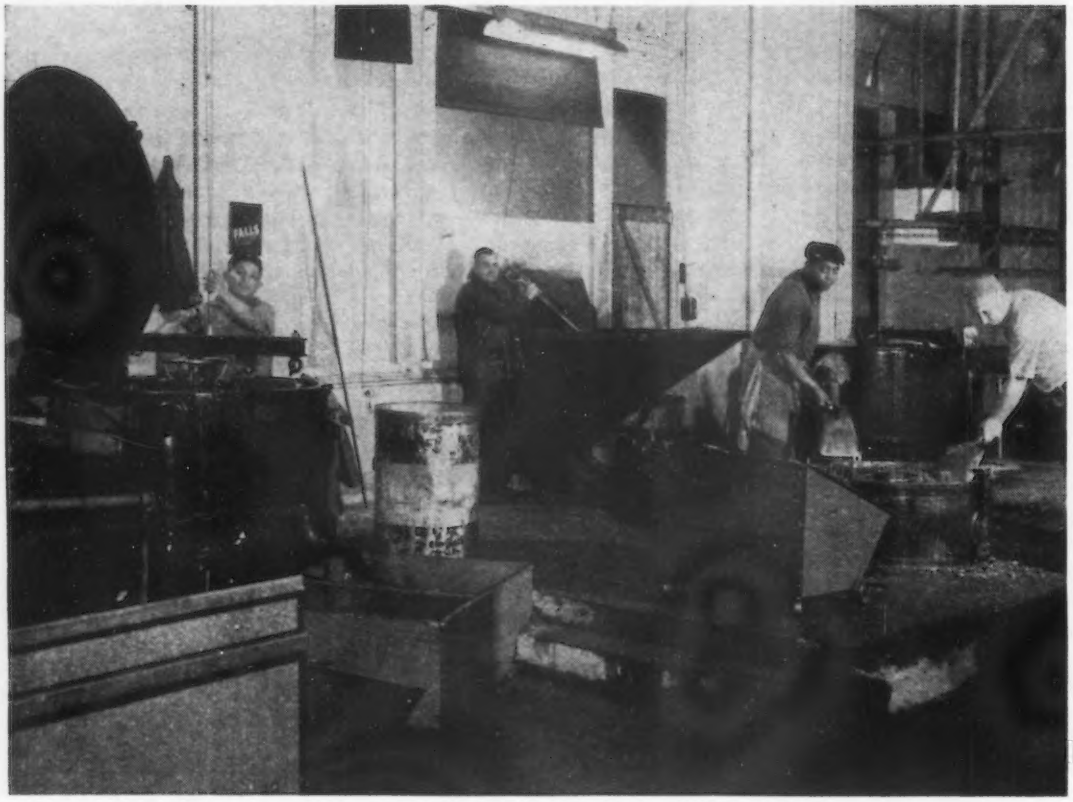
Cutting oils can readily be reclaimed by centrifuging, settling, filtering or by a combination of any one of these methods and subsequently made ready for service after concentrates and disinfectants have been added. As regards replenishment, it is a well known fact that under the terrific pressures exerted between tools and chips some of the most valuable elements in cutting oils are broken down. In good oils, the amount is only a fraction of 1 per cent, but when an oil has been reclaimed many times a difference in its performance must be noticed, if the valuable cutting ingredients are not replaced.

In those plants not having centrifuging equipment, settling and then filtering will do an acceptable job. In a majority of instances, however, the cutting oil is reclaimed by means of a clarification system, in which heat is employed in order to produce a lowering of the viscosity so that settling and filtration can be accelerated. In some instances the cutting oils are recovered from chips taken from the sumps of machines and allowed to drain directly into circulating systems which serve many machines in common. This last method is considered to be merely a cleaning and conditioning process and not a reclaiming one.

For best results, however, even pressure filtration or clarification systems alone do not suffice because some of the finest metallic particles are so microscopic in size that they could readily be termed colloidal. Since these particles are highly abrasive to cutting tools, but are usually magnetic (except for stainless steel), they can be removed by running the oil through a magnetic filter. The oils if properly reclaimed and fortified

CUTTING oil reclamation system installed at the plant of the Matam Corp.





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VIEW of the centrifuging room. One of the baskets is being loaded with wet chips in the middle of the area. Dried chips are dropped into the hopper over a slat conveyor to be taken to storage bins.

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may be repeatedly used many times over.

A typical oil reclamation system operates as follows:

(1) Remove oil from machine sumps and from chip extractors.

(2) Place oil in first settling tank. This drops out the heavy solids and is primarily a place of storage.

(3) Transfer oil to second settling tank and slowly raise the temperature to 180 deg. F. and hold at that point. Finer solids settle out at lower viscosity.

(4) Pass hot oil through a centrifugal cleaner.

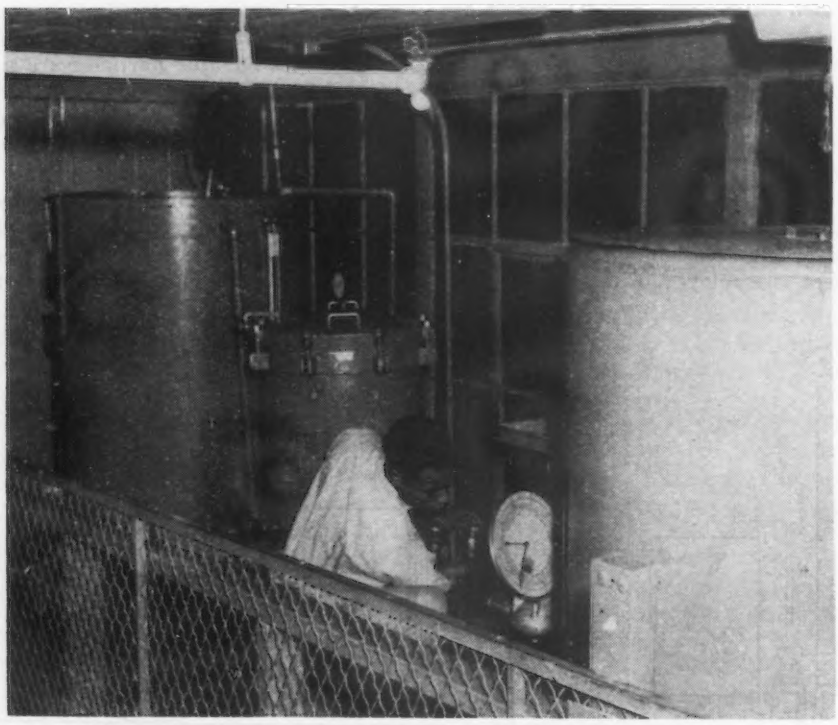
(5) Filter through cloth or through magnetic filter.

(6) Add oil concentrates and any necessary disinfectants.

(7) Cool oil.

(8) Return oil to system.

The Matam Corp. employs a slightly different system. The heating phase is entirely eliminated and by so doing, time is saved in regard to heating the oil to a specific temperature and then having to wait for it to cool sufficiently before it can be returned to the system for service. The following is a resumé of the reclamation system employed by the Matam Corp. on an oil which serves both lubricating and cutting purposes. (See layout of system).



OIL clarification setup. Next to the mixing tank in the background is the pressure filter. Clear oil being pumped to storage tank at right is being metered.

Matam's Reclamation System

After the chips have been whirled dry in a centrifugal extractor (product of American Machine & Metals, Inc.), for about 8 to 10 min., they are lifted out of the machine and conveyed to a chip storage bin for subsequent removal. From the sump the oil is automatically pumped into a 1500 gal. storage tank in order to empty the sump for subsequent chip extractions. The oil from the storage tank is then automatically pumped into a mixing tank of 180 to 200 gal. capacity, in which is added 20 lb. of

diatomaceous earth (Celite No. 535, manufactured by Johns-Manville). A propeller type agitator is used to insure a proper mixture of the diatomaceous earth and oil, because the earth has an added advantage of absorbing moisture and removing unwanted acids, besides brightening-up the color.

After about 3 to 5 min. of agitation, the mixture is then automatically pumped into the pressure filter (Sparkler filter Model 18-S-14, using oil filter paper No. 25, sold by Carl Schleicher & Schull Co.) and by-passed back into the original mixing tank until a gradual and uniform filtering media is built up over the filter paper. When the filtered oil does not show more than 0.025 per cent of *foreign matter present*, which in this instance can be either some free Celite, which is inconsequential, or/and magnetic iron in a colloidal state, *then and only then* the by-pass is closed and the oil passed through a permanent magnetic filter (Ferro Filter Model PQ-5, manufactured by S. G. Frantz Co.) in order to precipitate out the magnetic iron particles. Subsequently the oil is passed into two individual storage tanks.

Once the filtering media has been built up, additional oil can be passed through the filter media until approximately 400 to 500 gal. have been filtered or until such time when the filtering slows up.

From the first tank the reclaimed oil is used directly for lubricating purposes only and from the second tank the reclaimed oil is used for cutting purposes only, after being enriched with the proper proportion of concentrate to replenish the loss of the valuable elements in the cutting oil. An addition of disinfectant is also made to sterilize the cutting oil to prevent dermatosis. (Steridol No. 5, made by C. B. Dolge Co.)

Advantages of System

Some of the specific advantages directly attributable to the oil reclaiming system of the Matam Corp. are:

(1) Due to the fact that the reclamation is done *without any heating*, time and money as well as labor is saved.

(2) Since the oil after reclamation is used for both lubricating purposes and for cutting purposes after properly being enriched with a concentrate, the system is highly economical of oil and a reduced amount of oil need be purchased.

(3) There is an increase in the price per ton obtainable from the scrap dealer in dry, crushed turnings in carload or truck lots.

(4) There is an increase in cutting tool life. Since reclamation of cutting oil makes it economical to change the oil more frequently, this eliminates to a great extent the suspended carbon particles that burn and dull the tools cutting edge. Thus, there is a considerable reduction in the number of hours that a machine has to stand idle while the machine is re-tooled.

(5) There is economy in manhours, as the system is designed to be operated by a small number of men.

(6) Because the cutting oil is sterilized, a definite reduction in hand infections has been noticed and there is a reduction in absenteeism due to dermatitis.

Because the Matam Corp. employs the same non-staining and non-corrosive oil for both lubricating and cutting purposes, it is really comprehensible why a reclamation system is very profitable.

In the above-mentioned reclamation system for a total expenditure of 116 manhours or $106 per day, plus $20 per day for raw materials such as Celite and filter paper, approximately 8000 gal. of oil are reclaimed. With oil at approximately 30c. per gal., the money value amounts to $2400 for 8000 gal. of new oil or of reclaimed oil at a direct cost of $126 per day. With this system a total of approximately *56,000 gal. of oil* can be reclaimed per week very economically.

Movable Jig Speeds Air Intake Fabrication

TO hold the sections of the carburetor air intake duct of the P-39 Airacobra in place while being welded together, Bell Aircraft Corp., Buffalo, devised a special movable jig that clamps the two halves together. This jig holds the work firmly but allows for metal expansion.

In Fig. 1, the jig is shown in clamped position. Welding begins at the far end of the air intake, placed in the jig so that the two halves of the intake form a long V-shaped slot. As the welder progresses toward the forward end of the slot, the metal expansion caused by the heat and the rigidity of the welded part as it progresses forward brings the V-slot together on the open end. While the halves are held rigidly in place, the entire holding jig moves horizontally together, permitting the closing up of this gap between the pieces. Welding speed must be uniform so that the gap between the halves closes evenly.

Conventional procedure would be to hold the two pieces together and tack them, then proceed with welding. When the welding was completed, the part was usually warped and the sections buckled in many places. Straightening of the parts by hand was necessary before they could be used.

The fixture now used has a pair of clamps that run the full length of the seam, set back just far enough from the ends of the metal to give the welder room to work. This firm gripping prevents buckling from metal expansion, eliminates the need for both an extra worker to hold the job, and for tacking before welding.

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FIG. 1—This jig, designed by Bell Aircraft Corp. engineers, firmly holds the two halves of the carburetor air intake duct of the P-39 while welding. Welding starts at the far end, with the halves so placed as to form a V-shaped slot. As welding progresses, the metal expansion closes the slot so that the finished part requires no hand forming.

Tooling With Plastics

By EMRIC W. BERGER

Chief, Manufacturing Research, San Diego Division, Consolidated Vultee Aircraft Corp.

. . . A new thermoplastic material called Toolite has been found to be especially valuable for making hydropress form blocks because of its high compressive strength. It is also applicable to tool jigs and checking fixtures. Mixing the ingredients is like making cake batter and is done on identical commercial equipment.

A YEAR ago when the War Production Board issued its order banning the use of aluminum for tooling, a great part of the aircraft industry was temporarily thrown into a state of chaos. There were a number of substitute materials on the market, but unfortunately most of them were critical materials that could not be obtained or possessed undesirable physical properties and characteristics.

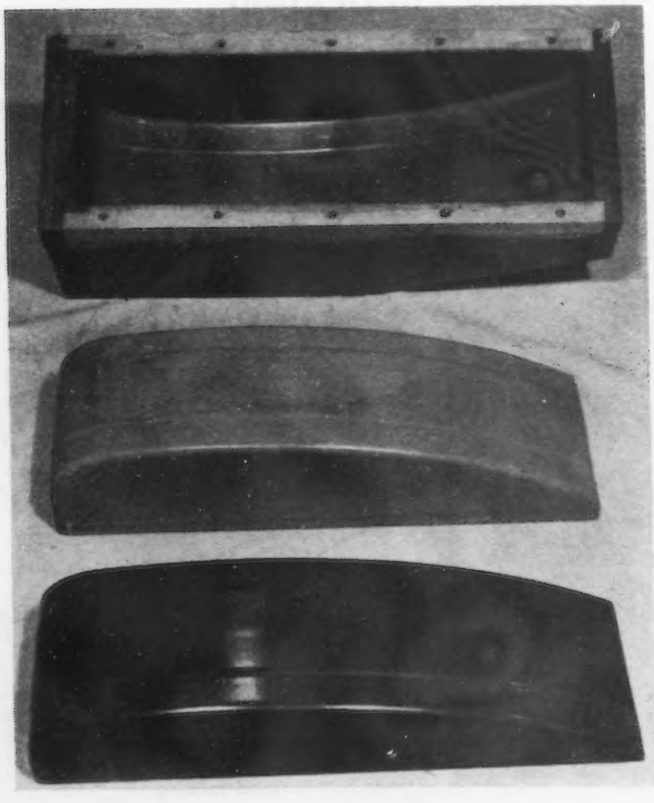
An ever-growing shortage of skilled tool makers for the fabrication of metal-forming dies and punches also demanded relief. When a compound die was needed for the hydropress, it was necessary to make a pattern, a sand mold and a casting; then the casting had to be machined. All of which required the experience of skilled help in order to attain adequate dimensional tolerance control.

At the Consolidated Vultee Aircraft Corp., an answer has been found to many tooling problems in Toolite,* a thermosetting cast resin whose ultimate possibilities are only beginning to be foreseen. Toolite is a homogeneous material with many desirable physical properties not ordinarily found in cast plastics. Foremost among these is an excellent compressive strength of 9000 to 12,000 lb. per sq. in.

** Toolite Plastic and the necessary catalyst are produced by the Adhere Corp., 1220 Maple Avenue, Los Angeles.*

After curing, the weight of Toolite is 77.38 lb. per cu. ft. and the specific gravity is 1.24. The material is inert to ordinary cutting compounds; oil and water absorption tests have revealed no visible effects after immersions in kerosene or water for periods of 24 hr. Although cured at a temperature of 160 deg. F., it withstands a temperature of 400 deg. At greater temperatures, it has a tendency to char, but it will not burn even when exposed to an open flame.

Available in numerous colors, for identifying types of tools, Toolite is opaque and has 100 per cent resistance to various alkaline and acid solutions (except in a few cases, where a surface coloring effect is noted). It is a non-conductor of electricity, and its contraction after curing at 160 deg. F. is only 1/32 in. per ft.



TOP: Female pattern made of wood. Middle and below: Male hydropress form block cast from Toolite plastic in the pattern shown above. The lower form has been coated with a parting lacquer.

Used With Plastalloy

Because of its high compressive strength Toolite has been found to be especially valuable in making hydropress form blocks, tool jigs and checking fixtures. In combination with Plastalloy* for a punch, it has further been found suitable for making female dies and pressure pads for double-action hydropress operations. A window frame part of 0.050 gage 24SO aluminum alloy with a holddown

** Another cast thermoplastic material made by the Plastalloy Co., Burbank, Cal.*

RIGHT

LEFT: Toolite plastic form block and part making reversed bead, top. Right: Toolite plastic form block with right and left hand part.

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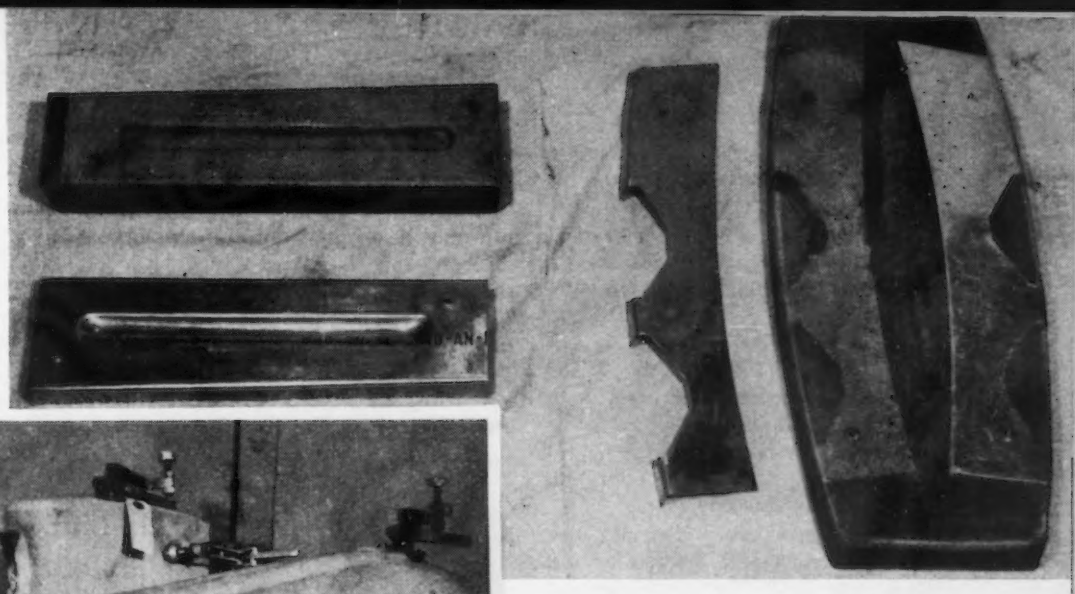

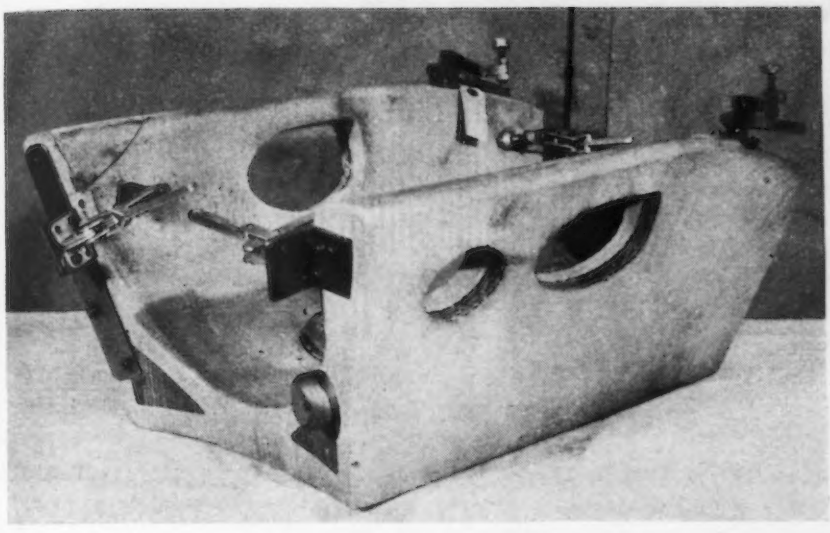

A Toolite plastic router block, with toggle clamps for holding formed sheet metal part in place.

area of 20 x 30 in. has been successfully formed, with 150 tons on the Toolite pressure pad and 300 tons on the thermoplastic punch and Toolite female die.

The female die and pressure pad of Toolite are cast around the Plastalloy punch. This insures the accurate matching of contours, and eliminates the requirement for scraping in the parts for perfect contact with the sheet metal. The thermoplastic punch has sufficient compressive yield to allow for the metal thickness.

Long, slender aluminum dies have a tendency to curl upwards when used on a hydropress for a comparatively short period of time and this soon causes breakage. At Consolidated-Vultee, Toolite dies have been used for a period exceeding 10 months, some for 0.091 in. thick ribs with pressed beads and lightening holes, without experiencing either warpage or breakage.

High glaze surfaces, which make it possible to cast to accurate dimensions, have made Toolite the choice in building jigs and fixtures. But probably the most interesting and important aspect of all is the fact that the plastic is so easy to work. Even with the most inexperienced help, we find that we are able to make suitable castings of all types.

Speaking in non-technical language,

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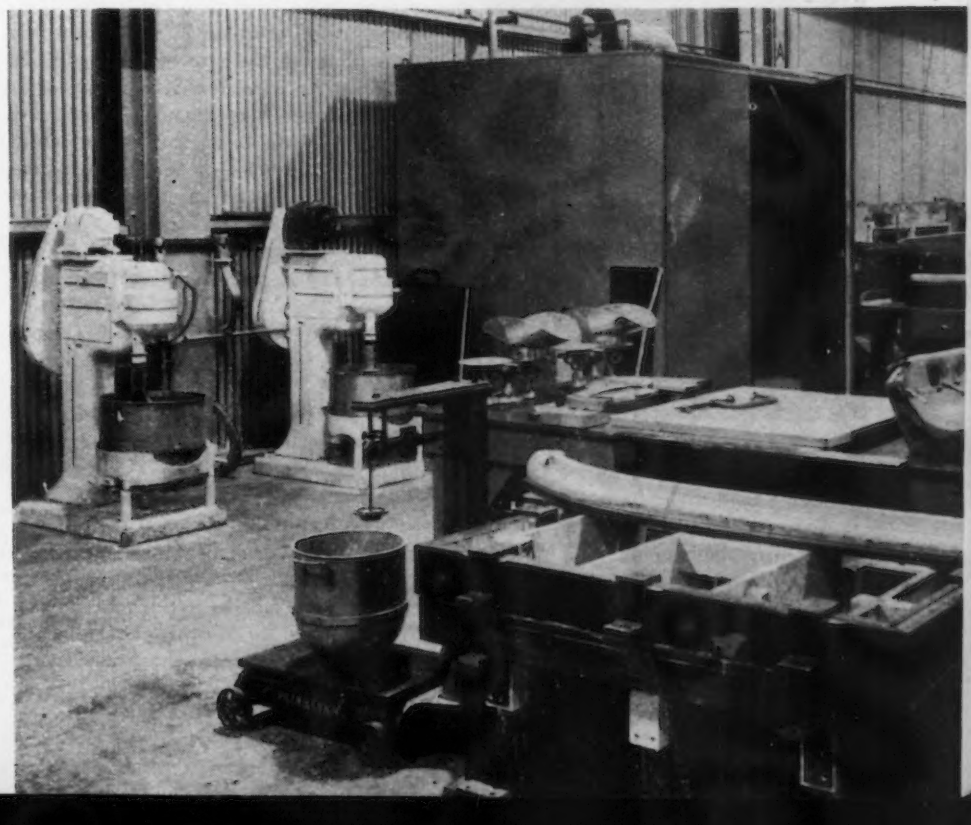
THE Consolidated Vultee Aircraft Corp.'s plastic shop. The mixing machines shown in the left background are standard dough mixing machines found in commercial bakeries.



For other articles that have appeared in THE IRON AGE on plastic tooling, see the following:

"Plastics in Production," by Dr. J. K. Leeg, Baker Oil Tools, Inc., Feb. 12, 1942.

"Plastics in Aircraft Tooling," July 2, 1942.

"Plastic Assembly Jigs and Fixtures," by Wm. D. Lewis, Timm Aircraft Corp., Oct. 1, 1942.

"Plastic Punches for Forming Aircraft Sheet Metal Parts," Feb. 18, 1943.

"Steel, Plastics and Zinc Used in Combination Die Sets," by John C. Wright, Vega Aircraft Corp., June 17, 1943.

"Forming Acrylic Resin Sheets with Plastic Dies," by Dr. J. K. Leeg, Sept. 9, 1943.

the entire process is like baking a cake. You mix the batter, butter the pan and cook in an oven. Of course, the actual process is a little more difficult than that, but it is nothing an inexperienced woman could not readily master.

A photograph showing the layout of the cast plastic shop at San Diego is reproduced with this article. Note the mixing machines; these are ordinary cake mixers, each with a capacity of 80 qt. Electrically operated, they have four speeds.

The forms for the tool design are made from wood or plaster, allowing 1/32 in. per sq. ft. for shrinkage and radius of at least ⅛ in. on all corners. The inside portion of each mold is covered with three coats of blue parting lacquer, made by the Scribner & Quinn Co. of Los Angeles, and one coat of Johnson's Glo-Coat wax. When plaster molds are used, they are thoroughly dried at 100 deg. F. in an oven before lacquering.

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POURING the Toolite plastic into a sheet mold formed of laminated plastic sheets held together with bar clamps. The ladle is a standard dough mixing bowl.

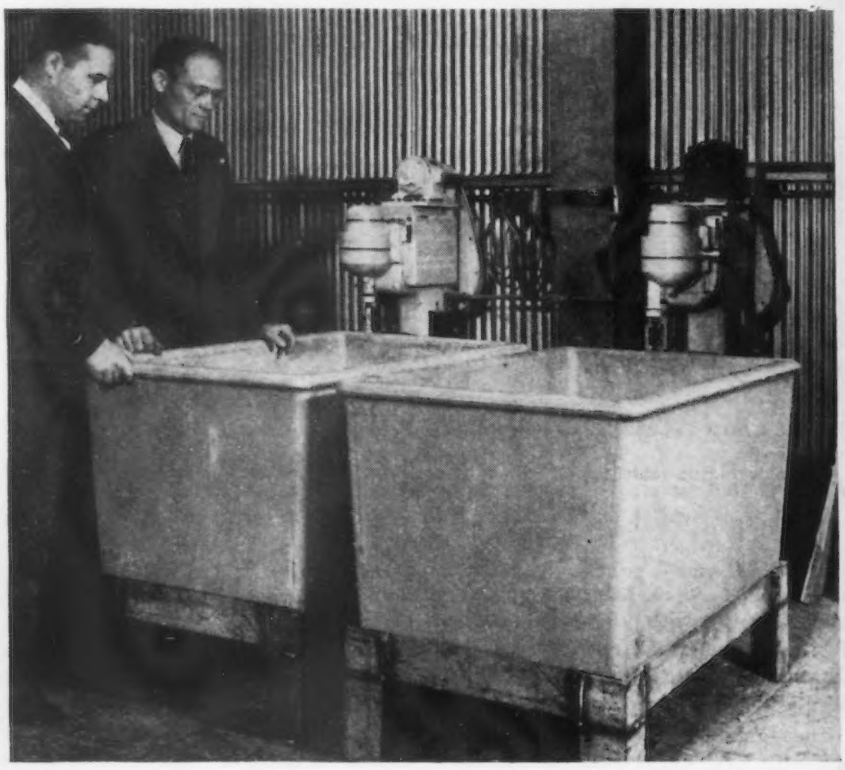
Two 30-gal. drums of Toolite are emptied into the storage tank and agitated slowly in order to keep the plasticizer thoroughly mixed prior to dispensing. Then the required amount (77 lb. for each cu. ft. of volume in the mold) is drained from the bottom tap of the storage tank into the mixing bowl (which is lined with tin) and the catalyst is added (4½ per cent). The mixing machine is operated at the rate of 160 r.p.m. for 15 min.

The mold is filled slowly and allowed to set for ½ hr. in normal atmospheric conditions. Then it is placed in an oven at a controlled temperature of 110 deg. F. for 2 to 6 hr., depending on the size of the mold. If the cast is a male, it is allowed to cook before it is removed from the mold. If female, it is removed while hot. The purpose of this is to insure adequate contraction allowance for separation from the mold.

The mixing tubs and bowls can be cleaned if immersed in a tank containing Turco Airlion No. 81 (6 oz. per gal. of water of 195 deg. F.) for a period of 3 to 5 min. immediately after use.

Experiments are being continued with Toolite for tools other than forming blocks. Tanks 4 x 2 x 2½ ft. have been cast and these are used as acid tanks in the plating department; they have been in service over six months with the acids showing no effect on the plastic. Such tanks can also be used to contain hot alkaline solutions similar to those necessary for spot-weld precleaning at 190 deg. F.

The most recent development in the use of Toolite is that of making blanking dies. To accomplish this, sheet tool steel has been cemented to the Toolite. Although this experiment is rather new, it is felt that it will completely revolutionize the manufacture of blanking dies, saving both materials and manhours.



Acid-proof tanks cast from Toolite plastic.

At San Diego, 3 x 5 ft. sheets are being continuously cast from Toolite from ¼ to 5 in. thick, which are bandsaw cut to size for simple form blocks. Also, waffle boards are being cast of this material to be used for flat piercing dies of approximately the same dimensions.

Solid Rosan* inserts with serrated locking devices are fastened in the forms after curing, then drilled for location pins from templates. This method assures more accurate locations.

When thoroughly cured, Toolite can be readily machined with any ordinary wood-working tools. Its machining characteristics are similar to those of hardwood, and in many cases the surfaces may be finished simply by means of either a planer or jointer.

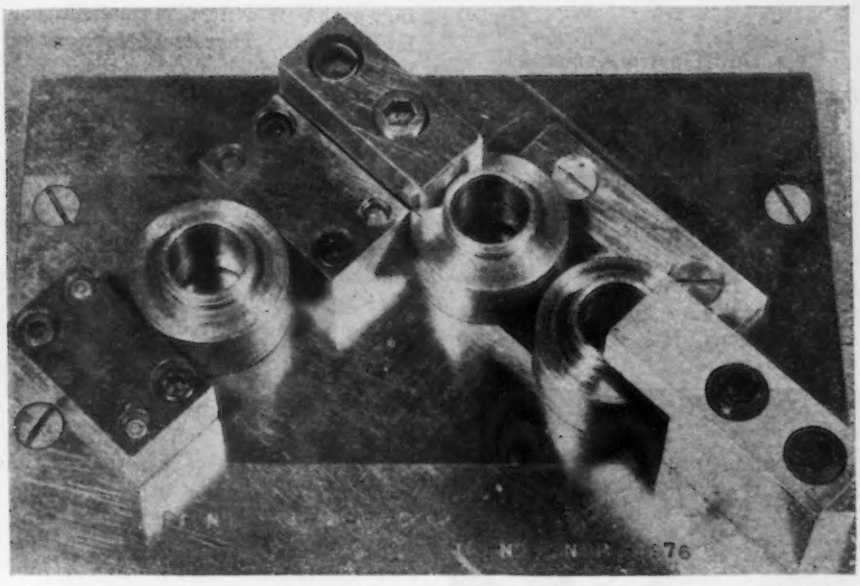
* *See "New System of Locking Studs and Inserts,"* THE IRON AGE, *Apr. 22, 1943, p. 44D.*

Fisher Short Cuts

. . . Hundreds of suggestions for production short cuts made by employees of the Fisher Body Division of the General Motors Corp. have produced noteworthy improvements in operations and work handling. Three typical innovations are shown on this page.

ABOVE

A ROTARY welding fixture was previously operated by push buttons, requiring that the welder lift his shield in order to actuate the rotary device. Jig and fixture department employee William Bolton suggested a foot control for the fixture. Its installation enables the operator to operate the rotary fixture with his foot during the period of welding.



ABOVE

THREE dimensions on bearing cups must be gaged and three snap gages were formerly used for this operation, making possible the checking of 290 pieces an hour. A special detail inspector at ternstedt, Mrs. Helen Bering, suggested a three-in-one gage, consisting of blocks mounted on a plate. The device is shown checking all required dimensions on three bearing cups. Its use makes it possible to check 538 pieces per hr., up 85 per cent from the former level.

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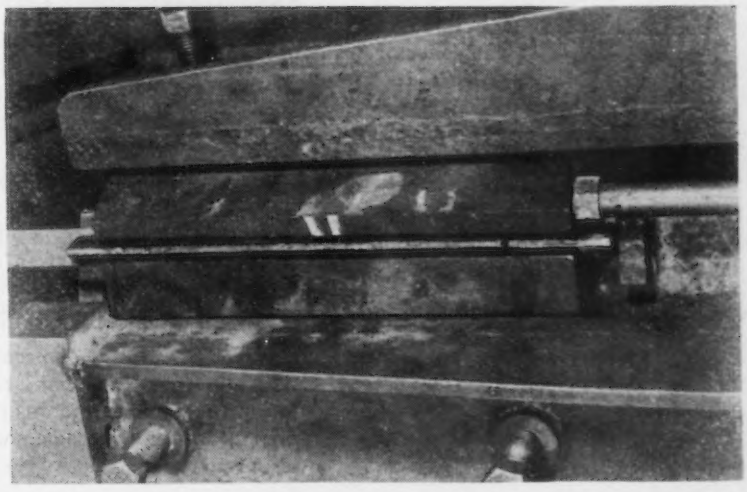


RIGHT

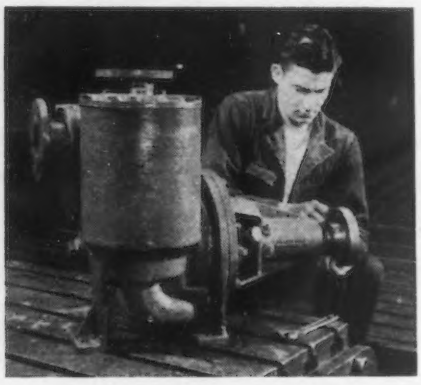
THE welding of vertical seams developed considerable difficulty at Ternstedt with the root bead cracking on the inside surface of the weld during cooling, necessitating extensive grinding of the cracks and rewelding. Welding instructor Clarence Hood suggested a back-up bar with a concave rather than a flat surface, producing a convex surface on the inside of the weld. The weld was strengthened, and at the same time cracking, grinding and rewelding has been all but eliminated.

New Equipment . . .

. . . . Plant Service

A large assortment of unclassified shop equipment is described and illustrated in the following pages

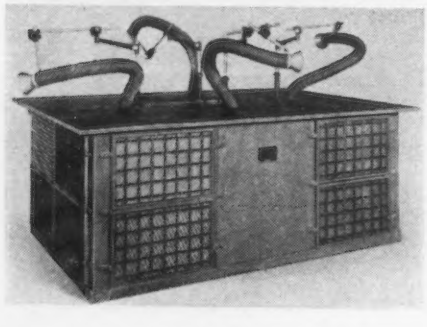
AN automatically controlled valve is a feature of the new type AO self-priming pump announced by *Allis-Chalmers Mfg. Co.*, Milwaukee. The pump is primed as the motion of



the water throughout the pump runner and the volute passage draws air in the suction passage through the impeller and out through the priming chamber. This hydraulic action lifts the column of water in the suction line. The priming valve closes slowly during this process, acting against a spring tension which governs the rate of priming and the static height of the priming suction lift. The automatic closing of the valve prevents water from by-passing back to the suction chamber. The pump impeller has an unusually thick vane with rounded inlet edges, permitting the pump to pass stringy materials and fairly large solids.

Grinding Bench

A FOUR-STATION grinding bench with integral dust collector has been developed by *Schmieg Industries*, 326 Piquette Avenue, Detroit, Mich., for use with portable grinders on non-



hazardous materials. High velocity suction is concentrated at the dust source by means of flexible suction hoses attached to swivel connections. The finer particles are removed by filters while a special plenum chamber is provided for the removal of heavy particles. The unit is furnished complete with fan, four suction hoses and motor with combination starter and push button.

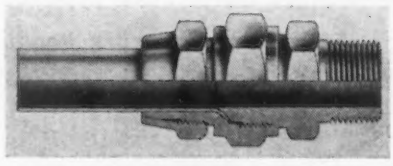
Dust Control Bench

THE type N Roto-Clone bench was developed by the *American Air Filter Co., Inc.*, Louisville, Ky., for safety in burring, filing and flexible shaft grinding of magnesium. The semi-enclosed bench assembly with down draft ventilation through wood grilles is furnished with tool shelf, fluorescent lights and partitions between stations. It is also available in

small individual units which can be located directly in back of magnesium grinding stands. The magnesium dust is precipitated and stored under water. No magnesium particles can pass the drain. Any hydrogen resulting from the reaction of magnesium and water is automatically vented whether fan is stopped or in operation.

Hydraulic Tube Fittings

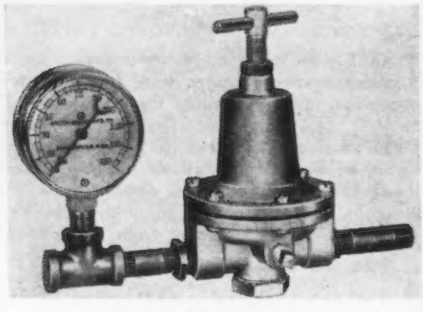
THE *Cotner-Wilkinson Co.*, Logansport, Ind., has announced a line of industrial and hydraulic tube fittings under the tradename of "Collet Grip," which require no threading,



welding or soldering. The double nut series is made for tube sizes ¼ to 2 in. The compression nut compresses the collet nut to the tubing, giving it a firm, permanent, collet-like grip. There is also a single nut series, which retains the double nut features but is simplified for close work.

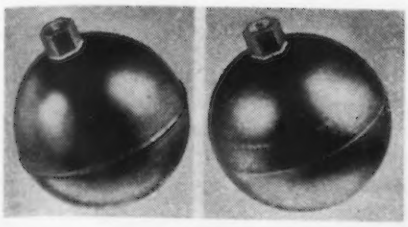
Regulating Valve

THE *Dayton Rogers Mfg. Co.*, 2835 12th Avenue South, Minneapolis, has designed a regulating valve that can be supplied with a pressure gage for reducing the average shop airline to the desired working pressure. They are equipped with a special compound spring mechanism which provides sensitive instantaneous pressure for the maximum airline pressure available. The action of the diaphragm is handled in such a manner that it assures sensitive opening and closing of the ports. It is manufactured in sizes for ¼ and ¾ iron pipe connection.



Hollow Metal Floats

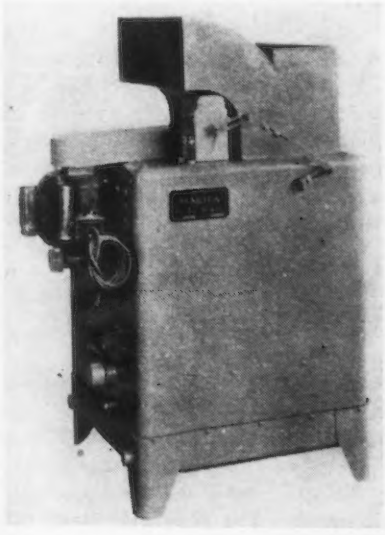
TWO types of corrosion-resistant hollow metal floats for use in steam traps, liquid level controllers and similar float-actuated mechanisms has been developed by *Chicago Float Works, Inc.*, 2330 South Western Avenue, Chicago 8, for service at working pressures up to 300 lb. sq. in. and temperatures up to 750 deg. F. Both types employ monel metal shells. In one the joint is brazed with high tem-



perature silver solder and connection fittings are silver brazed; in the other the shells are welded with monel metal and connection fittings are either silver brazed or welded. Sizes range from 2 to 8 in. diameter, spherical (ball) shape only.

Cooling Equipment

THE Niagara Aero after cooler for compressed air uses the evaporative cooling principle to obtain the lower temperatures and a new design gives greatly increased capacity in compact apparatus. Air, drawn by a fan through a water spray across coils containing the compressed air, is the cooling medium and temperatures within 10 deg. of the wet air temperature can be maintained. The equipment is also applied to gases generated for industrial use. *The Niagara Blower Co.*, 6 East 45th Street, New York 17, has patents pending on this equipment.



Metal Marker

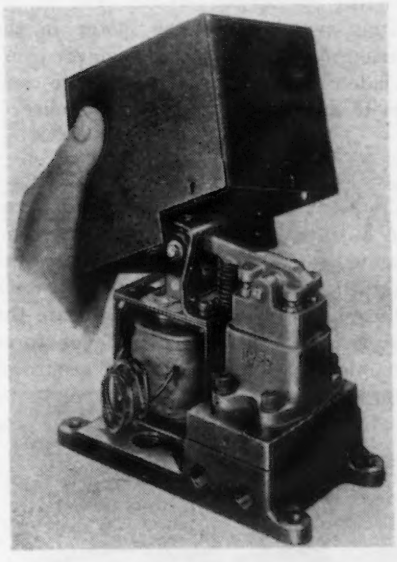
A PAINT stick metal marker for wet, icy or oily metal surfaces is marketed by the *Markal Co.*, 6 East Lake Street, Chicago. The model B is suitable for permanent wet weather markings, taking the place of paint and brush. It is made in several colors, enabling distinctive identification as well as routine piece work markings.

Paint Stick Marker

A PAINT stick marker for use on all cold surfaces is announced by the *Markal Co.*, 6 East Lake Street, Chicago. Designated as Markal N, it is real paint in stick form and produces permanent, fade-proof, weatherproof markings. It is particularly suitable for layout purposes on steel plates, whether bare or coated with zinc chromate or other protective coatings used in pickling.

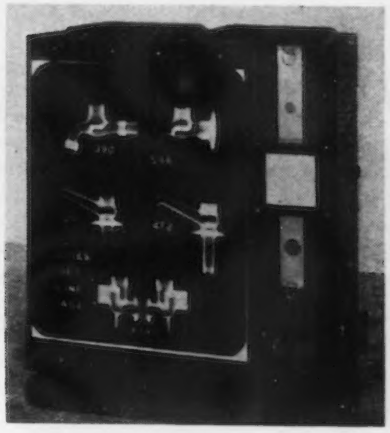
Midget Control Valve

AN unusually compact solenoid air control valve which can be operated at sustained speeds up to as high as 400 reversals per min. has been developed by *Ross Operating Valve Co.*, 6459 Epworth Blvd., Detroit 10, Model No. 835 is a ¼ in. heavy duty 4-way valve for the control of double-acting cylinders; it may also be used as a 3-way valve by plugging one outlet.



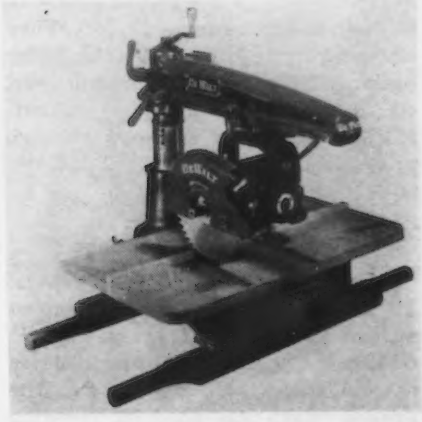
X-Ray Illuminator

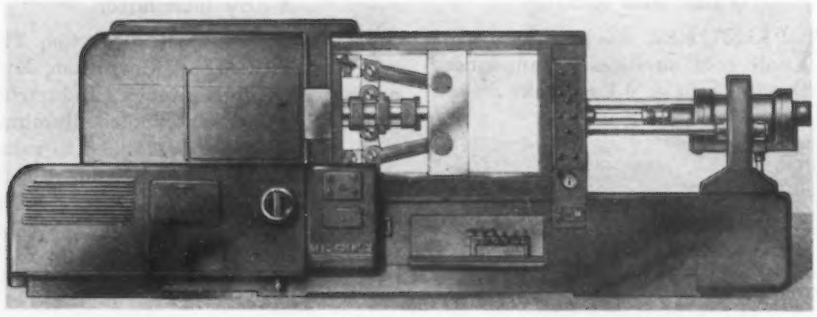
THE *Kelley-Koett Mfg. Co.*, 212 West 4th Street, Covington, Ky., announces a high intensity industrial illuminator with quadrupled illumination. The Keleket is claimed to raise the usable film density from 1.5 to 4.0. The view box is equipped with a Variac control for varying the voltage from 0 to 110 volts. The 14 x 17 in. illuminator permits viewing large films without repositioning. A wet film hanger allows films to be observed immediately after they are developed. A 3-in. spot with four times the intensity of the large front surface permits intensive examination of critical areas on the film.



Portable Radial Saw

DEWALT PRODUCTS CORP., Lancaster, Pa., announces a portable radial saw which will cross cut 14 x 1 or 12 x 3 in. material and rip from 0 to 26 in. wide. Light metals, ferrous and non-ferrous, can be cut when the machine is equipped with metal saw or abrasive wheel. The unit has three radial adjustments. The cantilever arm moves vertically, swings horizontally. It is available in 1½, 2 and 3 hp. sizes.





Die Casting Machine

REED-PRENTICE CORP., Worcester, Mass., has developed their large capacity 3G high pressure cold chamber die casting machine equipped with Vickers 2000 lb. pressure hydraulic pump system. The movable die plate mechanism can be adjusted through electric motor and screws to accommodate different thicknesses of dies. Machine can be operated either manually or semi-automatically.

Lubricating Oil

DEVELOPMENT of a new detergent type lubricating oil which will reduce wear and assure engine cleanliness and oil stability for low speed diesel engines is announced by *Standard Oil Co. of Indiana*, Chicago. The detergency results from the use of an additive which is both a detergent and an oxidation inhibitor. A film of the oil coats carbon and dirt, prevents particles from sticking and holds them in suspension until they are trapped by a filter or drained from the engine.

Packing List Protector

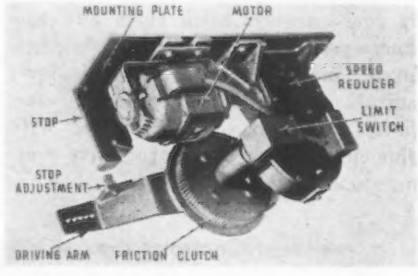
PACKING list protectors, fabricated from asphalt plyboard, have been developed by the Philip Carey Mfg. Co. and distributed by the *Western Paper Goods Co.*, 1224 West 8th Street, Cincinnati. The covers are available in 6 x 8, 8 x 11 and 10½ x 13 in. sizes and in a range of colors. They are adequately dished to take bulky packing lists, assembly instructions, etc., and are firmly affixed to the outside of the crates or boxes through pre-punched nail starters.

Synthetic Rubber Sponge

MANUFACTURE of a general purpose synthetic rubber sponge is announced by the *B. F. Goodrich Co.*, Akron. It is made in three densities, soft, medium and firm grades. Each has good oil resisting properties and can be made into slabs, cord, tubing or in almost any other molded shape. Slabs 24 x 120 in. can be made in thicknesses of ⅛, 3/16, ¼, ⅜ and ½ in. and 24 x 60 in. slabs in ¾ and 1 in. thicknesses.

Electric Door Operators

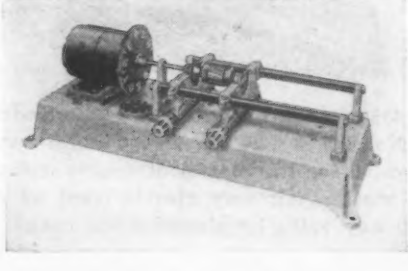
MODELS V and VR electric operators for operating one, two, three and four-leaf inward swinging



doors and for one-leaf outward swinging doors have been brought out by *Barber-Colman Co.*, Rockford, Ill. If the door is jammed, the clutch will slip only until the drive shaft reaches the end of its normal stroke, that is, the limit switch stops the motor in the usual manner. The unit is never overloaded longer than is required to complete an opening or closing stroke.

Balancing Machine

AN extremely sensitive and accurate balancing principle is embodied in the Dy-Namic balancers designed by the *Bear Mfg. Co.*, Rock Island, Ill. The machines indicate the disturbing centrifugal force or force couple with a high degree of accuracy. Both the angular position and the value or amount of unbalance is shown at the same time. The balancing machine reveals whether a static or dynamic unbalance, or both, are present without reversing ends of the body being balanced. A variety of models range from bench models to large floor and pit-type models for balancing such rotating parts as armatures, fans, blowers, fly-wheels, hubs, drums, propellers, gears, impellers, pulleys, wheels, rotors, etc. weighing from 6 oz. to 1000 lb.

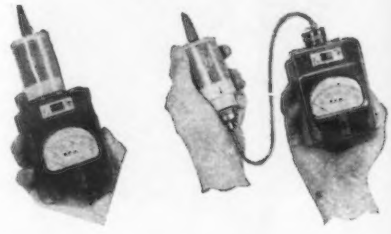


Air Blaster

A LARGE volume of air is directed in a straight line into out-of-the-way corners and dead air spaces by the air blaster developed by the *Chelsea Fan & Blower Co., Inc.*, 1206 Grove Street, Irvington, N. J. The unit consists of a heavy gage welded steel housing, mounted on an adjustable pedestal which may be tilted 60 deg. up or down. It is driven by a direct connected, ball bearing motor. Three sizes are available—18 in. ¾ hp., 600 GFM motor; 24 in. 1½ hp., 9000 CFM motor; and 30 in. 1½ hp., 11,000 CFM motor.

Electric Tachometer

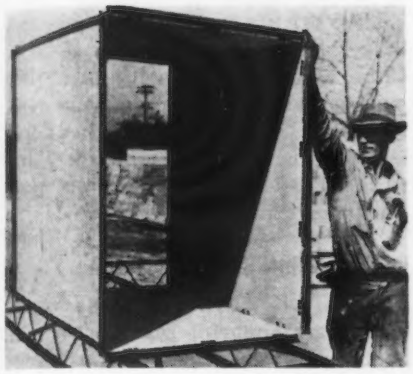
A SELF-ENERGIZED tachometer that can be used either as a hand type or separable type is announced by the *Ideal Commutator Dresser Co.*, 1925 Park Avenue, Sycamore, Ill. It consists of a small generator, coupled electrically to an elec-



tric meter. The generator itself consists of a small permanent Alnico magnet rotor mounted on precision sealed ball bearings. The meter is a rectifier type, capable of withstanding a momentary overload up to four times the maximum speed indication without damage.

Panel Connectors

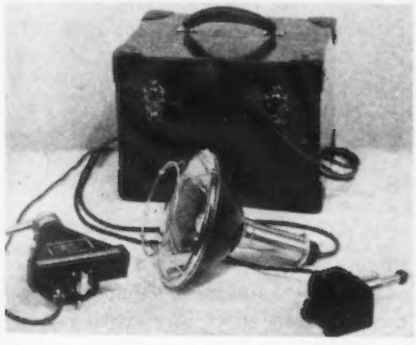
THE panel connectors introduced by *Dravo Corp.*, 300 Penn Avenue, Pittsburgh, are a method for assembling non-metallic ducts for heating and ventilation to conserve strategic materials and to meet requirements for non-corrosive ductwork. The units are said to require only three basic elements, which come in



various gages of metal, depending on the perimeter of the duct required. Panels are secured by clips placed on 12-in. centers and so shaped as to permit the non-metallic panels to be fitted snugly between them and the member.

Balancing Equipment

A VIBROMETER which measures vibration amplitude directly and a stroboscope which gives a direct visual reading of high spot or phase angle has been added to the Davey portable balancing equipment for dynamic balancing of machine parts of



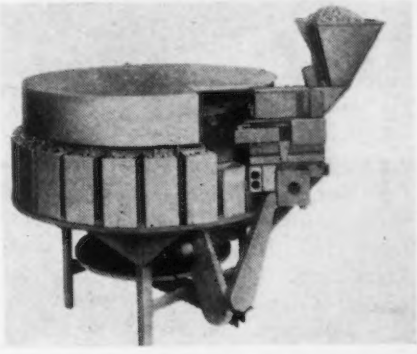
all sizes in their own bearings or in bearings built for the purpose. A remote control switch is mounted on the vibrometer. The unit is built by the *Vibroscope Co.*, 6 East 39th Street, New York 16.

Fluorescent Starter

WESTINGHOUSE ELECTRIC CO., East Pittsburgh, Pa., has developed a fluorescent starter that preheats the cathodes in the usual manner. It also interrupts the circuit when the lamp becomes deactivated or reaches the end of its life. A thermal switch is in series with the timing switch, and when the lamp fails, the starter makes a few attempts to put it in operation. The resultant heat brings the thermal switch into play, which then permanently opens the lamp circuit. The starter is fully automatic and is available for 40 and 100 watt lamps.

Length Sorter

A MACHINE which automatically sorts to length dural, brass and steel machine screws, bolts and rivets is announced by *Tubin Engineering & Mfg. Co.*, 764 San Pedro Street, Los Angeles 14. The machine delivers from 85,000 to 100,000 sorted parts in 8 hr., sorting to ⅛, 1/16 or 1/32 in. variations in lengths. Twenty-four different lengths can be sorted at one time into separate receptacles, with a throw-off receptacle for lengths not set for sorting on the machine.



Fluorescent Fixture

FOR areas where high levels of illumination are required or where high-bay mounting is necessary, *Sylvania Electric Products Inc.*, Salem, Mass., announces its new model HF-235R industrial fluorescent unit, which uses two 100-watt lamps. The fixture may be suspended by direct chain suspension, direct conduit mounting, messenger cable-clamp assembly or surface mounting with bolt or lag screws. They are suited to individual or continuous-row mounting.

Transparent Lunch Box

A LIGHT-WEIGHT, transparent Lumarith plastic lunch box, distributed by the *Irwin Corp.*, 27 West 20th Street, New York, cuts inspection time because it permits examination of the contents without opening the kit. Transpecto is standard size and is equipped with a vacuum bottle holder. One type has a transparent body and colored bottom and ends, and another has a colored body and bottom with transparent ends. Lumarith is a product of Celanese Celluloid Corp.

Reflectorizing Material

THE Minnesota Mining & Mfg. Co., St. Paul 5, has developed Scotchlite for signs, pointers and warnings. This reflectorizing material consists of tiny beads of clear glass firmly set in a flexible weatherproof backing. It comes in rolls of 12 to 24 in. wide and can be cut to any shape or design and then painted or silk-screen processed.

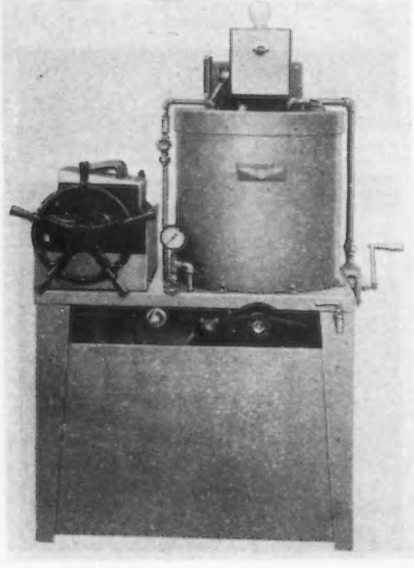
Safety Goggle

THE F3142 Ful-Vue safety goggle with 6.00 curve clear Super Armorplate lenses designed to fit the smaller features of women is announced by the *American Optical Co.*, Southbridge, Mass. It is made in 42 mm. eye size and bridge sizes in 19, 21 and 23 mm. The goggle combines efficient eye-protection against flying objects with all-round visibility, com-

fort and appearance. The double-braced bridge is designed for long life under hard usage. Earpieces have perspiration-proof insulation.

Oil Reclaimer

A SMALL capacity lubricating oil reclaimer, designed for small plants and organizations having their own fleet of trucks and motor cars, is being manufactured by the *Youngstown Miller Co.*, Sandusky, Ohio. With a capacity for purifying eight gallons of dirty oil in 70 to 90 min., it



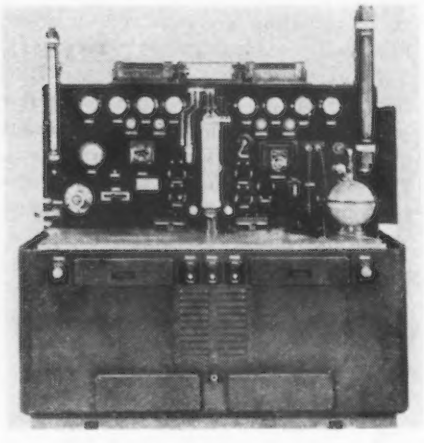
is claimed the Model A-8 will handle 2500 gal. of waste lubricating oil per year when operated only once a day. The machine has a two-stage filter press, is semi-automatic, operating under thermostatic control, and utilizes common refinery earths. Seven sizes are available.

Portable Test Stand

TO test the hydraulic systems of airplanes and the component parts comprising those systems, Model HTS3EM HydrOILic portable test stand has been put on the market by the *Denison Engineering Co.*, 1186 Dublin Road, Columbus, Ohio. The suction and pressure lines of the hydraulic system of the airplane are disconnected from the pump and connected to the test stand. The volume of flow is adjusted to any desired point between 0 and 3.2 gpm, and the test stand relief valve is set at a higher pressure than the hydraulic system's relief valve. The hydraulic system is then tested and operated in the same manner as under flight conditions. The stand is electric motor driven. Fluid is supplied from either the airplane or tester reservoir. The tester's working pressures are adjustable over a range of 500 to 3000 psi.

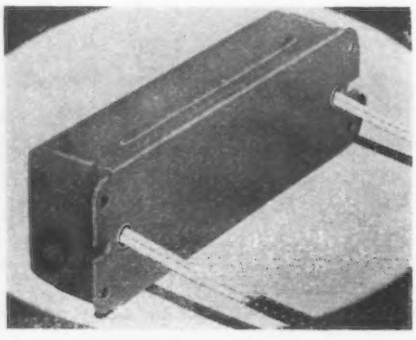
Test Benches

TWO models of test benches have been built by *Hydraulic Machinery, Inc.*, 12825 Ford Road, Dearborn, Mich. T-116, arranged for pressures up to 2000 lb., may be used for testing short lengths of hose or tubing, cylinders, etc. T-110 was built for testing most anything in the field of hydraulics.



Fluorescent Lamp Ballast

A NEW line of ballasts with leads coming out through two bushed holes at each end of the base plate is announced by *General Electric Co.*, Schenectady. They can be mounted completely exposed atop a narrow,



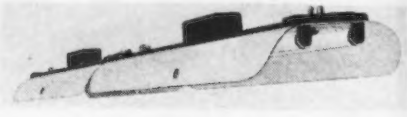
shallow wiring channel just wide and deep enough to enclose the leads. Because of their exposed location, they will operate in lower ambient temperatures. The ballasts are available in 40-watt Tulamp and three lamp ratings and 100-Watt Tulamp and Forlamp ratings.

Whiteprint Developer

A TABLE model for dry developing whiteprint reproductions of engineering drawings and tracings has been made available by the *C. F. Pease Co.*, 2601 West Irving Park Road, Chicago. The "700" is a developer only, with two forward speeds, 4 and 8 ft. per min., and can be used in conjunction with any blueprinting or direct process printing machine using dry direct process paper. It is made in two sizes, 42 and 54 in.

Industrial Fluorescent Lighting

DESIGNED for easy continuous strip installation, a new lightweight fluorescent luminaire with one-piece, double-length hood and two full size reflectors is announced by *Westinghouse Electric & Mfg. Co.*, East Pittsburgh. Available for use with four or six 40-watt or four 100-watt Mazda F lamps, the new type F N C



luminaire is the equivalent of two conventional units. The hood is fabricated from sheet steel with all ballasts, lamp holders and starter sockets mounted and wired as part of the channel assembly. Sliding hangers permit suspension from any part of the hood. The moisture-resistant, non-metallic reflectors are covered with a multi-coat polymerized finish which provides a reflection factor of 85 per cent or more.

Fluorescent Lamp Starter

AN average rated life of three years was announced for a fluorescent lamp starter by *General Electric Co.'s* Appliance & Merchandise Dept., Schenectady. The Watch-Dog is a manual-reset type for 40-watt lamps. It features precision lamp starting and dead lamp lockout.

AN INTRICATE DIE-PRESSED ALUMINUM FORGING

by REVERE

Weight: 1¾ lbs.; length: 9"; extreme width: 6"

The intricate die-pressed housing pictured above is really quite a job. It is typical of other difficult die-pressed aluminum forgings that Revere can supply in a wide variety of shapes and weights with a wide range of applications. The aviation industry alone has eagerly availed itself of these strong, close-grained, intricate die-pressed aluminum forgings and will attest their economy and utility. Revere forgings are also available in copper, various copper-base alloys and magnesium.

Revere will be glad to give you technical advice—*without obligation*—on any special problems that you may have in the field of die-pressed forgings. Write Executive Offices.

FREE! A 54 page manual, "Revere Copper and Copper Alloys—Technical Information for Product Designers," with 106 graphs relating to physical and metallographic properties under varying conditions; also, a new, easy-to-read chemical and physical properties chart, with pertinent illustrated information on Revere manufactured forms and welding technique. A complimentary copy sent you upon request. Address: Executive Offices.

REVERE

COPPER AND BRASS INCORPORATED

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Executive Offices: 230 Park Ave., New York 17, N. Y.

Assembly Line . . . STANLEY H. BRAMS

• Auto dealers seek distribution control of surplus automotive Army goods when war ends . . . Postwar auto rationing for period to relieve retail demand favored . . . Dodge-Chicago plant ships first air engines.

DETROIT—Last week saw the cream of the nation's car retailers, members of the National Automobile Dealers Association, troop into Detroit, overflow all available hotel space, plan for the near and long-term future, and leave behind them the very definite impression that any worries over the war's effect on the distributing organizations of the automobile companies have been overdrawn.

Of the 42,000 retail outlets in existence when the war began, approximately 10 per cent have retired, a few because of insolvency, others because of disinterest and service participation. Profitable service work and exceedingly productive used car selling accounted for the good showing. Most of those gone from the scene are the fringe city dealers. The big volume metropolitan operations are continuing, and so are the franchises in the small towns.

This convention developed some interesting viewpoints of definite concern to the manufacture. For one thing, an end to the war and a resumption of new car production will bring into focus the same problems in factory-dealer relationships which existed before the war. There will be continued demand for more liberalized franchises, for greater protection in sales areas, for fewer volume guarantees, for more protection against cancellation of agreements. A fair segment of membership within the association, concentrated mainly in the east, still leans to the idea of legislation as a method of obtaining such concessions, but the majority appears to rely more on conferences than legislation. However, the dealers took home with them copies of licensing laws in the states, so that after reading them, learning the advantages and disadvantages, they can develop a nation-wide sampling of sentiment to determine just how far the N.A.D.A. may want to go in seeking a uniform licensing law in all states.

Many of these state laws already in effect are definitely severe, and their application to automotive merchandising may prove preludes to applications to other forms of distribution. For instance, in Rhode Island all factory representatives of automobile companies are licensed, and their licenses are revokable when dealers submit evidence of coercion by them. In Wisconsin the factories themselves are licensed, but here the law is a boomerang, because any suspension of license due to a violation of the law in one instance immediately throws all other dealers in Wisconsin handling that merchandise out of business. In Iowa, franchises are partially protected by the simple expedient of non-licensing of any new agreement for 90 days in an area where an old franchise has been cancelled.

THE dealers are quite determined to be the channeling means for disposal of surplus automotive equipment. Speakers pointed out that at the end of the first world war surplus Army trucks were sold to the French, were never paid for, and ultimately found their way back to these shores for resale at undercut prices in competition with this nation's auto dealers. The dealers applauded a program which would take automobile parts and equipment in Army hands, expected to reach $2,000,000,000 at the end of the war, and distribute it through a commission created by Congress, consisting of half government and half business members. Selling would be at rates calculated not to disrupt then-current manufacturing and sales, at prices permitting a reasonable profit for the handlers and a fair recovery for the government, and always through established trade channels.

The dealers indicated great disapproval of means of current disposal of a reported 10,000 trucks turned over by the Army to treasury procurement and offered at open bidding. The dealers said bids were offered at ceiling prices by black market operators, making it impossible for litigimate dealers to obtain the trucks with margin to allow for reconditioning costs.

There was some belief that the number of automobile outlets in the post-war period would be larger than ever before, but that the number of actual direct factory dealers would be smaller. In other words, many of the dealers expected an extension of the practice of franchising dealers who in turn would appoint associate outlets and merchandise a considerable share of their stock through them.

The dealers reported that parts for cars of 1936 and earlier vintage were becoming constantly harder to obtain, as were special truck parts, like axles, etc. They were told by their Washington officials that cuts in the lead content of gasoline were likely to come within the next few months, and that the A coupon value on the Pacific coast would probably be reduced by one or 1½ gal. between now and Spring.

A sentiment was notable in favor of car rationing for a limited period after the war, for the simple reason that it would relieve the outlets of pressure for deliveries put on them by a car-hungry public. But, in contrast, the dealers' viewpoint on price control was that it should not be applied at all to new or used cars or trucks, now or after the war.

The dealers were furnished these projections on truck production this year: for medium trucks 7 per cent of the 1944 total will be produced in the first quarter and 29, 33 and 31 per cent, respectively, in the subsequent quarters. For light heavy and heavy trucks production will run 23, 24, 27, and 26 per cent by successive quarters this year. Dealers hope to obtain the same proportion of these completed units as they had in the last full peace year, but said some manufacturers plan to do distributing through branches entirely, leaving it to the field offices to determine where the trucks shall go, while others plan to ship to dealers only when those outlets have certificates on hand from would-be purchasers.

NOT the least interesting of the developments at the dealers' meeting was the appearance of Henry Ford II at a full session. The 26-year-old son of the late Edsel Ford

. . . and you cannot escape it!

This "Frozen-Action" photo pictures a force that is shaping the destinies of all mankind — now and for generations to come.

To our enemies it is a dreadful secret force that will one day bring them crying to their knees. Secret to them . . . because they have never fully understood it. Their warped minds could not possibly realize the extent to which American industry has mastered *the art of cutting and working metals on a vast scale.* Our enemies can neither equal nor escape this force — bred by generations of free enterprise.

To Americans, this force is the secret which has brought about the highest standard of living the world has ever known. When peace comes, it will be a key factor in building a better world.

Our picture shows Pratt & Whitney milling cutters at work. And there's a secret *here* — too. If you already use Pratt & Whitney small tools you know about it . . . about their keen cutting edges, long life, and dependability. If you are not yet a user of these fine tools — now is a good time to find out how they can help cut your costs in the highly competitive civilian production days which lie just around the corner. Get in touch with the nearest P&W branch office, where you will find expert engineers ready to co-operate by offering sound, economical solutions to your metal working problems.

Shown are two Pratt & Whitney plain milling cutters at work. The line of top quality small tools made by Pratt & Whitney includes a complete line of TAPS, DIES, REAMERS, GEAR CUTTERS, MILLING CUTTERS, DRILLS, ARBORS, PUNCHES, THREADING TOOLS, METAL SLITTING SAWS . . . and many others. Each one is made to the well known Pratt & Whitney standard of accuracy.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT

was introduced as the vice-president of Ford Motor Co. in charge of sales. The young Ford was generally agreed to have made an excellent impression in this, his initital appearance as an official of the company founded by his grandfather.

Speaking in Chicago last Saturday, K. T. Keller, president of Chrysler Corp., revealed that the Dodge Chicago plant has shipped its first run of production engines to the Air Forces, and indicated that the plant is expected to be in substantial production of these motors "before many months."

Output, Mr. Keller inferred, has been somewhat delayed by still-continuing design changes in the engine. The power plants being made are those which will drive new superbombers; at monthly peak production their horsepower will aggregate more than the output of "two Boulder Dams, plus Grand Coulee and Bonneville put together."

Up-to-date equipment figures were provided by Mr. Keller in his address. He said the plant will utilize about 8000 machines, requiring approximately 1,200,000 tools, jigs, dies and fixtures, with gages and small tools bringing the total up to nearly 5,000,000.

On the post-war score, Mr. Keller renewed the automotive industry's plea for development of a policy now for cleaning up the war plants. He outlined a six-point program which he said could be undertaken now, as follows: (1) Determination of what the government is going to ask industry to maintain in the form of physical facilities to supply the armed forces in preserving peace after the war. (2) Decision which of these industrial units shall be retained in operating condition by present custodians and operators. (3) Decision what facilities the government will wish to retain itself for the protection and maintenance of peace. (4) Decision what government equipment and materials in its own or privately owned plants the government will wish to dispose of. (5) Listing and earmarking of them for sale under a sensible pricing and disposal procedure, then selling of them now under conditions that will let them stay where they are as long as the war needs them. (6) Finally, arrangement for the prompt removal of machines and materials that will be in the way of peacetime production when the war ends.

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DPC Will Move Idle Stack to Texas

• • • **Lease agreements** for the erection of a charcoal blast furnace and byproduct plant at Rusk, Texas, have been completed between the Defense Plant Corp. and McCrossin Engineering Co., New York. DPC will appropriate $2,379,000.

The project comprises the removal of an idle blast furnace and sintering plant from Pembroke, Fla., and of a complete carbonizing plant and charcoal byproducts recovery plant from Wells, Mich.

Most of the equipment required for this plant is now idle and only a relatively small proportion of new equipment and supplies will be required.

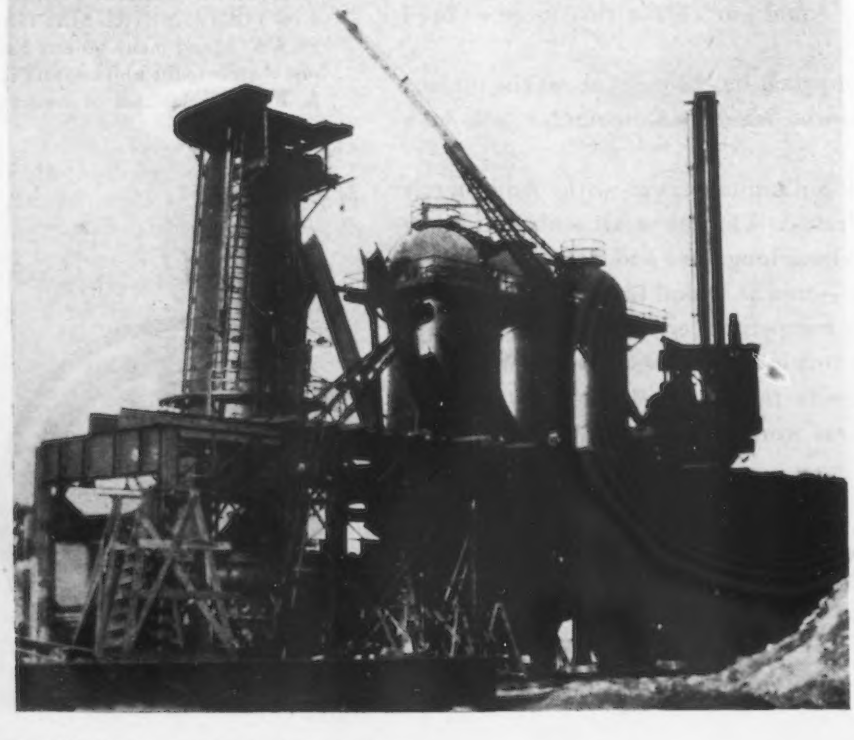
The blast furnace now standing idle on a phosphate quarry in Florida was originally built to make elemental phosphorous from phosphate rock which is abundant at Pembroke. The process was not feasible and was, therefore, abandoned. This plant has a ground plan of about 210 ft. by 230 ft. and will be so re-erected as to be integrated with the charcoal plant, furnishing the fuel, and with the central power plant that will use part of the blast furnace gas for raising steam. Only a new hearth jacket is necessary. No changes are contemplated in the sintering and carbonizing plants.

Ground plans for the ore crushing and cleaning plant have not yet been made and must await the detailed survey of the proposed plant site, and the general plan of the integrated plant.

The new plant will make 100 tons of charcoal pig iron daily and will furnish, in addition, charcoal, glacial acetic acid, methanol, sintered iron ore and blast furnace slag for mineral wool.

Col. E. F. McCrossin, president of McCrossin Engineering Co., DPC's agent in design, engineering and construction, has been active since 1925 in the exploration and development of the iron ore deposits of Northeast Texas and his original reports and maps were incorporated in the U. S. Geological Survey of the "Brown Iron Ores of Eastern Texas." Ralph H. Sweetser, author of "Blast Furnace Practice" and numerous articles in THE IRON AGE, is consulting engineer.

FROM PEMBROKE, FLA., to Rusk, Tex., goes this idle blast furnace and sintering plant. When completed, 100 tons a day of charcoal pig iron will be produced, in addition to glacial acetic acid, methanol and wood tars.



Use the Stainless Strip that **SIMPLIFIES** Production Problems

PRODUCED ON AUTOMATICS—Notwithstanding the high tensile strength required in this material, its high ductility makes possible complete fabrication on special automatic machines.

REVERSE DRAWS NO PROBLEM—Uniform Carpenter Stainless Strip made possible this difficult reverse drawn part. Danger of splitting around the edge of the inside hole was entirely eliminated.

PROOF OF DEEP DRAWING QUALITIES—Here's an example of the way in which Carpenter Stainless Strip can be deep drawn. Easy working qualities, plus the close tolerances to which the strip is held, effect savings in deep drawing costs.

When you choose a Stainless Strip today, you want one that blanks and forms readily, keeps output at a high level, and is easy on your tools and dies.

Carpenter Stainless Strip gives you that kind of performance. This Strip blanks as clean as a whistle, yet has ample ductility for fast, easy forming. And Carpenter Stainless Strip works the same, coil after coil, as a result of uniform temper.

In thousands of press rooms, ductile, bright-finish Carpenter Stainless Strip is smoothing out wartime production difficulties. And some of the same manufacturers who are side-stepping fabrication troubles with this Stainless Strip today, are planning on it to get greater Stainless production economy in their post-war products.

Investigate Carpenter Stainless Steel now! Get in touch with any of the Carpenter offices below, and put your problem up to your Carpenter representative. He will help you make your Stainless operations more economically productive now and in the future.

This handy Carpenter Stainless Steel Selector Slide Chart will help you quickly spot the right grade of Stainless to meet your requirements. It provides data on working properties, physical characteristics, etc., of each grade of Stainless. A note on your company letterhead will bring you a Slide Chart . . . free to Stainless users in the U.S.A.

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St. Louis, Indianapolis, New York, Philadelphia

Washington . .

L. W. MOFFETT

• Report of Smith (House) Committee charges War Labor Board committed illegal and unconstitutional acts . . . War power of President and Congress discussed, with latter's said to be more comprehensive.

WASHINGTON — The Smith (House) Committee report submitted to Congress last Thursday says that there "ought to be a law" to prevent the National War Labor Board from continuing its clearly illegal and unconstitutional activities.

The report which proves in a masterly fashion through citing tens of Supreme Court cases that something should be done by Congress to curb the War Labor Board's highly arbitrary and biased actions in favor of labor fails to say what good more law will do in the face of the board's willful disobedience to perfectly valid existing laws.

Perhaps the board's failure to do this was a studied effort to provoke comment and action not only by members of Congress but by the public.

The question raised, of course, is why the public permits the executive branch of government to be derelict in carrying out the mandates of Congress. If the executive branch of government fails to carry out the laws made by Congress and ignores the Constitution, the courts and the Congress are powerless.

The only remedy is the election of those who will obey the will of the people enforcing the laws enacted by Congress.

When the gravity of this situation will percolate to the hinterland and engender positive action at the polls, is unpredictable. Perhaps the public is already aware of this danger to representative government, but will hesitate to choose a new President in the next national election because of the war.

THE report charges that WLB committed the following illegal and unconstitutional acts:

1. Ordered the check-off and the closed shop contrary to the National Labor Relations Act and War Labor Disputes Act, the Constitutional and numerous decisions of the Supreme Court, other federal courts and the National Labor Relations Board.

2. Enforced a new legal doctrine that it (WLB) has the power and authority to compel the parties to execute a contract to do anything that the parties might voluntarily do, irrespective of whether there is any legal or contractual obligation on the parties to do so.

3. Has not confined itself to labor disputes in war industries but has assumed jurisdiction over all types of business, no matter how remotely they may be removed from any connection with the war.

4. Adopted a policy that in the determination of a wage dispute the question of the financial status or ability to pay of the employer is irrelevant and immaterial and that any employer whose business does not justify the payment of what the board in its judgment or generosity regards as a decent standard of wages is economically inefficient and ought not to be permitted to remain in business.

5. Assumed the power not only to fix future wages but to render a money award for back wages for services already rendered and paid for without affording the employer an effective right of judicial review.

6. Compelled employers and employees to agree to submit disputes to arbitration contrary to the settled decisions of the Supreme Court.

On this, the report says:

"If one Federal bureau can with impunity destroy the essential legal components of a contract; can without review by the courts render money awards for unlimited sums for past services rendered and already paid for; and can establish the principle that the ability of the employer to pay any wages that the fancy of the Board may dictate is immaterial and not to be considered; it is obvious that such a policy, if unrestrained and exercised by biased agencies not concerned with the judicial elements of a fair trial, may and probably will make serious inroads into our constitutional system of judicial determination and destroy the elementary rights of private property and private enterprise."

THE report makes clear that the assertions of the Board that "they are acting by the direction of the President of the United States and that the President has delegated such authority to them by reason of his war powers under the Constitution are not correct."

Says the report:

"The President does not possess 'war powers' which authorize him to compel an employer whether engaged in war work or not, to release workers who do not maintain their membership in a private labor union.

"The Constitution, Article II, Section 2, provides that the President shall be the Commander in Chief of the Army and Navy of the United States and of the militia of the several states when called into the actual service of the United States.

"The Constitution nowhere confers upon the executive authority such as the War Labor Board purports. The Constitution was not designed to subject to the arbitrary will of civil appointees of the President the liberties guaranteed to all citizens under the Constitution."

Decisions on the war powers of the President by the highest court have been few. The report cites them and it is significant that in none of them

Steel Cost Study Ready This Week

Washington

• • • OPA will have cost information from 90 per cent of the steel industry ready for study by the end of the present week. The information covering carbon steel will first be compiled and studied, followed by a similar study of alloy steel costs. From the report it will be determined whether price increases are necessary. The report also will measure the effect on costs arising from any potential wage increase.

TONNAGE USED 1941 (PART)

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Acceptance Proves Value

HEARTH PATCH is a war-born refractory that has made good.

Open hearth men, driving furnaces for more and more steel to meet war needs, called for an emergency patch material . . . something that could be dumped into large bottom holes to make strong, safe repairs with least delay. Hearth Patch was the answer.

Just how well Hearth Patch serves this purpose is demonstrated by its steadily growing acceptance. Month after month, the tonnage used increases. New customers are trying it, liking it, becoming regular users.

Hearth Patch is designed for quick, emergency repairs. A fine-grained, fast-setting magnesite, it is intended to be thrown quickly, without slag addition, into deep holes while the furnace is still very hot. Properly applied and given a working surface of dolomite clinker, it sets into a dense repair.

Hearth Patch has been much improved in its development over the past three years. It is now a Ramix-type product of high fusibility, greatly increased refractoriness, and remarkable stability.

Our Service Engineers are prepared to assist your personnel in proper ways to use Hearth Patch and other Basic Refractories products—to help you make maximum savings in production time with good refractories.

BASIC REFRACTORIES, INCORPORATED

CLEVELAND, OHIO

has the WLB's assertion been supported.

THE Supreme Court has held that the powers of the President during war are purely military and that his conquests do not enlarge the boundaries of the union nor extend the operation of our institutions and laws beyond the limits before assigned to them by the legislative power. The report points out that the powers granted to Congress with respect to war are more comprehensive than those granted to the President.

Furthermore, the Supreme Court has held that the imposition of the will of a military commander over the will of civilians is called martial law and in any event no great emergency would justify the subordination of the Constitution and its guarantees. Also according to the court, martial law is limited to the theater of actual military operations.

It is significant that the minority report which weakly seeks to rebut these arguments, contains little of sound legal contention, but merely seeks to controvert the law through weasel words.

Chairman William H. Davis adopts the minority report for his answer to the Smith Committee, and asserted on Jan. 26 that the power to "settle disputes" in the War Labor Disputes Act confers the authority to order provisions in contracts to which "parties do not agree."

This answers none of the Smith Committee's objections, but serves to illustrate the determination of the Board to have its way no matter what the settled law may be.

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Army Clarifies Renegotiation Stand

Washington

• • • **Withdrawal** by the War Department of the right of contracting officers to exempt contract termination settlements from renegotiation has encouraged reports that the Department has been acting arbitrarily and inconsistently.

Actually, the War Deparment explained, the revocation of this power presents no departure from prevailing procedures. This exemption clause has fallen into disuse because while contract termination embraces only a few contracts at a time, renegotiation covers a whole year's business.

The general rule of the Department has been to consider canceled contracts as part of the whole of a firm's business when renegotiating. Consequently, since this exemption provision has not been widely employed and because of the differences in the nature of termination and renegotiation, it was decided that discretion to exempt canceled contracts was improperly lodged in contracting officers.

However, the memorandum sets up a clarification of exemptions which may be made with the approval of the director of the Army Service Forces.

The exemptions which apply to fixed price, short term contracts are as follows:

1. Fixed price contracts containing no provision for price adjustment except provisions for equitable adjustment of the price in case of changes in specifications, deliveries, rate of production, or increased expenses resulting from statutory renegotiation.
2. Contracts providing for full performance within six months or less.
3. Where the contractor has had previous experience in producing the same or substantially the similar articles.
4. Where the total cost of performance of the contract can be determined with reasonable certainty at the time the contract is made.
5. Where the contract price contains substantially no allowances or charges for contingencies and any remaining allowances or charges for the particular procurement.
6. Where the profit and the margin of profit are relatively low.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Committee to Investigate Geneva Mill Sale to Russia

Washington

• • • **Senator McCarran** of Nevada, chairman of the Committee on Centralization of Industry, on Tuesday appointed a subcommittee of three to investigate reports that the Federal Economic Administration has offered to ship the Geneva Steel Co. structural mill and equipment from Geneva, Utah, to Russia. This mill was a part of the steel expansion program and is near completion but recently WPB stopped work on it.

It is reported, however, that Russia does not want to take the project because the power equipment is not suitable for that country's use. The Senators named on the subcommittee are Gillette (D. of Iowa), Murdock (D. of Utah), and Robertson (D. of Wyoming).

Senator McCarran will also meet on Feb. 11 and 12 in Carson City, Nev., with the Attorneys General of California, Utah and Nevada, regarding decentralization of steel capacity and basic magnesium plants in the west that have been built up under the war expansion program and has been or is expected to be partly or entirely abandoned as no longer needed.

HOW DOES THE GAGEMAKER

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Plug gages being checked to a tolerance of a few millionths of an inch at Republic Gage Company, Detroit.

Gages often must be accurate to within infinitesimal tolerance limits—a very few millionths of an inch. These "millionths" must be measured accurately.

The Republic Gage Company and hundreds of other gagemakers know their gages are right because they use Sheffield Visual Gages for final inspection. This widespread use by gagemakers is testimonial proof of dependable, highly accurate performance of the Visual Gage. The responsibility of integrity so imposed is appreciated by Sheffield and respectfully observed by the master craftsmen who *make the instruments by which other types of gages are checked.*

DELIVERY WITHIN TWO WEEKS can be made of your Visual Gage requirements for production and gage inspection. Six amplifications, 500, 1000, 2000, 5000, 10,000 and 20,000 to one. Wire or write for quotation.

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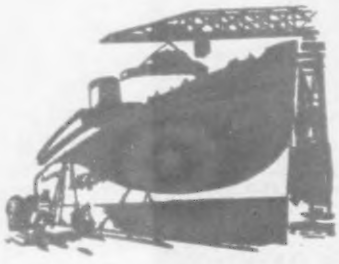
WEST COAST . . . OSGOOD MURDOCK

• From 10 to 20,000 tons of shipyard scrap to be allocated to Midwest mills . . . Another steel-minded Senator proposes tin plate mill for Pacific Northwest.



SAN FRANCISCO — Following several weeks of fairly open discussion and negotiations, alocation orders are being issued to West Coast shipyards for a major movement of shipyard scrap, predominantly plate, to midwestern mills in the Chicago district. It seems likely that from 10,000 to 20,000 tons will be moved within the next 30 days.

In recent weeks West Coast mill buyers have purchased melting grade scrap from $1.00 to $2.00 below ceiling prices, and turnings and borings sell, if at all, much further below ceiling. All mills have inventories for 90 days or more, representing the largest tonnage and value of scrap they have carried for 10 years, since depression days. Since some furnaces and open hearths are shut down, particularly in mills rolling only reinforcing bars and light shapes, and since shipyards continue production, the supply of prime scrap continues to accumulate. Although the mill buyers don't like to see ship plate cuttings and the best scrap ever produced on the West Coast shipped out of the area, they are equally reluctant to accept all allocations at ceiling prices when they can buy commercial scrap for less and when their inventories are already normal to plump. For the next six months, at least, continued scrap production is assured, to supply even maximum demand.

Another important subsidiary was added to U. S. Senate Pacific Steel, Unlimited, last week by Senator Mon C. Wallgren (D. Wash.) when he proposed a tin plate mill in the Pacific Northwest to operate on plate produced at Geneva and available postwar. The Senator points out that "Washington state has the electric power to operate a tin plate mill and installation of facilities there would lift a 400,000 ton burden from transcontinental railroads."

To can Alaska salmon, Walla Walla fresh peas and the varied prewar products of the Pacific Northwest required barely one-third of the approximately 400,000 tons of tin plate sold normally on the West Coast. Columbia Steel Co. has operated a small, old fashioned tin plate mill at Pittsburg, Cal., but it is now shut down. That there should be a tin plate mill somewhere on the Pacific Coast is self evident, and, after the war emergency, it will undoubtedly be a first move by Columbia to replace or modernize its tin plate mill, probably at Pittsburg, since nearly half of all tin plate demand on the Pacific Coast is in central and northern California for fruit, vegetable, and fish products. U. S. Senate Pacific Steel Unlimited must expect competition from existing private plants, and the fact that they will continue to be operated by natural gas or by-product fuel instead of low cost Federal electric power need not thwart their ambition for a share of this well established, long supplied market.

FOLLOWING two big mass meetings of purchasing agents from manufacturers, wholesalers and distributors with representatives from government procurement agencies and major war contractors with surplus materials, held at San Francisco and Los Angeles separately, the WPB Redistribution Division has issued a classified list of materials available. Since the meetings, it is announced that negotiations are pending involving material roughly valued at a quarter million dollars, but discouragingly the publicity in connection with the meetings has developed additional listings from surplus inventories greater in volume and value than what has been moved. On material originally acquired with preference ratings of AA-5 or higher it is necessary to obtain corresponding ratings to dispose of the material, yet the regional WPB offices have authority to waive this requirement in cases where materials are sold to distributors or wholesalers, with the understanding that final sale will observe original priorities ratings. Present materials listed by Region 10, including California, Arizona, Nevada, and southern Idaho, include 22,000 tons of various steel products, mostly in small quantities but involving 500 tons of 3/16x1 in. hot rolled strip, analysis 10/10, in lengths 17 ft. 9½ in., 250 tons of the same material in lengths 12 ft. 8½ in., and 325 tons of 3/16x3⅛ in. strip in 20 ft. lengths. Some 2,000,000 lb. of copper products are listed including, strangely, a cold million pounds of virgin copper 20 lb. ingots. It is generally conceded that this considerable conglomerate mass of material represents only a trickle of what will eventually be available, and that even without priority restriction there would be serious difficulty in moving some of the items listed.

WHEN 23,080 employees of Douglas' Long Beach plant went to the polls in an NLRB election Jan. 26, out of 27,356 eligible to vote, 10,699 voted in favor of the CIO United Automobile Workers of America as their collective bargaining agent. Of 84.2 per cent of employees voting, 46.5 per cent thus favored CIO. For the AFL International Association of Machinists, 4590, or 19.9 per cent voted, while 7725 or 33.6 per cent favored no union. A run-off between CIO and AFL will be conducted within two weeks. This week the 44,000 workers at the Santa Monica plant are voting on the same question.

ALTHOUGH the northern California area officials of the War Manpower Commission and the U. S. Employment Service continue to declare that over 100,000 additional war workers are needed in the area, industrial plants are slightly reducing their personnel and both men and women are filtering from the top brackets back to the service trades and average jobs they held before donning tin helmets and blue overalls for the shipyards. The California Labor Statistics bulletin indicates that there were 4200 less employees in durable goods industries in the San Francisco Bay area in December than in November and a reduction of employment for all manufacturers in the same district from 281,900 to 274,300. Although there is an urgent demand for skilled ship re-

Detachable work unit of new "TOCCO JR. 7½" conveniently mounted on bench in production line.

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BRAZING carbide tool tips—all sizes. Time: 10 to 50 seconds.

ANNEALING 75 mm. steel cartridge cases to 70-75 R.B. Time: 10 seconds.

HEATING to 2200° F. for forming 1" on end of 1" bars. Output 90 per hour.

HARDENING wearing surface of teeth of small bevel gears. Time: 18 seconds.

The "TOCCO JR. 7½" offers thousands of shops a thrifty head start in the race for *better products at lower cost* with TOCCO Induction Heat Treating.

This new TOCCO has a DETACHABLE WORK UNIT which can be mounted on a suitable bench in the production line (as shown above), handy to related operations, with the power unit located wherever desired. This higher degree of versatility and adaptability of heat treating affords greater production flexibility for fast-moving manufacturers.

Here are the cost-cutting advantages of larger TOCCO machines in a complete motor-generator type induction heat treating unit at a new *low cost*. Output is 7½ K.W. (9600 cycles).

Write today for free descriptive bulletin on this new TOCCO.

THE OHIO CRANKSHAFT COMPANY • Cleveland, Ohio

TOCCO

HARDENING..BRAZING

ANNEALING..HEATING

★

pair craftsmen, particularly electricians, the demand for mass labor has slacked off and no one seems to know where the 100,000 which WMC and USES repeatedly request would either live or work or eat.

In 1943 all California factories employed an average of 878,000 wage earners, more than three times the average of 276,300 in 1939. Wages paid these workers last year totalled $2,213,000,000, 50 per cent above 1942 and over six times the amount paid in 1939. For 1943 average weekly earnings were $51.96, average hourly earnings $1.162 and average hours worked per week, 44.7. Part time as well as full time workers are included in the statistics of working time and overtime pay and shift premiums are included in averaging weekly and hourly earnings. These employment figures exclude office, clerical, sales, construction, executive, technical, and professional personnel which, if included, would bring the total employed in California manufacturing establishments last year well over 1,000,000 persons.

AFTER four days on strike, with picket lines in front of 79 foundries and manufacturing plants and unfavorable top headlines in the Seattle, Tacoma, and Portland newspapers, approximately 10,000 foundry workers voted to call off their strike and appeal for a decision following a public hearing before the National War Labor Board.

Labor relations officials throughout the Pacific area observe an increasing restlessness by organized labor and ineffectiveness by labor leaders and officials to hold their members to no strike pledges. There is no personal loyalty nor long-standing acceptance of leadership within the mass production unions that have come into being. Restlessness originates at the bottom, with the men and women in the lower brackets who pay the same dues and who are dissatisfied with their income on a comparative basis, not only as against workers in other industries but even as compared with higher classifications within their own union affiliation.

In recent collective bargaining conferences and negotiations of new contracts, union representatives have been disposed to "stall," very generally expecting a breach of the Little Steel formula and fairly confident that it will not be long before wages are increased 25 per cent over the hold-the-line base, instead of the former 15 per cent.

o o o

New West Coast Shipping Council Headed by A. E. Roth

San Francisco

• • • **Election** of Almon E. Roth, president of the San Francisco Employers Council since its organization in 1939, to head the new National Federation of American Shipping is looked upon by business and civic leaders here as a development of prime importance to postwar industry, business and shipping of San Francisco and the Pacific Coast. He has been given indefinite leave of absence from the Employers Council.

Roth knows the West and its agricultural, industrial and shipping problems intimately. He has come to grips with them as president of the Pacific American Shipowners Association, president of the Pacific Coast Waterfront Employers Association, as vice-president and director of the California State Chamber of Commerce, president of the San Francisco Employers Council and more recently a member of the National War Labor Board.

The new organization will work with the government on a program to reconvert the huge wartime shiping fleet to a peacetime basis. Headquarters will be in Washington.

Trade Channels to Handle South African Small Tools

Washington

• • • **The Foreign Economic** Administration and the Union of South Africa Government Supply Mission announced that commercial trade channels will be used for exporting small and hand tools to South Africa for non-military use. Tools for military use will continue through government channels.

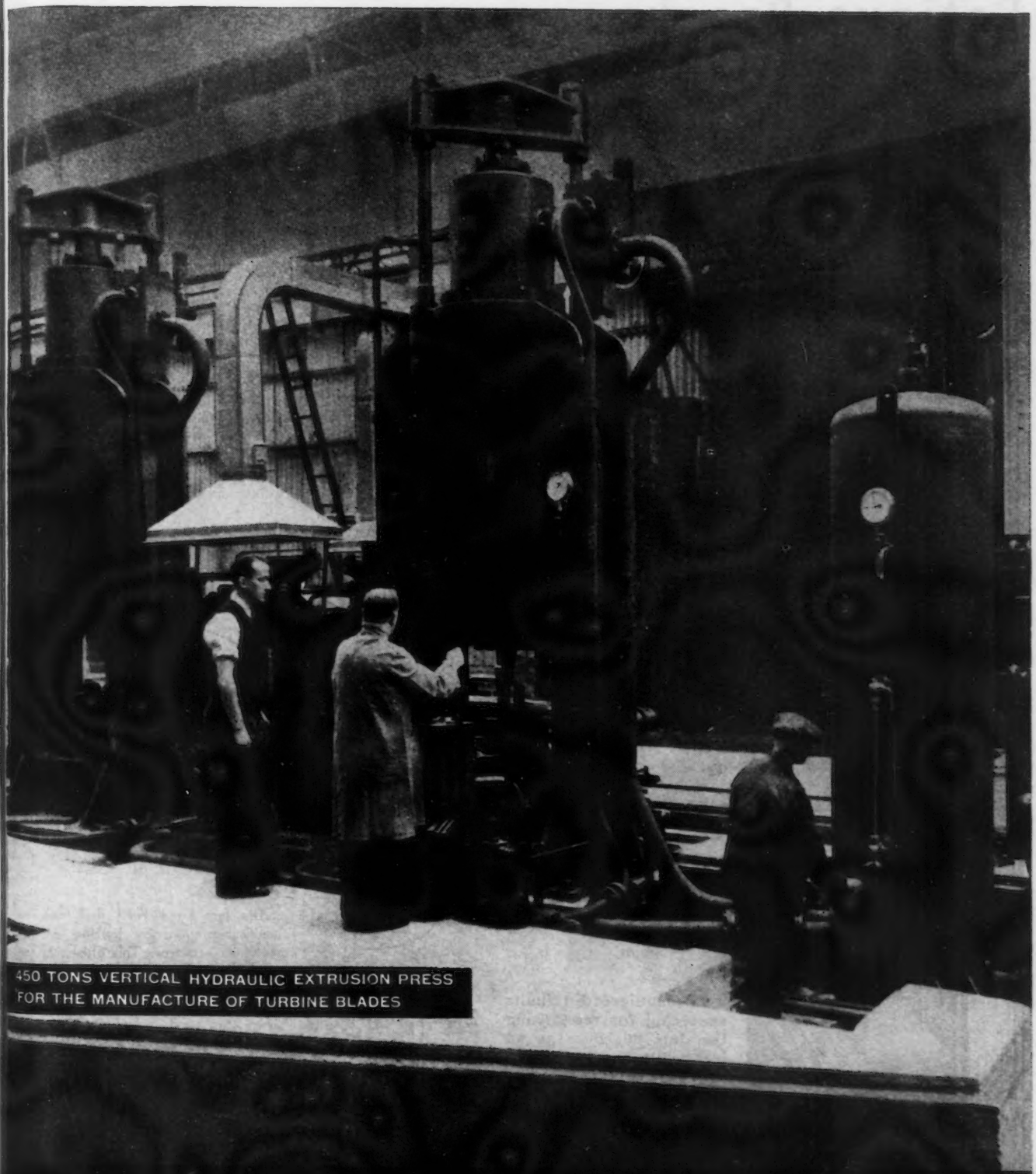
Under the new arrangement, South African merchants will submit orders for six months' forward requirements. The orders will be assembled and, from the desired supplier designated on the order, will be grouped together. A summary of all tools from given American suppliers will be prepared and sent with the orders to the United States.

The supplier will use the summary to prepare an application for priority rating for all tools in the CMP product groups. Rating application must show all available information regarding end use and state that tools concerned were included in the 1944 Requirements Program for South Africa. Each supplier must apply to the South African Supply Mission for a release certificate covering each order received from a South African merchant and applications for shipping space, when desired, should be forwarded to the mission.

. . . Cited for Awards . . .

• • • **The following companies** have received the Army-Navy E award for excellence in war production:

Aluminum Company of America, Trentwood Works, Trentwod, Wash.
American Electrical Heater Co., Detroit.
Arcrods Corp., Arcrods Cleveland Plant, Cleveland.
Arvey Corp., Jersey City Plant, Jersey City.
Atlas Elevator Co., San Francisco.
Cochrane Corp., Philadelphia.
Columbia Electric & Mfg. Co., Spokane, Wash.
Columbian Rope Co., Auburn, N. Y.
Columbus Foundry Corp., Brooklyn.
Continental Can Co., Inc., Clearing Ordnance No. 78, Chicago.
L. A. Darling Co., Bronson Plant, Bronson, Mich.
Erco Radio Laboratories, Inc., Hempstead, N. Y.
Florence Stove Co., Shell Plant, Kankakee, Ill.
Food Machinery Corp., Riverside Division, Riverside, Cal.
Frisch & Co., New York.
Great Lakes Steel Corp., Stran-Steel Division, Mansfield Plant, Mansfield, Ohio.
Griffin & Co., Naval Division, Jeffersonville Boat & Machine Co., Jeffersonville, Ind.
Houdaille-Hershey Corp., Oakes Products Division, Decatur, Ill.
Kane Mfg. Corp., Kane, Pa.
Edward Katzinger Co., Chicago Plant, Chicago.
James A. Kiley Co., Somerville, Mass.
Lima Woolen Mills Co., Lima, Ohio.
McDonough Steel Co., Oakland, Cal.
Nachman Motor Corp., Long Island, N. Y.
Nashua Mfg. Co., Bower Division, Lewiston, Maine.
National Fireworks, Inc., Chillicothe, Ohio.
Norfolk Iron Co., North Quincy, Mass.
Frank D. Palmer, Inc., Chicago.
Seagoing Uniform Corp., Brooklyn.
Shell Oil Co., Inc., Martinez Refinery, Martinez, Cal.
Southern Welding & Machine Co., Charlottesville, Va.
Square D. Co., Industrial Control Division, Milwaukee.
E. C. Taylor Engineering Co., Tuckahoe, N. Y.
Wollensak Optical Co., Rochester, N. Y.
Edwards and Co., Inc., Norwalk, Conn. (third award).
Worth Steel Co., Claymont, Del.
Globe-Union, Inc., Milwaukee.
Logansport Machine Co., Inc., Logansport, Ind.
Moeller Instrument Co., Richmond Hill, N. Y.
L. F. Grammes & Sons, Inc., Allentown, Pa.
Air-Maze Corp., Cleveland.
Burkey Underwear Co., Inc., Hamburg, Pa
Edlund Machinery Co., Inc., Cortland, N. Y.
Hacker Boat Co., Mt. Clemens, Mich.
Kewanee Machinery & Conveyor Co., Kewanee, Ill.
Lion Knitting Mills Co., Cleveland.
National Lead Co., Magnesium Reduction Co., Luckey, Ohio.
Rock Bit Sales & Service Co., Philadelphia.
Underwood Elliott Fisher Co., Bridgeport Plant, Bridgeport, Conn.
Wauna Lumber Co., Wauna, Ore.
Westport Lumber Co., Westport, Ore.



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Fatigue Cracks . . .

BY A. H. DIX

Narrowed Down to Three Centuries

Recently we bragged that while your favorite family journal is able to answer most questions it receives, sometimes it bogs down on seemingly simple questions, as for instance, "When were machine cut nails first made?" Kind friends have given us these answers:

Cut nails were made as early as 1819 over in Wareham, Mass.

—*L. R. Crago, Mgr., Cut Nail Sales Div., Wheeling Steel Corp., Wheeling, W. Va.*

In 1786 Ezekiel Reed of Bridgewater, Mass., patented a machine for making cut nails.

—*F. R. Morral, Industrial Fellow, Mellon Institute of Industrial Research, Pittsburgh*

Although there were patents of earlier date, it is recorded that the first cut nail was made by Jeremiah Wilkinson of Cumberland, R. I., in 1777.

—*E. H. McClelland, Technology Librarian, Carnegie Library of Pittsburgh*

The first cut and machine headed nails were made in England towards the end of the 17th century.

—*H. C. Sproule, Lake Erie Engineering Corp.*

Down to the Last Rivet

Now that that's settled we would like to put into the record the exact answer to another question that gave us grave doubts of the brains department's omniscience—"How many rivets in a battleship?" We told the inquirer the answer was 1,269,983 ("Fatigue Cracks," Dec. 9, 1943). We now have a true count. The Navy reports that the new 45,000-ton USS Missouri" has exactly 1,135,000 rivets. We think it is remarkable how close the brains department came to the right answer, considering that its ouija board is the old-fashioned manually-operated type.

"Where," He Said, "Have I Seen . . ."

Congratulations on the Jan. 20 front cover. We consider ourselves FORTUNE-ate to be represented in this forward moving issue of the D.O.F.J. Again I.A. leads the field in originality.

—*E. C. Shults, Adv. Mgr., Pratt & Whitney, West Hartford, Conn.*

To omniligent Ed Shults an orchid for recognizing the Jan. 20 cover as an identical twin of a former Fortune front cover design. The similarity had escaped us.

Does "D.O.F.J." stand for "distinctly omneitous family journal" or is our first guess correct?

We Stuck Out Our Chin

To keep from getting over-fond of ourselves, every now and then we send a questionnaire to a cross-section of our readers, inviting them to come clean. While we realize that many beautiful friendships have been broken up by the assumption that an invitation to indulge in candor is to be taken seriously, we take a masochistic delight in giving readers an opportunity to plant their Sunday punches on our chin, if so minded.

A chin-unveiling exhibition has just been completed, and we are happy to report that an experimental wiggle of our sub-maxillary reveals it is still intact. The only blow that shook us was a vehement letter from a foreman who thinks we are anti-labor.

This time more than the usual number of readers by-passed our chin completely, reached clear around to our back, and patted it with such comments as these:

"I don't see how you can improve this book. I think it is the best on the market."

"I enjoy IRON AGE *and cannot wish it different in any way."*

"I like your magazine very much. It is the best all around from a technical man's viewpoint."

Others were more temperate, merely telling us that we have "a good magazine," or "better than average." As usual, the feature that garnered the highest number of bouquets was the editorials.

In the line of concrete criticisms, we are told that we should have more on the reader's particular specialty —welding, tool design, farm implements, export markets, and so on. There is, of course, a limit to what the brains department can do in this regard.

A Midwestern manufacturer thinks we ought to put the table of contents page in the same place each week or put the page number on the front cover. As our motto is that the customer is occasionally right, we will investigate.

Another reader suggests, "Make six months index available as a separate pamphlet." We have been getting out semi-yearly editorial indexes since the Democrats tried to win an election with the slogan, "When Mark Hanna whistles, McKinley dances." The index for the second half of '43 is now on the press. Free to all who ask for it.

All in all, we were treated very kindly.

Names That Fit the Job

The president of Stephens Union's student body is Joe Mixer, a pretty example of predestination. Often, however, destiny is thwarted. Herndon A. (Alcoa) Oliver, Jr., calls attention to the case of W. Nelson Bump. Mr. Bump is with our neighbor, American Airlines, five flights up. He should be with a drop hammer concern.

In Defense of J. R. Williams

The left hand twist drill can be easily explained by looking at the sketch in a mirror. This also puts the feed handle on the right side of the drill press where it belongs.

Perhaps somewhere in the process of working up the cartoon for printing a tracing was reversed . . .

—*G. E. Grimshaw, Grimgrip, Inc., New Bedford, Mass.*

But this would also reverse the words in the "balloons" — unless they were lettered in later.

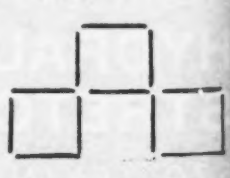
I fly to the defense of J. R. Williams. That is no L. H. twist drill; it's a spiral type reamer, which is correctly left hand to avoid digging in.

—*H. L. ("Red") Blood*

No dice. The helix angle according to your favorite family journal's technical editor, Frank Joseph Oliver, is too acute for a reamer.

Puzzles

As you saw at a glance, last week's match trick is solved as shown in the diagram.



Five minutes is par for this: A man went into four gambling houses in succession. It cost him $100 to get into each one. It cost him the same amount to get out of each. In each house he doubled what he came in with —after paying the admission charge. When he left the fourth house, he had no money left. How much did he have when he started?

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Scales

Dear Editor:

RESUMED ASSEMBLY LINES

Sir:

About 30 months ago in your "Assembly Line" you described the difficulties of beginning production on new models. We are very anxious to secure about six copies.

P. J. GALETTO,
Sup't of Inspection (Tanks)
Cadillac Motor Car Div.,
General Motors Corp.,
Detroit 32

● See "Assembly Line" for Nov. 7, 1940, page 70.—Ed.

GAS KITCHEN

Sir:

The Jan. 20 Dear Editor page had an inquiry from William Hope of Manchester, England, on modern kitchens. You indicated in your answer that you were turning the inquiry over to the Edison Electric Institute. . . . I would like to point out public acceptance of gas in the home makes it the preferred fuel of millions of people both in the United States and in England. . . . The American gas industry is taking active steps to continue to furnish leadership in the design and development of truly modern American kitchens and homes.

We have written to the gas company in Manchester, England, to furnish Mr. Hope the information he has requested.

C. GEORGE SEGELER,
Engineer of Utilization
American Gas Association,
420 Lexington Ave.,
New York

SUPERFINISH FOR REFLECTORS

Sir:

Your Aug. 19 issue contained a reference to the Superfinish process developed by Chrysler and now being used for plating reflectors. I am interested in getting full information.

WILLIAM M. SIESEL,
Consulting Engineer
Flight Training Research,
Box 589,
Trenton 4, N. J.

● As far as we know, Chrysler is the only concern doing this type of work. The process follows the methods described in the series on Superfinishing in The Iron Age issues of Sept. 1, 8 and 22, 1938. You may be able to obtain specific information on the application of Superfinishing to plating reflectors by writing D. A. Wallace, president, Chrysler Sales Div., Chrysler Corp., 12200 East Jefferson Ave., Detroit 14.—Ed.

COMPARABLE ELECTRODES

Sir:

I believe the table, "Comparable Arc Welding Electrodes," and the booklet, "How to Get Maximum Output from Your Cutting Tools," will be helpful to me. Please send them. A check is enclosed.

MAJOR WILLIAM B. SWEET,
Ord. Dept.
Military Intelligence Service,
Pentagon Building,
Washington 25

MODERN HEAT TREATING

Sir:

Your Jan. 13 article, "Modern Heat Treating Takes a Lot of Know-How," refers to liquid nitriding. What is the name of the manufacturer that supplies the salt? What company has available the Scottsonizing process? Who handles the Nusite hardening process?

W. CORTLYN RHODES, JR.,
Production Mgr.
Air Associates,
Teterboro, N. J.

● Liquid nitriding salt is a product of E. F. Houghton Co., 303 West Lehigh Ave., Philadelphia, and A. F. Holden Co., New Haven, Conn. Nusite hardening was developed by Perfection Tool & Metal Heat Treating Co., 1740 West Hubbard St., Chicago 22. Scottsonizing process is a development of C. U. Scott & Son, Rock Island, Ill.—Ed.

ORDERS IN BLANK

Sir:

Here is a suggestion that may be helpful to some of your readers. When we have occasion to order small quantities of hard-to-locate materials, we make out our regular purchase order in the usual manner, but leave the supplier's name and address blank.

We mail the order to the supplier who we think most likely to have the material attaching the following memo:

"This order carries no supplier's name. If you have the material on hand for immediate shipment, fill in your name, ship and bill material at once.

"In case you cannot fill this order from stock, sign your company name below and forward to whoever you believe might be able to do so. Signing below will avoid having this order show up in your files a second time. Thanks. Just our lazy way of procuring small quantities of hard-to-locate materials."

H. E. PAINE,
Purchasing Agent
Lane Manufacturing Co.,
Montpelier, Vt.

FOREIGN PATENTS

Sir:

Page 114 of your Dec. 23 issue has a list of patents seized by the government and now available to domestic firms. What is the proper procedure in order to obtain copies of patents?

HARRY P. BREWER,
Purchasing Agt.
Milford Rivet & Machine Co.,
Milford, Conn.

● Order direct from the Commissioner of Patents, Washington 25, D. C. Price is 10c each, payable in currency, certified check, money order or Patent Office coupons. No stamps. A 28-page reprint of the seized patent lists published in The Iron Age, up to and including the Jan. 20 issue, is now ready. To get a copy send 24c in stamps to The Iron Age, 100 E. 42nd St., New York 17.—Ed.

TOOL ROOM TIME ESTIMATING

Sir:

I am much interested in time estimating of tool room jobs, but find it impossible to get any literature on the subject. The only information that is published relates to time on production set-ups, or so it seems.

At one time, I discovered an author who stated that there was a method of checking time by allowing so much for different types of cuts, but gave no actual listings. Have you ever come in contact with any books or know of any concern that might be able to help me?

HERMAN SCHWEIZER
9441 109th Ave.,
Ozone Park, N. Y.

● "Time and Motion Study" by Lowry, Maynard and Stegemerten, contains formulas for constructing synthetic time studies on the basic elements of machine operations. The publisher is McGraw-Hill Book Co., 330 West 42nd St., New York, price is $5. Details of time values for various machining operations on dies will also be found in "Die Design and Estimating," published by American Industrial Publishers, 2460 Fairmount Blvd., Cleveland, price $3.—Ed.

HIGH SPEED MILLING

Sir:

We are interested in high speed milling, and are informed that articles on the subject were published in the Oct. 14 and Dec. 9, 1943 issues.

We should like to obtain reprints of these articles.

GEORGE O. SMILEY,
Tool Engineering Department
Saginaw Steering Gear Div.,
General Motors Corp.,
Saginaw, Mich.

Sir:

Will you kindly send me a copy of your five-page report of high speed milling symposium of the last A.S.M.E. annual convention?

D. C. ROWE,
Asst. Works Manager
Bell Aircraft Corp.,
2050 Elmwood Ave.,
Buffalo, N. Y.

MILL PASSES

Sir:

Where can I obtain a treatise on mill passes, particularly in the blooming, billet and merchant mills?

S. E. ELDRIDGE,
Asst. General Manager of Sales
The Newport Rolling Mill Co.,
Newport, Ky.

● The best book we know of is the 1440-page "The Making, Shaping and Treating of Steel," by J. M. Camp and C. B. Francis, published by Carnegie-Illinois Steel Corp., Pittsburgh. We do not know the price.—Ed.

COPPER OUTPUT

Sir:

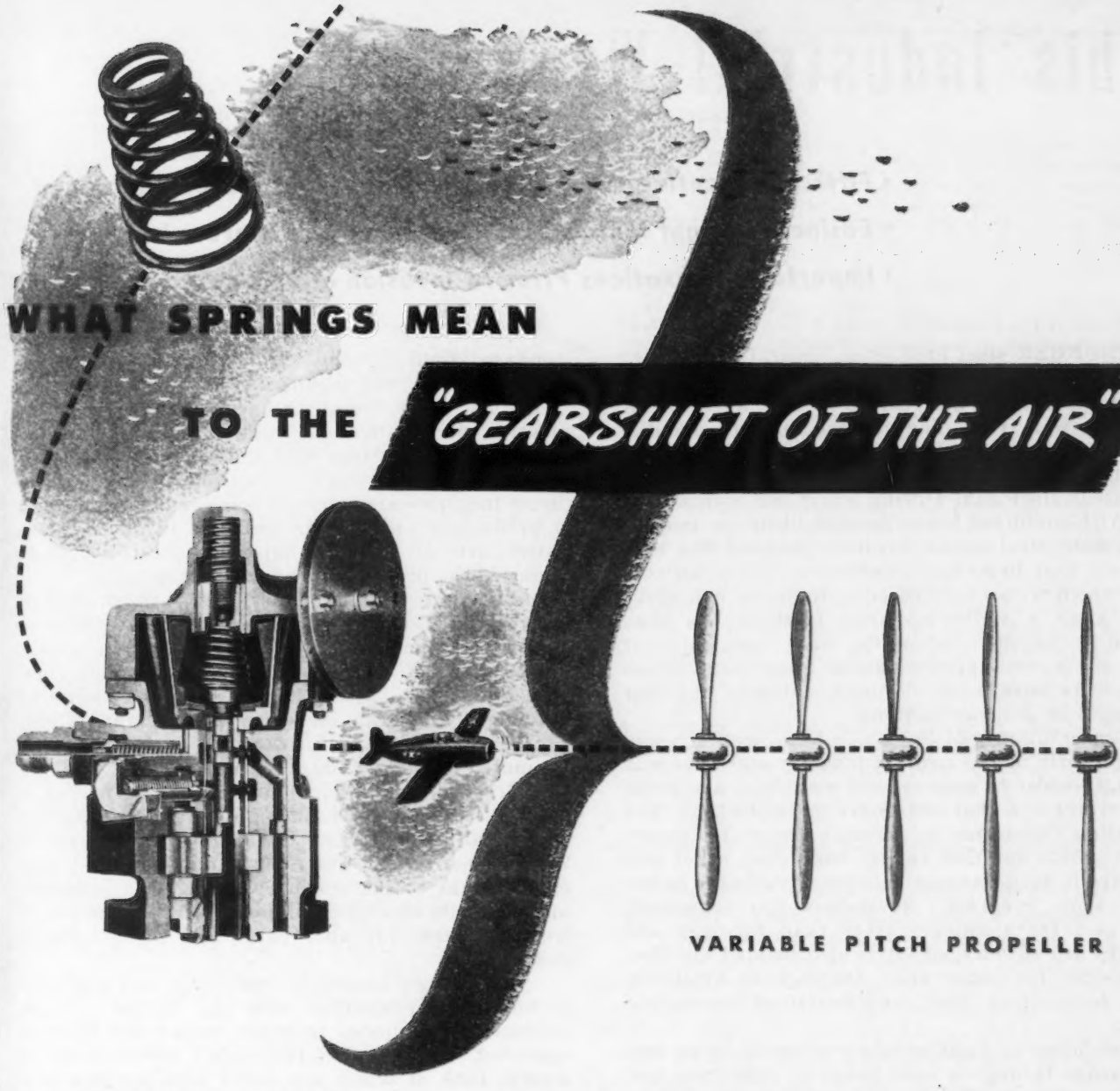
How much copper was made in the United States from 1938 to 1942?

J. A. KNUPP,
Secretary-Treasurer
Waynesboro Manufacturers' Association,
Waynesboro, Pa.

● Refinery production of copper from foreign and domestic ores, in net tons, was:

1938	792,500
1939	1,009,515
1940	1,313,556
1941	1,395,309
1942	1,414,561

—Ed.

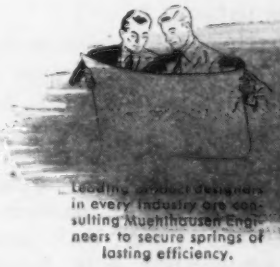


SKYROCKETING—swooping—diving—our planes are driving the enemies dizzy on every front. And one of the main reasons for U. S. air supremacy is the constant-speed propeller—controlled by the Woodward Hydraulic Governor. This maintains a constant engine speed by operating the pitch-changing mechanism of the propeller.

Muehlhausen Springs are responsible, too—for they are important parts of the governor. In the illustration above, note particularly the cone-shaped compression spring located at the top center. The tension of this spring holds the flyballs which, in turn, regulates a pilot valve controlling hydraulic pressure to propeller.

All springs used in this governor are made to tolerances measured in thousandths of an inch, and designed to compress squarely under all degrees of loading. Typical examples of the unvarying precision demanded in the design, fabrication, and testing of Muehlhausen Springs. Send for Die Spring Folder.

MUEHLHAUSEN SPRING CORPORATION
Division of Standard Steel Spring Company
817 Michigan Avenue, Logansport, Indiana



Leading product designers in every industry are consulting Muehlhausen Engineers to secure springs of lasting efficiency.

MUEHLHAUSEN SPRINGS
EVERY TYPE AND SIZE

This Industrial Week . . .

- ***Fifth Consecutive Weekly Rise in Steel Ingot Output Achieved***
- ***Easiness in Light Metals Puts Conservation Program in Reverse***
- ***Important Relaxations Prior to Invasion of Europe Doubted***

STRONGER steel production, typical of the high tempo centering upon the making of invasion equipment, is the feature of this week on the domestic war front. The current jump of one-half point to 99.5 per cent of capacity is the fifth consecutive weekly gain in steel ingot output, the total movement since Jan. 1 being about two points.

With continued heavy demand likely for landing craft, many steel makers are more inclined than ever to doubt that important relaxations in civilian controls which would involve large tonnages can occur until after a well-established foothold has been gained in Europe. But at the same time, in other parts of the metal producing and metal using industries, there have been additional cutbacks and new evidences of postwar thinking.

Conservation policies which have been stressed so vigorously in the aircraft industry since the war began, in order to save critical materials, are going into reverse now that metals are more plentiful. The Operating Committee on Aircraft Materials Conservation points out that copper base alloy sheet and strip are in better supply because of cutbacks in the small arms program. Reversions are suggested. New uses for aluminum other than forgings and castings are encouraged. It is also pointed out that magnesium for other than forgings is available, while ferro-alloys, zinc, and beryllium-copper are easier.

Producers of light metals are urging large tonnage usage through a wide range of industries and some government officials are considering "substantial" programs. Meanwhile, the closing of three more aluminum production lines at Massena, N. Y., was announced this week, bringing the total to 15, equivalent to a 14 per cent decrease in aluminum output.

MARKET trends in steel indicate that the tightest products still are plates, sheets, certain structurals, and pipe. Demand for ingots and semi-finished steel for sale is off considerably from a few months ago. Certain types of bars are in strong demand, but other production units could use more tonnage. Cold finished bar demand has picked up recently due to war requirements. It is reported that WPB may raise the quota on galvanized sheet production, permitting some mills to re-enter the business, and that a large mail order house has applied for permission to stock galvanized sheets. Preliminary inquiries are reported being made on steel for a production program on bathtubs to go to devastated parts of England, but since sheets would be required the program may encounter delay.

Tin plate production during the third quarter, because of recent revisions in M-81, is expected to top second quarter output, which may run around 750,000 tons of tin mill products. It is understood that the sheet situation has been further tightened recently by definite increases in the landing mat program. Previous estimates, before the increase, amounted to about 1,100,000 tons for 1944.

Other highlights include two major moves of the WPB which seem to indicate that the stockpiling of critical materials may be tapered; the cutback of 741 locomotives in the Army's requirements; new evidences as to the adequacy of pig iron supplies; and moderate relaxation of some curbs on the use of iron and steel for auto parts and small tonnage items.

At Chicago, industrial executives are reported to be doubtful whether even the limited civilian production announced in recent weeks will proceed very fast. Producers of two widely varied types of metals, both of whom are faced with surplus production capacity, report that efforts to have these metals released for civilian uses which would require no further fabrication, have been turned down flat.

MAKERS of farm equipment, competing against war goods firms for vital components, are lagging slightly behind their timetable but hope to get back on schedule before the June 30 deadline which customarily marks the end of the farm machinery production year. The industry has been allotted and has placed orders for 974,000 tons of steel covering the periods from last July to next April. For the 1944-45 production season, manufacturers propose that they be permitted to suggest their own production patterns.

Uncertainty over postwar world conditions, particularly exchange rates and wage rates, is said to be a potential barrier to the planning of export sales of steel. Some producers who have studied the problem believe the industry would do well to discount grandiose ideas concerning American steel participation in foreign markets after the war. Before the outbreak of war, U. S. producers were able to export in cooperation with foreign producers on a stated

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basis but some encountered periods when their export products sold far below the going domestic market.

In line with the steel industry's drive to obtain higher prices, arrangements have been completed for obtaining cost data for all principal steel products, including alloy steel. A satisfactory tabulation of these data may be expected by the second week in February, according to OPA. Meanwhile, iron ore producers are reported considering a further appeal for price relief during the coming season.

PAYING the full cost of construction, Bethlehem Steel Corp. has acquired from the Defense Plant Corp. some $22,000,000 worth of blast furnaces, coke ovens, and other facilities that were built for DPC in Bethlehem plants. This move may be followed by the acquisitions of scrambled facilities by other steel companies, although not all of them are expected to offer to pay the full cost.

The DPC is reported to have made plans to shut down five of its blast furnaces, indefinitely, as they are completed. Meanwhile, lease agreements for the erection of a charcoal iron blast furnace at Rusk, Texas, have been completed with DPC scheduled to appropriate $2,379,000. This project involves moving an idle furnace from a quarry in Florida.

Sidelights of current markets include the circulation of an aircraft partsmaker's inquiry at New York asking for data on the performance of steel at minus 160 deg. F. West coast steel mill buyers are reported to have purchased "melting grade" scrap at $1 to $2 per ton below ceiling prices recently.

Labor disputes continue to hamper the steel industry. Among several walkouts recently, an unauthorized strike at the Carnegie-Illinois Steel Corp. 100-in. plate mill at Homestead last week, participated in by a crew of eight on the shearing line, caused an estimated loss of war plates amounting to 5000 tons. In Washington, CIO and AFL have stirred up a real fight with the Bureau of Labor Statistics over living costs.

Contributing to the rise in steel ingot output were gains of one point to 101 per cent and three points to 98 per cent at Pittsburgh and Wheeling, respectively. Youngstown operations dropped one point to 96 per cent while at Cleveland output declined two points to 98.5 per cent. Detroit is down half a point to 103 per cent and the Eastern District rate has decreased to 97 per cent from 106.5 last week. Unchanged are Philadelphia at 91; Buffalo at 104.5; Birmingham at 99; Cincinnati at 95; and St. Louis at 101.5.

Tax Bill Renegotiation Sections

Washington

• • • The renegotiation provisions of the new Revenue Act as agreed upon by Senate and House conferees Monday afternoon blasted the hopes of industry that the broader Senate provisions would be incorporated into the bill. Although a few of the minor Senate changes were approved by the conferees, the renegotiation sections of the bill now resemble the more cautious House approved provisions.

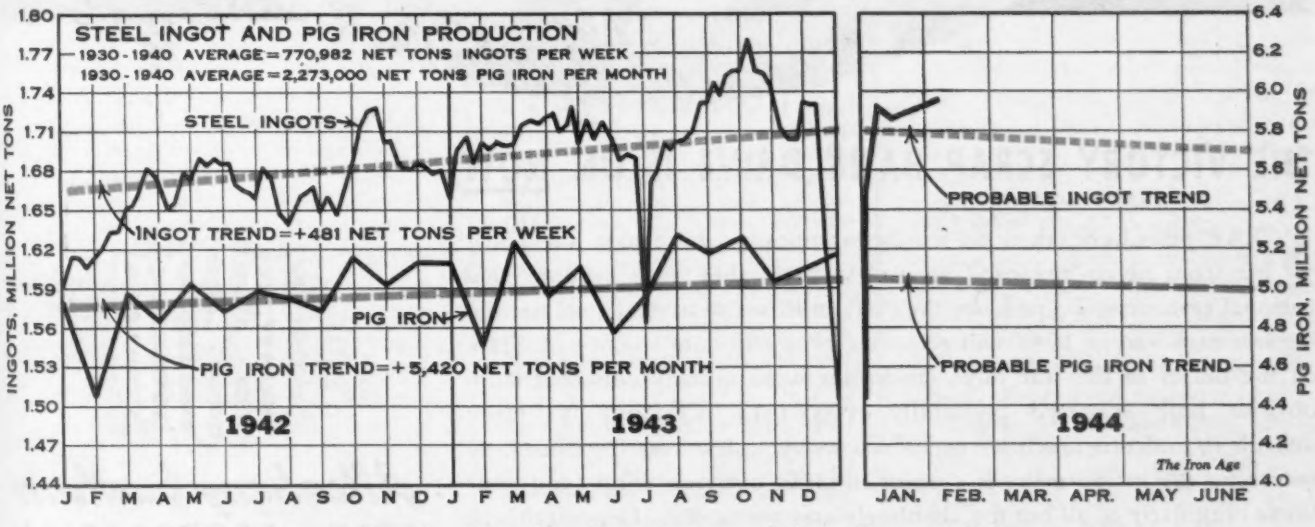
As written now, appeal can be made to the Tax Court rather than the Court of Claims as approved by the Senate. A contractor can appeal to the court only in the case of unilateral agreements entered into in fiscal year ending after June 30, 1943. The mandatory exemption of standard commercial articles was also deleted.

However, the secretaries of the various governmental departments have the power to exempt articles in specific cases.

The pricing clauses have been separated from the renegotiation provisions, but the status of repricing is the same. The only change is that it is not an integral part of renegotiation.

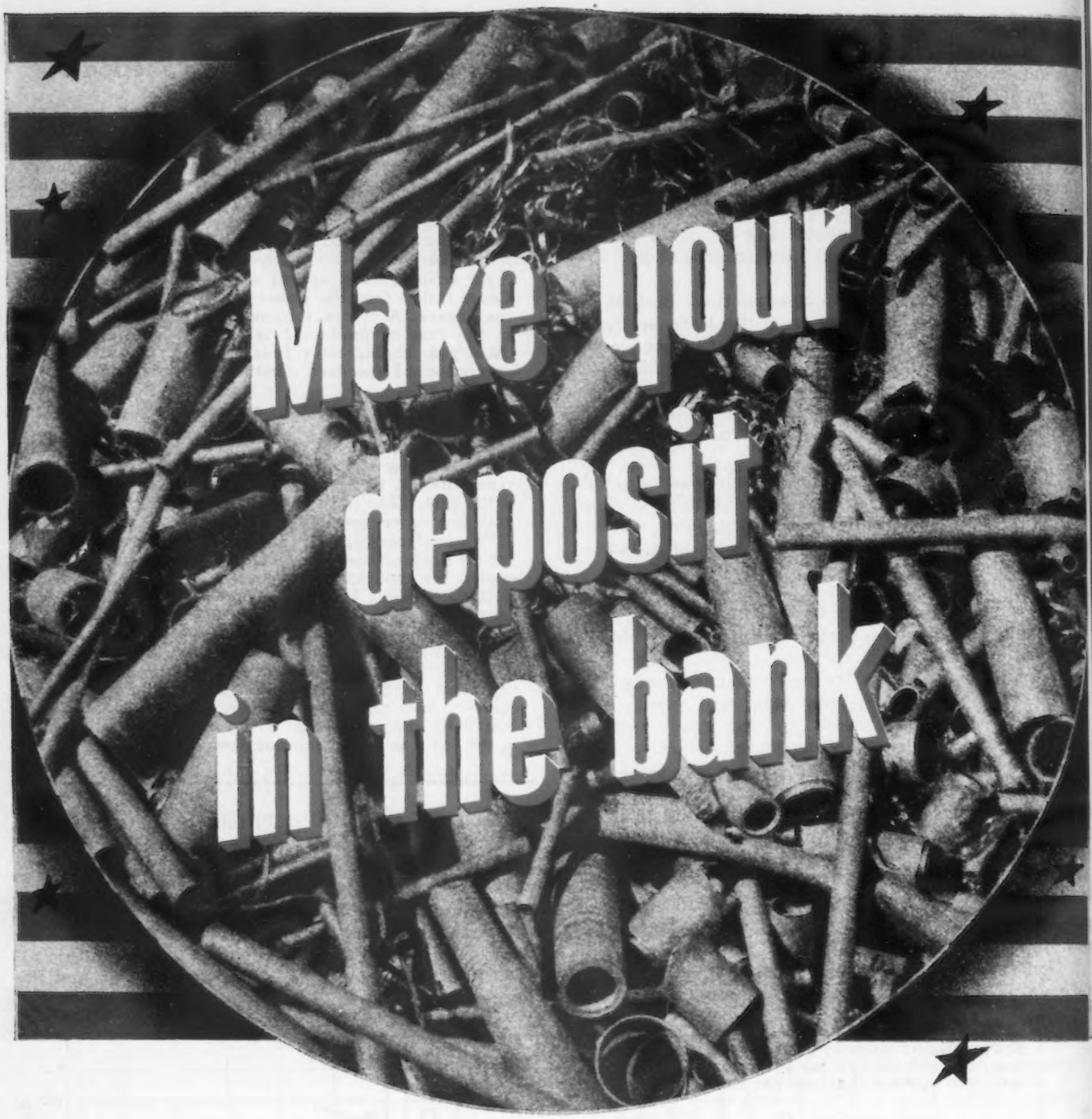
The conferees agreed to a Senate amendment terminating renegotiation on Dec. 21, 1944. It may be extended six months or shortened that length of time if the President feels that competitive conditions or fair prices have or have not been established.

The conferees also agreed to the appointment of a member of WPB to the six-man War Contracts Price Adjustment Board as provided for by the Senate. The controversial Senate provision which would have exempted machine tools from renegotiation was rejected by the conferees. The status of subcontracts is the same as under existing law.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 27.....	99.0	103.5	97.0	91.0	100.5	104.5	95.0	99.0	103.5	95.0	95.0	101.5	106.5	99.0
February 3.....	101.0	103.5	96.0	91.0	98.5	92.5	98.0	99.0	103.5	95.0	95.0	101.5	97.0	99.5



THE VICTORY SCRAP BANK DRIVE IS ON NOW

SCRAP piles have taken on a new significance these past few years. Far from being regarded as useless junk, they have become vital national resources. To produce the extra millions of tons of steel needed for war now and in 1944 will require a proportionate amount of scrap. At the outset of the war huge stockpiles were quickly collected from obvious junk scattered plentifully everywhere. Certainly it's more difficult to find this much needed scrap today, unless you are constantly searching for it. So make it a point to clean out your shop (and your home) regularly of all but the absolutely essential metal. Deposit this in the Victory Scrap Bank . . . a deposit that will pay you *real dividends.*

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

Bethlehem Steel Corp.

DPC Reported Planning to Close Five of Its Blast Furnaces

Pittsburgh

• • • What final disposition will the government make of DPC blast furnaces and steel plants? Will they be shut down permanently? Will they be sold eventually to those who were selected as agents to run them? Will they be put on the block to the highest bidder? These are a few of the questions in the minds of the steel fraternity.

According to sources here, these are serious queries, because the DPC capacities add up to considerable tonnage. They represent the latest in engineering skill. The location of some of these plants, with respect to normal steel demand and distribution, may be in question, but in most cases the equipment and mills are located in areas already serving large percentages of the nation's steel demand.

Proof that this situation is uppermost in steel officials' minds was expressed recently at Pittsburgh by Benjamin F. Fairless, president, U. S. Steel Corp. of Delaware, who gave his ideas of what should be done. He argued that the government should dispose of its plants and facilities as promptly as possible after the end of the war, and should not compete with private business. In cases where the government plants were more efficient, it should allow private industry to buy or lease these lower cost plants on some equitable basis. Where the plants were uneconomical to operate, they should be scrapped or put under lock and key, Mr. Fairless said. So far, there has been no clear cut policy from governmental circles as to the final disposition of DPC plants.

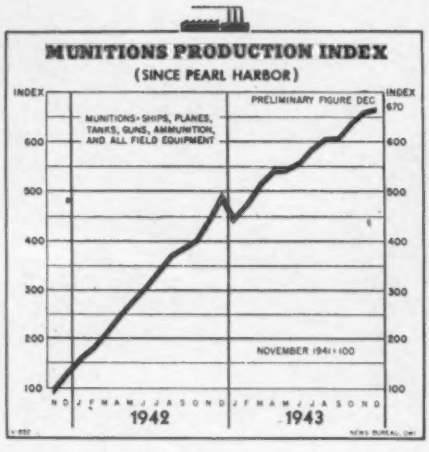
In practically all lease agreements with DPC, the steel company, acting as agent for the government, is said to have the first right to an option on buying the plant. For the present, many of these plants have been ordered shut down, and construction ceased if it has not been completed. However, construction on most blast furnaces and steel plants was well advanced before orders to shut them down were given. It is believed by many that it would be an economical waste not to eventually complete some of these plants.

The problem, for the duration, of those DPC plants, which are now operating, and which probably will not be ordered shut down in the near future at least, is not a serious one. After the war, the situation with respect to those plants will be quite different. Most of the additions now operating are what is known as "scrambled" DPC plants, that is, located in with, or mixed in with, privately owned plants and equipment. There are a few completely integrated, or almost completely integrated, DPC projects, such as the Homestead Works at Pittsburgh, and the Geneva Steel Co. at Utah. The question of whether these units, which are now

• • • Bethlehem Steel Corp., during the past year, acquired from the Defense Plant Corp., all integrated steelmaking facilities in its plants built to the DPC account. These consist mainly of blast furnaces and coke oven batteries that were constructed at the Bethlehem, Lackawanna, Steelton, and Sparrows Point plants, and cost Bethlehem Steel Corp. between $22,000,000 and $23,000,000. This price is stated to be the cost of construction of these units. The acquisition was made, according to E. G. Grace, president, to prevent the government from "being our landlord" on such facilities. This move is believed to be the first in the direction of steel producers obtaining full title to DPC constructed and financed steel mill facilities.

operating, will continue to do so, under the mangement of the company probably depends on two things: the economical cost of running these plants, compared with the cost of running commercially owned plants, and whether or not some of the agents may exercise their option on certain of the units, as the Bethlehem Steel Co. did last month.

Taking as an example the DPC open hearth plant at Carnegie-Illinois Steel Corp.'s Homestead Works: As long as the company is paying a stipulated royalty per ton of steel produced at the DPC plant, to the government, as the latter's agent, the cost of operations plus the rental or royalty would be the figure which would be used to determine if this plant should be shut down, or if some other unit owned by the company should be shut down. In case total demand for steel fell off to such an extent that either the Homestead DPC unit should be shut down or whether one of the company's own plants should be shut down, the decision would be settled by whichever one



cost the least to operate. In the case of the open hearth furnaces or steel rolling mills, this is relatively simple. In the case of blast furnaces, however, a different problem is presented. The increased costs of making pig iron at a DPC blast furnace, due to royalties paid to the government as agent, might present costs higher than production at privately owned blast furnaces, especially in view of the falling off in pig iron demand and the increase in over-all capacity.

The opinion on the disposition of blast furnace units which are not needed, seems to be borne out by the report that the DPC already has made plans to shut down five blast furnaces, indefinitely, as they are completed. It is understood that two of these furnaces already are shut down in the Chicago district for an indefinite period, one at Inland, and one at Republic. There is a definite possibility that the DPC furnace at the Pittsburgh Steel Co.'s Monessen Plant has also been ordered shut down indefinitely. The Daingerfield, Tex., blast furnace is also reported to have been ordered down, and it is further said that one of the three blast furnaces in the Geneva Steel project, will be shut down indefinitely in April when it is completed. These reports seem to indicate the probable trend of action in practically all DPC blast furnaces, in view of the fact that many commercial or privately owned stacks have been blown out recently because of lack of demand.

Plate Shipments Month by Month Since October, 1941

(By Type of Mill) Source: WPB Steel Division

Month	Universal Mill		Sheared Mill		Strip Mill		Total Net Tons
	Net Tons	Per Cent of Total	Net Tons	Per Cent of Total	Net Tons	Per Cent of Total	
1941							
October	94,311	15.9	346,401	58.4	152,440	25.7	593,152
November	998,828	16.1	350,868	56.6	169,311	27.3	620,007
December	113,467	17.3	358,273	54.8	182,604	27.9	654,344
1942							
January	122,227	16.2	381,899	50.6	250,396	33.2	754,522
February	111,965	14.8	377,770	49.8	268,988	35.4	758,723
March	123,152	14.1	449,379	51.1	306,195	34.8	878,726
April	121,838	13.6	436,614	48.7	337,519	37.7	895,971
May	125,608	12.4	461,375	45.6	425,211	42.0	1,012,194
June	123,114	11.7	438,144	41.7	489,704	46.6	1,050,962
July	126,100	11.2	447,481	39.8	550,537	49.0	1,124,118
August	115,710	10.5	430,197	39.2	551,959	50.3	1,097,866
September	115,372	10.9	434,555	40.9	511,909	48.2	1,061,836
October	114,506	10.4	449,895	40.8	536,981	48.8	1,101,382
November	114,755	11.3	424,708	41.9	474,136	46.8	1,013,599
December	114,650	10.8	454,902	42.9	490,487	46.3	1,060,039
1943							
January	121,039	10.7	448,481	39.5	565,893	49.8	1,135,413
February	118,519	11.0	424,167	39.6	529,315	49.4	1,072,001
March	138,805	11.9	465,572	39.9	563,302	48.2	1,167,679
April	131,272	11.7	454,827	40.5	535,548	47.8	1,121,647
May	119,332	10.7	460,060	41.3	535,528	48.0	1,114,920
June	115,986	11.0	431,565	40.9	508,534	48.1	1,056,085
July	121,059	11.1	438,066	40.2	530,552	48.7	1,089,677
August	124,315	11.7	439,358	41.4	497,263	46.9	1,060,936
September	121,929	11.0	444,585	40.2	540,337	48.8	1,106,851
October	127,751	11.1	463,250	40.4	555,844	48.5	1,146,845
November	135,999	11.9	463,656	40.6	541,485	47.5	1,141,140
December	130,573	11.2	474,122	40.5	564,501	48.3	1,169,196

Farm Equipment Output Lagging; Scramble for Components Is A Factor

Chicago

• • • **Farm equipment** manufacturers are lagging slightly behind their 1943-44 farm production timetable but hope to gather sufficient momentum to meet annual goals for the production year ending June 30.

Competition for automotive components with the landing craft and motor truck programs is causing most of the difficulty. Unfabricated material is in adequate supply with deliveries on time although some worry still is caused by flat rolled steel products. The industry has been allotted and has placed orders for 974,000 tons of steel for the three calendar quarters in the period July 1, 1943, to April 1, 1944, and for the full year will be granted 96 per cent of the steel it used in its biggest previous year.

The December production rate of wheel tractors, the principal motive power item, announced as 20,000 for the month, probably was maintained in January, a preliminary check shows. This figure was the largest for any month in two years and compares with a production of 4200 in December, 1942. Further production speedups will be necessary if the annual goal of 209,000 is to be reached, however. In 1943, wheel tractor production climbed from 15,000 during the first quarter to 18,000 in the second quarter, 33,000 in the third quarter and 56,000 in the fourth quarter. Several manufacturers who had been participating heavily in the tank and certain ordnance programs were enabled to get back into the farm equipment business with all four feet because of cuts in these programs in 1943 and thus have been able to make up lost time.

As in the past, manufacturers who produce most of their own components have been better situated than those purchasing in the open market. Efforts to procure combine engines, a widely purchased item, have run head-on into similar requirements for landing craft, while such automotive items as bearings, bushings, and malleable castings have crossed swords both with landing craft and truck programs. Minor delays have been caused by failure to receive tires on schedule. Some manufacturers, who do not operate their own gray iron foundries report delays in receiving castings caused, assertedly, by commercial foundry labor shortages.

Recognition by the War Production Board of the importance of food production has enabled the farm equipment industry to hold its own as a "must" program even in competition with combat items, it is claimed. George Krieger has moved up from his former post of chief of the WPB Farm Equipment Division to become a special assistant to Donald Nelson with the responsibility of coordinating the food program and equipment requirements. He has been replaced by Charles Deere Wiman, whose business background is with Deere & Co. In order to keep in closer touch with manufacturers, W. F. Heesch, deputy director of the division in charge of production, has established headquarters at Chicago. The division also is setting up regional staffs to expedite the production in various sections of the country, with A. C. Dallach as manager of the important Chicago region.

For the 1944-45 production season starting July 1, it is proposed that manufacturers be permitted to suggest their own production patterns, using the amount of materials allotted them for such machines in such quantities as they wish to build. Lists and quantities of machines proposed as well as their suggested distribution would be submitted to the War Food Administration for approval. It is pointed out that such a scheme might encounter difficulty if manufacturers suggested heavy production of machines requiring large quantities of particularly critical components.

Manufacturers have been given advance allotments of controlled materials for the third and fourth quarters of 1944 to the extent of 100 per cent of allotments for the current period.

•

Ottawa

• • • **Canadian War Expenditures** Committee in a report tabled in the House of Commons said that agricultural implement manufacturers should study the possibility of producing a much higher percentage of Canada's equipment needs. The report continued:

"In view of our tremendous industrial development brought about by the war, and in view of the dominant position which Canadian agriculture now holds with respect to food production, it is unthinkable that Canadian manufacturers should continue to supply only 38 per cent of the farm implements used in this country. . . ."

o o o

SUPER-BAZOOKA: *The British announced a new type anti-tank gun that is being used successfully in Italy against pillboxes, concrete emplacements and similar targets. Named the "Piat," it weighs* 33 *lb. and fires a projectile weighing* 2.75 *lb. It will penetrate* 4-*in. of armor plate, it is claimed. It's name is derived from initials of the official designation —"Projector Infantry Anti-Tank."*

o o o

WPB Announces Program for Stockpiling Critical Materials

Washington

• • • **The first statement** of stockpiling policy adopted by the government was drawn up at a meeting of the WPB on Jan. 25. The Board agreed to put into operation the following program:

1—Maintenance of Critical Material List with periodic reviews by the Program vice-chairman.

2—The following criteria were adopted to govern the size of the stockpiles of various metals: (a) possibility of losing territory; (b) interruption of imports by submarine warfare or other enemy action; (c) land transportation tied up; (d) disruption of production through accident, sabotage, or strikes; (e) where shortages develop, metals supply would be increased to fit requirements.

3—Where the foregoing standards do not provide a guide, then the government will fix stockpiles at one or two stocklevels—either at three months' total requirements, or at one years' requirements. To arrive at this figure, domestic production is subtracted from estimated future imports.

Meanwhile, executive vice-chairman

Here is Up-to-date List of WPB

• • • **Many report forms** of WPB Steel Division have been discontinued, according to a recent memorandum prepared by W. A. Hauck, chief of the control branch. Other reports have been abbreviated. There are still 36 Steel Division forms on which reporting is required from steel producers. Twelve reports are on the subject of ferro-alloys, and five are in connection with warehouses. The three basic reports, WPB-180, WPB-2848 and WPB-2633, are substantially reducing the need for special branch reports.

Report Forms Now in Use

1. Control Branch: (Basic Reports)

- WPB-180 Ingot Capacity and Production Report
- WPB-2633 Report of Shipments and Past Due Orders
- WPB-2848 Production Directive Report

2. Alloy Steel Branch

- WPB-949 High Speed and Tool Steel Production
- WPB-2933 Alloy Steel: Melt Report

3. Carbon Bar & Semi-Fin. Branch: (None)

4. Cold Finished Bar Branch

- WPB-1727 C.D. Carbon Shell Steel: Requirements

5. Export Steel Branch: (None)

6. Ferro-Alloys Branch

- WPB-689 Chromium: Stocks, Consumption, Allocation
- WPB-765 Molybdenum: Application, Allocation
- WPB-1770 Ferro-Alloys: Permission to Use
- WPB-2362 Columbium: Stocks, Consumption & Allocation
- WPB-2446 Molybdenum: Prod. & Consmpt. of Wire, Rod & Sheet
- WPB-2868 Tungsten: Application for Allocation
- WPB-2870 Tungsten: Consmpt. & Allocation of Wire & Rod
- WPB-2871 Nickel: Stocks, Consumption & Allocation
- WPB-2872 Nickel Chemicals: Deliveries & Allocation
- WPB-3452 Cobalt—(Letter from Producer on Shipments)
- WPB-3453 Molybdenum—(Letter from Producer on Shipments)
- WPB-3454 Vanadium—(Letter from Producer on Shipments)

7. Forgings & Castings Branch

- WPB-970 Steel Forgings: Shipments and Unfilled Orders
- WPB-971 Iron Castings: Capacity and Production
- WPB-2681 Steel Castings: Shipments, Past Due Orders

8. Metallurgical & Conservation Branch: (None)

9. Pipe Branch: (None)

10. Facilities Branch

- WPB-3196 Application for Extraordinary Repairs

11. Plates & Shapes Branch

- WPB-652 Steel Plate Order Report
- WPB-653 Summary of Steel Plate Order Reports
- WPB-1566 Telegraphic Report of Plate Shipments
- WPB-1583 Structural Shapes—Weekly Rolling Schedule

12. Rail & Track Accessories Branch: (None)

13. Raw Materials Branch

- WPB-2903 Scrap: Producer's Report
- WPB-2904 Scrap: Consumer's Report
- WPB-2905 Scrap: Dealer's Report
- WPB-3174 Pig Iron: Producer's Report

14. Sheet & Strip Branch: (None)

15. Tin Plate Branch

- WPB-3329 Tin Plate: Letter on Stocks for Cussomers

16. Tubing Branch: (None)

17. Warehouse Branch

- WPB-1722 Steel Warehouse Earmarked Stock

Charles E. Wilson ordered all material divisions to advise the Combined Raw Materials Board when taking any action affecting domestic production, imports, conservation, or stockpiles. The new policy makes WPB take into account "the international implications of their recommendations."

Mr. Wilson's order says that the need of advising CRMB is "particularly important when a major change in policy is being contemplated or when the United Kingdom or other countries have cooperated with the United States in building up the present position in the commodity in question."

Such new programs are to be "discussed informally" with CRMB members. Mr. Wilson said that the purpose of these communications will be to advise other nations of plans before they are put into effect and thus to assure that the necessary cooperation in the international raw materials field can be discontinued."

The materials affected are: Ferro-alloys, iron ore, cadmium, copper, graphite, lead, magnesium, chromite, cobalt, manganese, mercury, mica, molybdenum, silver, tantalite, tin, tungsten, vanadium and zinc.

This action by WPB is significant in view of speeches made by WPB vice-chairman W. L. Batt advocating that postwar foreign trade and international debts be paid in raw materials from abroad. Mr. Batt has also suggested the stockpiling of such critical materials as could not be immediately absorbed into the economy.

Steel Division Report Forms and Discontinued Reports

WPB-2444 Steel Warehouse Purchase Authority
WPB-2888 General Steel Products: Receipts & Shipments
WPB-2892 Merchant Trade Products: Receipts & Shipments
WPB-2889 Merchant Trade Products: Base Tonnage

18. Wire & Wire Products Branch: (None)

Administrative Summary Reports

Comparative Statements by Months:

1. Iron Ore—Consumption and Inventory
2. Coke—Capacity, Production and Consumption
3. Pig Iron—Capacity, Production and Consumption
4. Scrap—Consumption and Inventory
5. Ingots—Capacity, Production and Operating Rate
6. Controlled Steel Products—Shipments—By Products
7. Controlled Steel Products — Shipments — By Agencies
8. Steel Castings—Capacity, Shipments, Operating Rate and Order Load
9. Past Due Orders—Per cent for each of 35 Selected Companies
10. Warehouse—Shipments to and Shipments from
11. Surplus Inventory—Shipments Authorized
12. Steel Forgings—Shipments, Yield and Order Load
13. Iron Castings—Capacity, Production, Operating Rate and Order Load.

Over-all Industry Operating Reports:

20. Estimated Quarterly Supply of Steel Products—Carbon and Alloy
21. Summary Production Directive Report—Performance and Mill Load
22. Summary of Operations—CMP and Steel Industry

Report Forms Discontinued

1. WPB-1837 Hard Facing Materials: Production—Alloy Branch
2. WPB-1838 Hard Facing Materials: Requirements—Alloy Branch
3. WPB-1201 Forger's Requirements—Carbon Shell Steel—C.F. Bar Branch
4. WPB-2766 Producers Report Lend-Lease Shipments—Export Branch
5. WPB-1907 Producers Quarterly Report on MRO—Facilities Branch
6. WPB-763 Molybdenum—Stocks and Consumption—Ferro Alloy Branch
7. WPB-939 Nickel Contained in Nickel Scrap—Ferro Alloy Branch
8. WPB-1242 Calcium Silicon—Requirements—Ferro Alloy Branch
9. WPB-2689 Tungsten—Stocks and Consumption—Ferro Alloy Branch
10. WPB-2912 Vanadium—Stocks and Consumption—Ferro Alloy Branch
11. WPB-2913 Vanadium—Application for Allotment—Ferro Alloy Branch
12. WPB-2783 Nickel Chemicals—Customers Application—Ferro Alloy Branch
13. WPB-2934 Producers Ferro Alloy Requirements—Ferro Alloy Branch
14. WPB-2943 Cobalt — Stocks and Consumption — Ferro Alloy Branch
15. WPB-2944 Cobalt—Application for Allotment—Ferro Alloy Branch
16. Special Producers Telegraphic Report on Struc. Ship.—Plate & Shape Branch
17. WPB-2787 Producers Daily Order Report—Program & Distribution
18. WPB-1767 Producers Weekly Rail Production Report—Rail Branch
19. WPB-2335 Rail Steel Mill Report—Rail Branch
20. Special Report on Rail Bookings and Shipments—Rail Branch
21. Special Report on Rail and Track Accessories—Rail Branch
22. WPB-3140 Consumers Monthly Iron Ore Report—(Proposed but Deferred)—Raw Materials Branch
23. WPB-3172 Producers Report Pig Iron Orders—Raw Materials Branch
24. WPB-3173 Consumers Report on Pig Iron—Raw Materials Branch
25. WPB-3175 Producers Report of Pig Iron Orders—Raw Materials Branch
26. WPB-2632 Manufacturers Small Arms Report—Sheet & Strip Branch
27. WPB-1383 Purchasers Report on Tin Plate—Tin Plate Branch
28. WPB-1385 Producers Report on Tin Plate—Tin Plate Branch
29. WPB-1888 Producers Report on Tin Mill Products—Tin Plate Branch
30. WPB-2179 Producers Report for Revised Schedule—Tin Plate Branch
31. WPB-2890 Producers Report on Warehouse Deliveries—Warehouse Branch

Chicago Executives Doubt Whether Even Limited Civilian Output Will Proceed Fast

Chicago

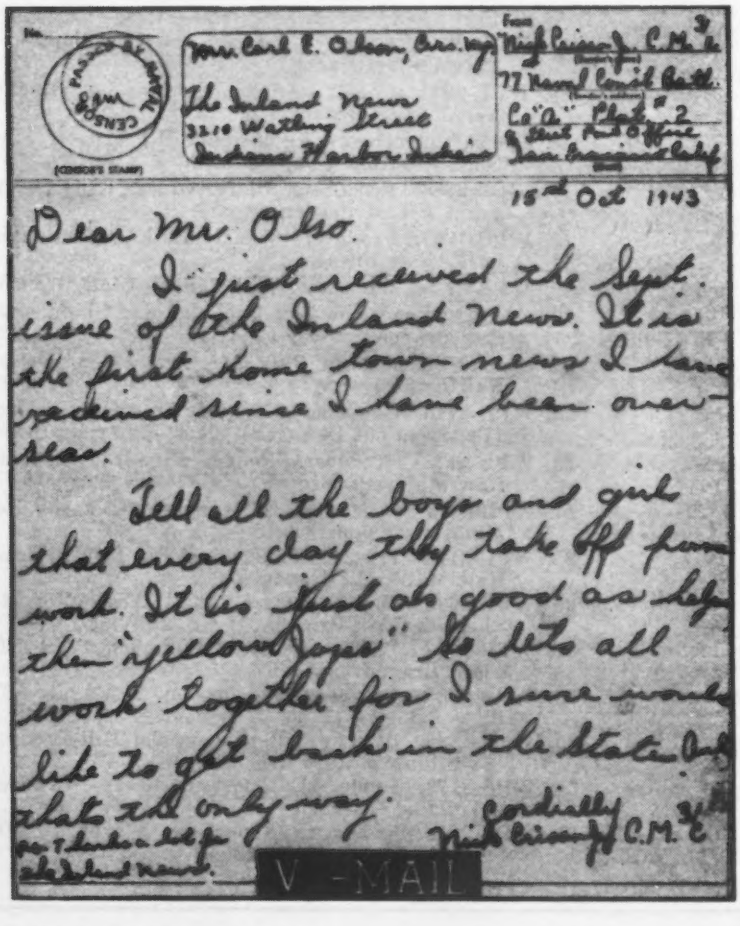
• • • **Despite** persistent reports that WPB will revise limitation orders and allot materials to permit production of civilian items on a limited scale, local manufacturers and metal producers declare that approval of any such program, no matter how small, still is being withheld in stratospheric government circles.

Producers of two widely varied types of metals, both of whom are faced with surplus production capacity, report that efforts to have these metals released for civilian uses which would require no further fabrication have been turned down flat. Until invasion of the European continent has been successfully achieved, the metal producers were told, no metal will be released for civilian purposes. This decision apparently has been battled up from War Production Board divisional levels, through Donald Nelson, who has been reported sympathetic, through James F. Byrnes, who has been critical, and beyond, where Army-Navy opposition to date has won out. Even though mines, smelters and mills may curtail production and operating and managerial staffs disintegrate, the decision has been represented as final.

In fact, the so-called "test tube" program in which small concerns in three limited areas would be allowed to use idle materials in production of consumer goods may yet be in jeopardy although the fact that it was planned was announced officially by WPB chief Donald Nelson before the conference of Mayors at Chicago, Jan. 21. The following day, it is reported, the same high official level which has vetoed previous civilian programs acceptable to WPB repeated in unequivocal terms its no-production-whatsoever ukase.

The revision of WPB Order L-63 to permit manufacture of electric irons on a small scale is so long overdue that it is openly feared here that the revision may have been completely stalled, even though WPB and manufacturers had agreed, and announced, their exact plans concerning distribution of production quotas. The electric iron case, in fact, is said to have become the cause célebre of all civilian goods manufacture, even to the pricing method fought out over Byrnes' desk. Despite WPB insistence that the iron order still is to be issued, rumor has it that this tiny flame of civilian indulgence has been stamped out for fear that it might become incendiary to an uncontrollable blaze. At any rate, local electric iron manufacturers scheduled to share in the program say they have had no hint whether or when schedules would be released and materials alloted.

KEEP MILLS GOING: *This V-mail letter, received by "The Inland News," Inland Steel Co.'s employee publication, from Nick Crisso, a former employee now with Seabees in the South Pacific, tells its own story. He appeals to the "boys" in the mill to keep 'em rolling so he can come home.*



15th Oct 1943

Dear Mr. Olso.

I just received the Sept. issue of the Inland News. It is the first home town news I have received since I have been over-seas.

Tell all the boys and girls that every day they take off from work. It is just as good as help them "yellow Japs" So lets all work together for I sure would like to get back in the States only that the only way.

Cordially
Nick Crisso C.M.3/c

V-MAIL

Brazilian Tantalite Mining Urged by U. S. Government

Parklhas, Brazil

• • • **By agreement** with the Brazilian Government, the U. S. Purchasing Commission, now a part of Leo Crowley's Foreign Economic Administration, buys all of Brazil's tantalite output and loans money to private producers to stimulate development of the mines. Although 1943 tantalite production zoomed 140 per cent over 1942, actual production figures are small.

Mining the ore deep in the Brazilian interior has been no easy job for American engineers and Brazilian technicians, but the worth of this rare mineral in the Allied war effort is great. Tantalum, the metal which is derived, is what makes the ore so worthwhile. Exact military uses are secret, but tantalite's importance can be realized from its high air priority —A-1-A. The pure ore is flown to the United States and processed.

In order to counteract mine owners' belief that the tantalite business is a war bubble that will soon burst, USPC men have eased their burden through loans and higher prices, and by pointing out the great peacetime future which tantalite appears to have in the field of electronics. U. S. government agencies are sending down about $250,000 worth of mining equipment for the project.

Army Cuts Its Locomotive Orders

• • • **Manufacturers** of large and small steam locomotives have been advised that altered military requirements will reduce by 741 the number of steam locomotives of 80 tons or more, and by 162 the number weighing from 50 to 80 tons, from the scheduled quotas for 1944, the War Production Board announced Jan. 28.

Within the past week industry representatives from both groups of manufacturers have met in Washington with Government officials to evaluate the effects of these reductions, which will amount to approximately 25 per cent of the military orders for the large type and 35 per cent for the small.

WPB officials said the reduced requirements would not release any existing production facilities, since the original program called for progressively increased production in each quarter of 1944. Plans of the industry now call for an evening out of operations. Military requirements remaining to be supplied in 1944 call for more than 2,000 large and 300 small steam locomotives.

In addition to these still heavy military requirements, approximately 275 steam locomotives of various sizes for domestic use have been scheduled for delivery during the first nine months of this year, according to officials of the Transportation Equipment Division of WPB.

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Toronto

• • • **Canadian** National Railways has placed the following rolling stock orders: with Canadian Car & Foundry Co., Ltd., Montreal, 2,300 box cars and 200 flat cars; National Steel Car Corporation, Ltd., Hamilton, 2,050 box cars; Eastern Steel Car Co., New Glasgow, Nova Scotia, 700 box cars and 500 70-ton copper cars; Canadian National Transcona Shops, Winnipeg, 200 refrigerator cars, and with Montreal Locomotive Company, Montreal, 20 mountain-type locomotives. 1500 cars and 28 locomotives on order; Bessemer and Lake Erie reports six heavy locomotives to be delivered and C. & O. reported part of an order for 3000 composite coal cars delivered, with several locomotives on order. Grand Trunk & Western let contracts for 300 gondolas, 200 automobile cars and 10 diesel electric locomotives. Lehigh Valley reported partial delivery of 250 gondolas and an order for 900 hopper cars. New York Central let contracts for 1000 box cars and about 70 locomotives; Nickel Plate has on order 500 box cars, 500 hopper cars, 50 gondolas and 30 freight engines; Pennsylvania R. R. has had partial delivery on 116 steam locomotives, 6 diesel-electric, and 10 electric locomotives, 1000 gondolas and 94 flat cars.

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Barge and Cargo Ship Contracts Let

Washington

• • • **The contract for** construction of three more C-3-S-A3 (export type) cargo vessels has been awarded to Bethlehem-Sparrows Point Shipyard, Inc., Baltimore, the Maritime Commission announced last Friday. The new vessel, scheduled for delivery in the spring of 1945, are of the same design as four others being delivered in May, June, October and November of 1944.

The ships are of the type of the Commission's long-range building program which began in 1937. The C-3 type cargo ships have a capacity of 9902 deadweight tons and steam turbine engines which develop 8500 h.p. Normal speed is more than 16 knots.

Allocations of 50 1250-ton, all steel, dry-cargo barges to 10 inland waterway transportation companies were announced Jan. 20 by ODT.

The companies and the number of barges allocated to each are as follows: American Barge Line, Pittsburgh, (4); Commercial Barge Line, Inc., Evansville, Ind., (3); Arrow Transportation Co., Paducah, Ky., (4); Mississippi Valley Barge Line, St. Louis, (10); Central Barge Co., Chicago, (6); Marine Transit Co., Chicago, (2); Ohio River Co., Cincinnati, (5); Federal Barge Lines, St. Louis, (10); Mechling Barge Line, Joliet, Ill., (4); and George N. Childs, St. Louis, (2).

Two new 141,000-barrel (T2-SE-A1) tankers, scheduled to be completed by the middle of February, will join the fleet of The Texas Co., the Maritime Commission announced. They are being built at the Sun Shipbuilding and Dry Dock Co., Chester, Pa.. The Commission said The Texas Co. was buying the new tankers at war-time construction costs, less the cost of national defense features, and was asking for no construction or operating subsidy.

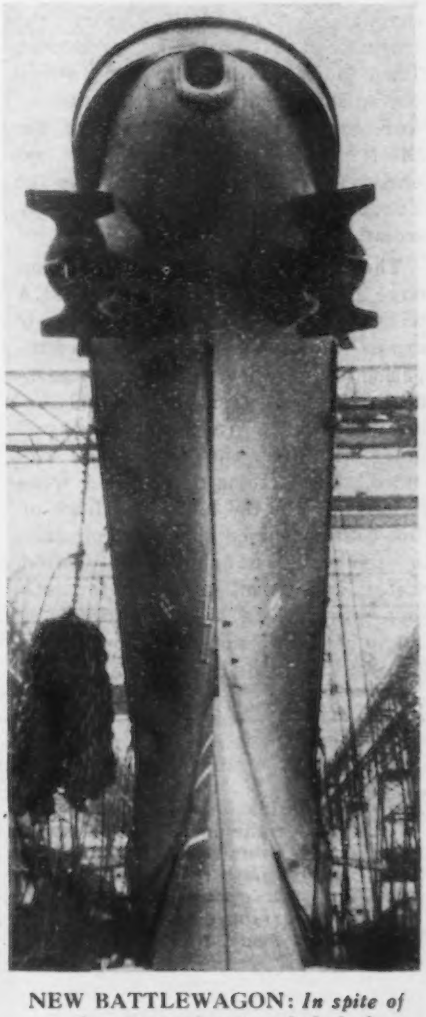
Railroads Let Contracts for Rolling Stock for 1944 Delivery

Cleveland

• • • **Coming aid for** the railroad rolling stock situation here is reflected in the call for bids by the Chesapeake & Ohio Railroad for 5000 hopper type coal cars and 15 Mallet freight locomotives. The Erie Railroad reports that the need for cars may bring forth a call for bids sometime in February.

Contrasted with this are the railroad reports gathered by the Great Lakes Regional Advisory Board which indicate that approximately 2.37 per cent of owned and leased rolling stock of several of the major haulers is listed as bad order.

The Baltimore & Ohio reported



NEW BATTLEWAGON: *In spite of early notions that aircraft had obsoleted surface craft, need for bigger and better ships is now more apparent than ever. The 45,000-ton "Missouri," launched Jan. 29 at Brooklyn Navy Yard nine months ahead of schedule is described by the Navy as the "world's mightiest battleship."*

Uncertain World Conditions To Be Barrier for Export Planning

Pittsburgh

• • • Sir Andrew Rae Duncan, British minister of supply, who has been in this country, toured plants of Carnegie-Illinois Steel Corp. and Jones & Laughlin Steel Corp. here this week. The visit of Sir Andrew, former chairman of the British Iron and Steel Federation, aroused discussion here as in other cities, concerning probable world postwar steel distribution problems.

Steel leaders here recall that before the war, and under the aegis of the Webb-Pomerene Act, American steel producers were able, within the framework of the anti-trust laws, to participate and apportion export steel tonnage, as mutually agreed by United States and foreign producers. The American organization, which was disbanded last year because of war conditions, was known as the Steel Export Association. For several years, William S. Todd was the European representative of the association.

The distribution of export steel tonnage among the members of the SEA was carried out on the basis of their export sales in a certain previous base period. It is believed by some experts that British steel interests would certainly favor a re-establishment of this set-up after the present war has ended. The actions of the SEA were strictly within the anti-trust laws of this country, since they applied only to steel sold outside of the United States, and permission to enter into such agreements was contained in amendments to the anti-trust laws. Restraint of trade, either domestic or foreign, against non-members of SEA was prohibited.

The possibility of a recreation of an American steel export association is not necessarily a foregone conclusion, according to some steel leaders here. Until a more certain forecast of postwar conditions, such as exchange rates, labor rates, etc., can be made, it is hardly likely that steel producers of the United States can, or will, be able to make any commitments. One major impasse, which would have to be settled, probably involves the vast difference between average wage rates paid in this country and those paid abroad. Exchange rates and the cost of steel making in this country will be of far greater importance than other factors, according to steel observers here. While exact labor rates paid abroad are not available at this time, it is significant that in 1936 the average American rate was about 66 cents an hour, whereas in recent months it has climbed to in excess of $1.13 an hour. While some of this increase is due to overtime and incentive payments, nevertheless the bulk of the increase in steel labor costs is due to substantial increases over the past several years in base labor rates. This condition, plus other factors, according to some steel officials, present a sobering thought to those in the industry who look for an unprecedented export steel business. There are some steel producers who have studied the problem, who believe that the industry would do well to discount grandiose ideas concerning American steel participation in foreign markets after the war.

Some American steel companies would, also, prefer to forget some of their experiences with export business during 1936 and in 1938, when American products were shipped abroad at as much as $10 a ton below the going domestic prices. According to some observers here, the problem of sharing in the world export market, outside of the United States, will be important but not too much of an immediate postwar concern, owing to the exceptionally heavy demand which is anticipated on the home front, after the war is over. Obviously, when steel operations begin to slump sharply in this country, there will be considerable interest in foreign markets. However, in view of the wide divergence between labor costs abroad and those at home, as well as exchange problems, some sources believe a government subsidy would be necessary if American steel received wide distribution abroad. It is understood here, however, that American steel officials have an open mind on the question, and realize as much as any other country the necessity for world-wide cooperation in the manufacture and distribution of steel abroad.

Steel exports from the United States, prior to 1937, averaged between 4 and 5 per cent of the total steel produced for sale in this country. In 1937 there was a sharp rise in the percentage, due apparently, to pre-war influence. Figures for war years are not available. Participation of American steelmakers in export business, given in percentages of total steel produced for sale, since 1930 to 1939, follows: 1930, 4.8 per cent; 1931, 4.4 per cent; 1932, 3.7 per cent; 1933, 4.0 per cent; 1934, 5.7 per cent; 1935, 4.4 per cent; 1936, 4.1 per cent; 1937, 7.4 per cent; 1938, 7.5 per cent, and 1939, 7.5 per cent.

Grace Takes 58.8% Slash in Salary

• • • The salary of E. G. Grace, president of Bethlehem Steel Corp., was cut 58.8 per cent from $537,724 in 1942 to $221,645, which totals $42,546 after Federal income taxes. He and other executive officers at Bethlehem have again volunteered reductions in 1944 that will limit their incentive compensation to the amount paid in 1943. After all Federal income tax requirements in 1944 are met, including the 12.5 per cent holdover tax, Mr. Grace's salary will amount to $20,159.

1943 Steel Earnings

• • • Examinations of early reports of profits for the last quarter of 1943 and for the entire year show no indications of a trend toward either higher or lower net profits. Some companies show earnings for 1942 were higher than for last year but as many indicate lower profits during the past year. This tabulation is only for companies that have thus far reported earning and will be supplemented by more complete data in a subsequent issue.

COMPANY	EARNINGS DURING		
	4th Quarter	Year, 1943	Year, 1942
U. S. Steel Corp.	$13,389,673	$63,642,322	$71,248,569
Bethlehem Steel Corp.	12,707,797	32,124,592	25,387,760
Inland Steel Co.	.....	10,810,574	10,721,372
Jones Laughlin Steel Corp.	2,451,647	9,512,228	10,141,690
Youngstown Sheet & Tube Co.	.....	8,037,442	10,305,706
Keystone Steel & Wire Co.	490,568	726,720*	456,931*

* Six months earnings as fiscal year starts July 1.

Consultation with Advisory Groups Is Promised by WPB

Washington

• • • **Codified** into a single order, GAO 2-141, signed by chairman Donald M. Nelson, WPB on Monday restated a policy outlining the rules and orders applicable to all group meetings of industry representatives and Industry Advisory Committees with WPB officials.

Under the new order, which makes no changes in policy or procedure, no limitation, conservation order or amendment may be issued without prior consultation with an advisory committee if the changes will result in a substantial alteration in the operation of that industry. A WPB vice chairman, however, is authorized to waive this requirement only in case the order is of an unusually confidential character or if the necessity for speed of issuance makes such waiver expedient.

Among features of the new order are:

The section on objections to proposed orders states that "the Office of Industry Advisory Committees shall be responsible for notifying all members of existing committees, or committees which shall be created in the future, that any committee member may write a memorandum of objection to a proposed order to the vice-chairman responsible for the industry division involved, except for those advisory committees within the Office of War Utilities and the Office of the Executive Vice-Chairman, in which cases the objections may be sent to the director of the Office of War Utilities and the Executive Vice-Chairman, respectively. These officers may, in their discretion, instruct the Government presiding officer to call additional meetings of the committee to permit further consideration before final action is taken."

The section on meetings called by industry states that "no representative of WPB shall attend any meeting called by a trade association or any other industry organization or group of industry representatives unless the meeting is a sizable one to which all members of the trade in the vicinity are invited or would be admitted or unless the meeting is public in character. Speeches or remarks made at such meetings by representatives of WPB shall be designated by the persons making them as wholly unofficial. No representatives of WPB shall attend any informal meeting of limited attendance called by industry representatives. Any discussion of WPB business by representatives of WPB and representatives of industry at meetings called by representatives of industry is contrary to the provisions of this order and outside the protection afforded by the agreements made between the Attorney General of the United States and the General Counsel of WPB relating to the anti-trust laws."

Armco Strengthens Control of Rustless by Stock Purchase

• • • **The American** Rolling Mill Co. announced that it had agreed to purchase from C. E. Tuttle, president of the Rustless Iron and Steel Corp., all his common stock interest in the latter company. It was indicated that Mr. Tuttle would retire soon as president and a director of Rustless but that arrangements were being made through which he would render thereafter advisory service to Armco and its subsidiaries.

For a number of years Armco has owned a controlling interest in Rustless. It is expected that Charles R. Hook, president of Armco, will succeed Mr. Tuttle. For the past nine years Mr. Hook has been a director of Rustless.

SCALE MODEL: *Admiral Vickery admires scale model of an escort carrier of which delivery was accepted on 19 during 1943.*

U. S. Steel's Capacity Set at 33,675,000 Tons

• • • U. S. Steel Corp. estimates its ingot capacity now at 33,675,000 tons, according to Irving S. Olds, chairman. This figure includes ingot capacity scheduled to come into operation over the next six months. It includes capacity which the corporation is operating for the government. On July 1, 1943, the corporation set its capacity at 31,330,700 net tons. The new figure includes two-thirds or 867,000 of the Geneva project capacity, and 1,740,000 tons at Homestead. Deductions include the 242,000 tons at the abandoned Pencoyd plant and minor adjustments totaling some 20,000 tons.

U. S. Steel's Sales Rose But Profits Dipped in '43

• • • **Earnings statements** of United States Steel Corp. for the past two years compare as follows, with 1942 items adjusted to give effect to contract renegotiations:

	1943	1942
Sales and rev.....	$1,979,081,554	$1,862,951,692
Labor costs	$913,441,851	$782,661,701
Purchased prod. and serv.	708,281,232	648,401,343
Deprec., etc.	134,048,973	128,161,530
Post-war res've ..	*23,876,570	25,000,000
Interest	6,251,454	6,153,392
Loc. & misc. tax..	41,539,152	48,255,157
Federal taxes	88,000,000	153,070,000
Income	$63,642,322	$71,248,569
Pfd. div.	25,219,677	25,219,677
Com. div.	34,813,008	34,813,008
Surplus	$3,609,637	$11,215,884
*After deducting prior years for replacement of depleted inventories.	$1,123,430	applicable to
Fin. steel shipm't's	20,244,830	20,615,137

Whiteside Resigns WPB Post

Washington

• • • **Arthur D. Whiteside,** WPB Civilian Requirements vice-chairman, has resigned effective Feb. 19 to return to his post as president of Dunn and Bradstreet. Mr. Whiteside stated his decision to leave WPB was in no way caused by the fact that the armed services have laid down the law that no general civilian production can be started until the outcome of the invasion is known.

Although reports that WPB chairman Donald M. Nelson is considering the names of three men to fill Mr. Whiteside's job have been published, OCR officials say that Mr. Nelson has tried unsuccessfully for more than 60 days to get someone from industry to fill the assignment.

Union Steel Wage Fight Draws Rebukes to Government Statistics

Washington

• • • **In setting the** stage for enforcing demands for a steel wage increase, designed to be a forerunner to general wage increases throughout the ranks of labor, CIO and AFL have stirred up a kilkenny cat fight with the National War Labor Board and the Department of Labor's Bureau of Labor Statistics.

Turning to the technique of beating the other side to the draw, the unions pulled fast tricks that have roughed up both WLB and BLS. His eye immediately on the demand of his USWA for a steel wage boost, Phil Murray, speaking as the CIO head, told the Senate Committee on Education and Labor last week that steel workers' living costs had increased 50 per cent since January, 1941, the date on which the Little Steel formula is based.

Whereupon he was sharply challenged by acting commissioner of labor statistics A. F. Hinrichs. The commissioner, while conceding that the Bureau's figure of a 23.5 per cent rise in the cost of living might be subject to questioning, took sharp issue with Murray's much more altitudinous figure which was declared to be a "very daring" one for anyone to present as typical. Mr. Hinrichs, irritated at the attack on the Bureau's figure as unreliable, is scheduled to make a detailed reply to Murray's statement, which was an extemporaneous presentation and is widely accepted as full of errors. Mr. Hinrichs, nevertheless, told the Committee that the CIO steelworkers' "study" "ably demonstrates that even at a wage level of $50 a week families have to live very narrowly and with no access to luxury goods."

But not content with arousing the ire of BLS alone, two labor members of the Presidential Committee on the Cost of living issued publicly a "recommended report" before the public member, WLB chairman William H. Davis and the two industry members, George K. Batt of Newark, N. J., and H. B. Horton of Chicago, had studied the report. The report does not square with Murray's statement. It said that the cost of living had increased 43.5 per cent since Jan. 1, 1941. While much higher than shown by BLS it is 6.5 per cent under the Murray calculation.

This report, covering the cost of living and the BLS index, made by R. J. Thomas of CIO and George Meany of AFL, drew replies from both Mr. Davis and Mr. Hinrichs. Mr. Davis said that the report was submitted to the Committee on Jan. 25 but that, "it is not in any sense a report of the Committee." Mr. Davis said that industry members will submit their comment in "due course." A copy of the report was also given to the BLS for comment. These comments, and all other relavent data will, of course, Mr. Davis said, be carefully considered before the Committee makes its report to the President.

Meanwhile, however, Mr. Hinrichs issued a statement challenging the CIO-AFL report just as he criticised the Murray statement. Mr. Hinrichs said that, in compliance with Mr. Davis' request, the Bureau would study the CIO-AFL document carefully and submit comments and criticisms. Mr. Hinrichs did, however, take occasion to make passing comment on the report. Discussing that part of the report which placed the food price rise at 75 per cent since January, 1941, Mr. Hinrichs said that the BLS index shows that the January, 1941 $10 basketful would now cost $14.

"The Thomas-Meany report says $17.40," Mr. Hinrichs pointed out. "Every retailer knows that food prices have not gone up twice as fast since price control as before and no housewife would claim it."

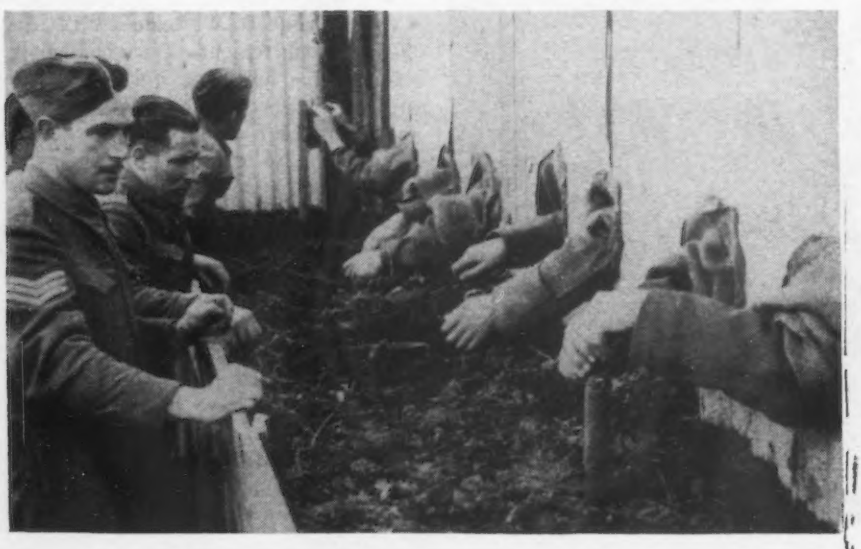
All of these discussions and differences over the rise in the cost of living are a setting for the steel wage case, which in turn is being used as the framework for a general wage increase in industries where no recent increases have been granted. Whether the CIO-USWA will succeed in cracking the Little Steel formula is therefore a question of great importance, not only as it affects the steel workers and steel costs, but as it affects industry and inflation generally.

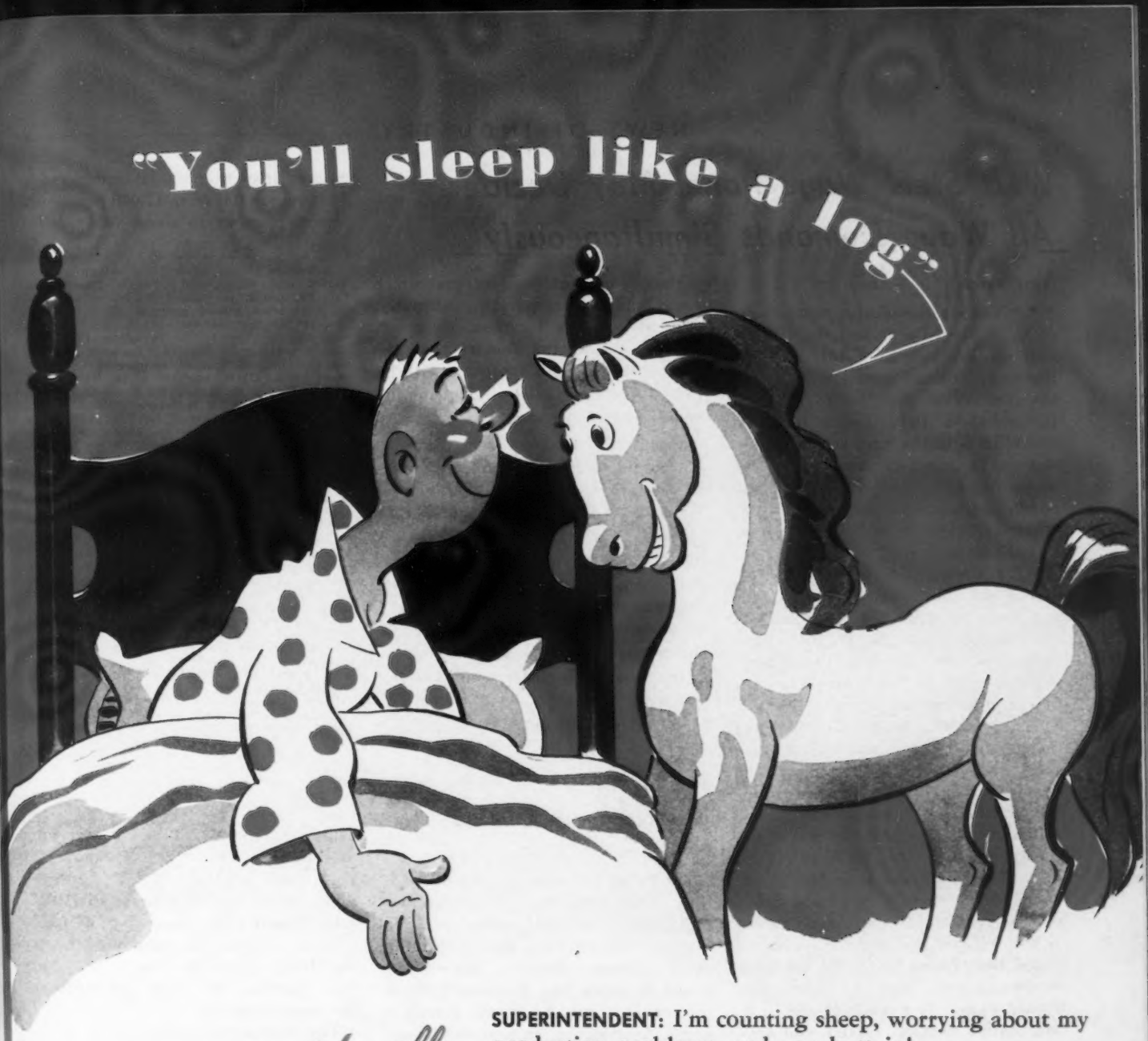
Because of its past habit of yielding to labor demands, often at the White House direction, the common opinion is that the steel workers will be given a further wage increase, though not the full 17c. an hour increase that they are asking.

One of the many speculations is that the WLB will grant an increase covering the difference in the cost of living of today as compared with the Jan. 1, 1941, cost. On the other hand there is a report that Fred Vinson, Director of Economic Stabilization, has told WLB that it is his opinion that the steel workers are not entitled to a further wage increase.

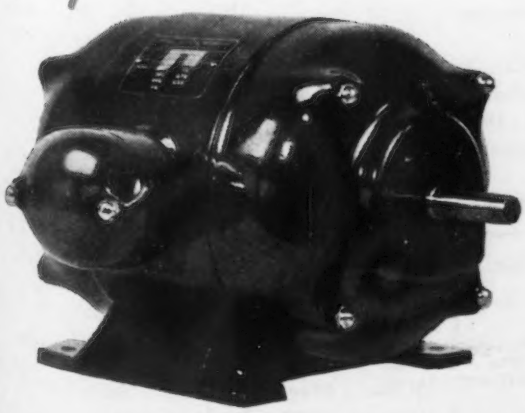
Preliminaries to hearing the steel wage case are being completed. While the United States Steel Corp. and several smaller cases have been certified to the Board, it is expected that all of the cases, more than 400 in all, including both steel makers and users, will be consolidated into one to expedite the proceedings. At best it promises to be long drawn out.

BOOBY-TRAP SCHOOL: ***These Britishers in Italy work blind through "Moascar Stocks" under supervision of experts, learning to handle booby traps and mines without being able to see them.***





Horsepower by Howell



The Howell Protected Type Motor, shown, gives complete protection against dripping liquids, metal chips and other falling particles. Completely streamlined — utilizing non-breakable steel frame — malleable or steel base — cast iron end plates and cast iron, weatherproof terminal box are standard construction features. Special horizontal and vertical mountings are available.

Available in sizes 5 H.P. and smaller.

SUPERINTENDENT: I'm counting sheep, worrying about my production problems, and you butt in!

HORSE: Super., I've got a suggestion — a hot tip —

SUPERINTENDENT: Come, come, be brief. I'm tired!

HORSE: Well, well, that's too bad. But Horsepower by Howell would put an end to all those electric motor problems in your plant. All Howell specialized motors and standard motors are engineered and precision-built for the *hard* jobs. Your jobs will be easy for these quality motors.

SUPERINTENDENT: Really? Maybe I can stop worrying.

HORSE: You bet you can! Folks quit worrying when they buy Howell Motors. They know they have a precision-built, properly insulated, quieter operating motor. With Horsepower by Howell in your plant, you'll sleep like a log.

Making postwar plans? Phone the nearest Howell representative or write the factory. Your inquiry will put our experienced engineering staff and complete facilities to work for you.

HOWELL ELECTRIC MOTORS COMPANY

HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915

WLB Steel Wage Panel May Decide All Wage Demands Simultaneously

New York

• • • **The steel producing** subsidiaries of U. S. Steel Corp., and the USWA-CIO are marking time this week on the wage demand question, following the citation of the case to the War Labor Board. It is believed now that the WLB is in the final stages of setting up a panel to hear the union wage demands, and the panel will handle most of the cases at one time, requiring briefs from both companies and the union.

WLB already has the U. S. Steel refusal on the union's wage demands and Republic Steel Corp., has had its case certified by the WLB. Other companies that may soon have their position cited to WLB are Wheeling Steel Corp., and Youngstown Sheet & Tube Co. Meanwhile, U. S. Steel Corp., steel-making subsidiaries are carrying on negotiations with the union on those demands that do not involve increases in wage costs.

Inland Steel Co., deadlocked its negotiations with the USWA-CIO on Jan. 27, and appealed to the U. S. Conciliation Service for assistance and referral of the unresolved issues to the WLB. Points in dispute included the 17c. an hr., wage increase, severance pay, and a guaranteed weekly wage. In a letter of the U. S. Conciliation Service, Inland said several conferences had been held, and bargaining would continue on issues that had not yet reached a deadlock. The Conciliation Service would be advised as each of these further issues are settled.

E. G. Grace, president of Bethlehem Steel Corp., pointed out this week that the various demands of the union, with regard to Bethlehem steel making operations only, would cost the company about 34c. an hr. This figure of course, includes the 17c. an hr. demand, along with sick benefits, severance pay, vacation pay, etc.

Mr. Grace pointed out that while Dept. of Labor cost of living indices show an increase in cost of living of 23.5 per cent from Jan. 1, 1941, to date, average hourly earnings of Bethlehem steel workers increased 36.4 per cent and weekly earnings are up 50.6 per cent. However, it must be remembered that the Dept. of Labor index on living costs, while the only one of consequence that is available, is not too accurate, and the increases shown in Bethlehem steel workers' earnings include considerable overtime which could and will stop rather abruptly, just as soon as business drops off. This is one of the factors that the union would like to overcome with its current demands, thus enhancing its position after the war.

Meanwhile, Mayor Frank Lausche of Cleveland charged that Cleveland's industries are penalized through the faults of a minority. He stated that because 16 per cent of the area's plants have labor shortages, the entire area is tagged "critical labor shortage area" and is being penalized with contract restrictions. Actual shortages, he claimed, occur mainly in forge shops, foundries, and battery factories, according to a survey of 140 plants employing 168,000. USES figures show that the labor demand in that region fell from 17,000 per month last September to about 7000 needed for January.

Activities on the labor front this week were varied and widespread. Fulton Iron Works Co., St. Louis, petitioned WLB for a review of a vacation award granted AFL electrical workers by the regional WLB. This petition was denied. . . . U. S. Vanadium Corp. was denied a reversal of a WLB decision granting maintenance of union membership and the check-off to UMW workers at its Rifle, Colo., plant. Wayne L. Morse, WLB public member, reaffirmed the WLB Non-ferrous Metals Commission award, stating that WLB has the "indisputable authority to direct parties to wartime labor disputes to abide by maintenance of membership awards in cases wherein the Board deems it advisable to grant that form of union security."

• • • **Ordered back by** the WLB, 350 strikers returned to work at Bison Casting, Inc., Buffalo, after being out one week in a dispute over a board wage ruling. . . . The Buffalo-Niagara area War Manpower Committee ordered a subcommittee to investigate the use of Italian war prisoners as laborers in district war plants. Fierce opposition of labor members had previously tabled this move. However, three plants have requested Italian prisoners for pick and shovel work. German prisoners are not being considered for such work.

• • • **The Ford Motor Co.,** rolling mill was closed Jan. 31 by a strike growing out of a dispute over the docking of 15 min. pay of 38 men said to have quite work early last week. About 1000 joined in the walkout.

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AFA Nominates Officers

Chicago

• • • **Ralph J. Teetor, president, Cadillac** Malleable Iron Co., Cadillac, Mich., was nominated to succeed L. C. Wilson, general manager, Reading Steel Casting division, American Chain & Cable Co., Reading, Pa., as president of the American Foundrymen's Association, at a recent nominating committee meeting. Fred J. Walls, International Nickel Co., Detroit, was nominated for the vice-presidency. Both the presidency and the vice-presidency are for one-year terms.

The following were nominated to become directors of the association for three-year terms: Frank J. Dost, Sterling Foundry Co., Wellington, Ohio; S. D. Russell, Phoenix Iron Works, Oakland, Cal.; R. T. Rycroft, president, Jewel Alloy & Malleable Co., Inc., Buffalo, N. Y., Joseph Sully, president, Sully Brass Foundry, Ltd., Toronto, Ont., and L. C. Wilson, general manager, Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa., now president of the association.

The election of officers and directors will be held at the annual business meeting of the association, which will take place during the Third War Production Foundry Congress, Buffalo, N. Y., April 25 to 28. All nominees have been active in work of chapters of the association.

Price Briefs

• Amdt. 81 to MPR 120 revises maximum prices for bituminous coal at the mine or preparation plant in Western Kentucky and puts them on a simpler basis.

• Amdt. 3 to MPR 452 provides for the exemption from price control of the sale and delivery of truck axles by Timken-Detroit Axle Co. to the War Dept. (Release No. OPA-3869)

• Amdt. 1 to Food Production Order 14, Sup. Order 1, Rev. 1 lifts restrictions on distribution of certain farm machinery items.

• Amdt. 2 to RMPR 34 reduces prices on fence posts to railroads and other industrial consumers. (Release No. OPA-3865)

Steel Founders Elect Officers

• • • **The Steel Founders'** Society of America announced the election of officers and directors for 1944-1945. Officers elected were: Oliver E. Mount, American Steel Foundries, Chicago, president; F. Kermit Donaldson, Machined Steel Casting Co., Alliance, Ohio, vice-president; Col. Merrill G. Baker, Steel Founders' Society of America, Cleveland, executive vice-president; and Raymond L. Collier, Steel Founders' Society of America, Cleveland, secretary-treasurer. Members of executive committee elected were: Oliver E. Mount, chairman; A. M. Andorn, Penn Steel Casting Co., Chester, Pa.; T. F. Dorsey, Fort Pitt Steel Casting Co., McKeesport, Pa.

Important Advancement IN FERRO-ALLOY BRIQUETS

NOW . . . A FULLY USEFUL PROTECTIVE BINDER

THIS ACHIEVEMENT dispels the old belief that a pitch binder for ferro-alloys would melt when heated, resulting in a crumbling briquet. These OFA Briquets, during the heating operation, produce a carbon binder which protects the readily oxidized ferro-alloy up to its alloying in the iron. It is then consumed as part of the charge without producing an added refractory slag burden.

YEARS have been devoted to find this "ideal" binder. We have prepared an interesting brochure containing complete factual information with actual production tests that prove the advantageous utility of this entirely new metallurgical application to ferro-alloy briquet binding. SEND FOR YOUR COPY TODAY.

IMMEDIATE DELIVERY *in tonnages to meet your requirements. Ferro Silicon briquets containing either one or two pounds of contained silicon, Ferro Manganese and Ferro Chrome briquets containing 2 lbs. of alloy—shaped for easy storing—colored for easy identification.*

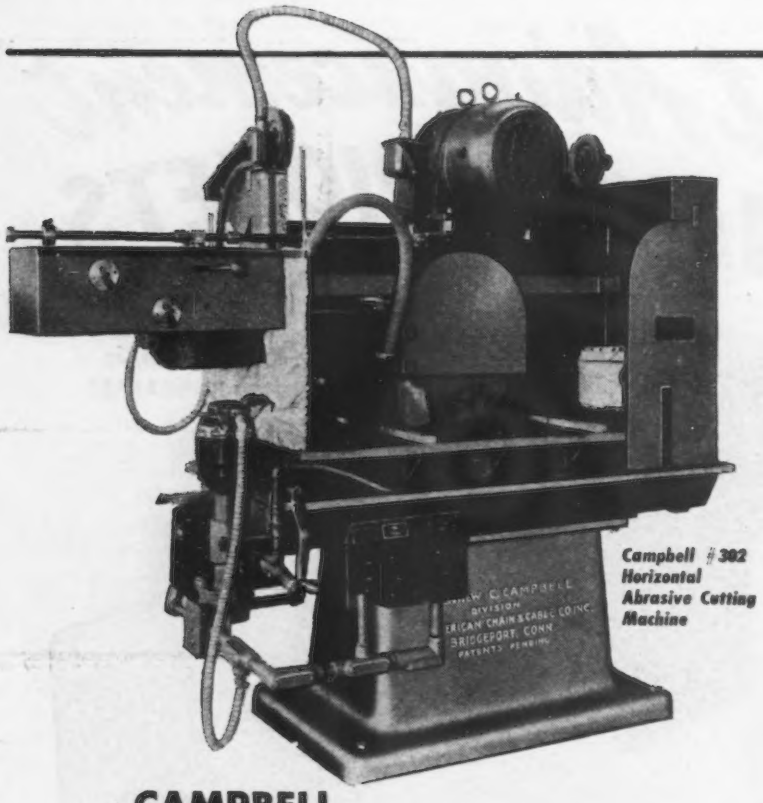
WRITE TODAY FOR NEW FACTUAL BROCHURE

PATENT PENDING

FERRO RAMITE

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma



Campbell #302 Horizontal Abrasive Cutting Machine

CAMPBELL ABRASIVE CUTTING MACHINES HELP MEET LABOR SHORTAGE

According to WPB, the peak of the skilled labor problem has yet to come. • If you cut any of the annealed or unannealed steels, non-ferrous alloys, plastics, glass or ceramics—solid bar, tubular or flat stock—a CAMPBELL ABRASIVE CUTTING MACHINE will help you. • Tell the CAMPBELL Engineering Department materials, shapes, sizes, lengths before cutting, lengths of cut off pieces and hourly production required. They'll give you cost data and production procedure without obligation. *ASK* for a copy of the CAMPBELL ABRASIVE CUTTING CHART. It shows how the CAMPBELL complete line of Abrasive Cutting Machines can be used to open the way to new highs of production and new lows of cutting costs.

Campbell

ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION

BRIDGEPORT • CONNECTICUT

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ACCO TRADE MARK

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

Priority Changes

L-157—Amended Sched. VIII provides for simplification and standardization of production of augur bits. (1-29-44)

•

M-9-c-4—Amended order frees frozen inventories of copper and copper base alloy pipe, tubing and fittings in the hands of utilities for use in underground gas and water supply and distribution installations outside buildings. (1-24-44)

•

M-65—Amended order makes a revision in procedures for allocating cadmium and controlling the use of cadmium products, for greater simplification. (1-24-44)

•

M-65-a—Order which dealt with restrictions on cadmium has been revoked. (1-24-44)

•

M-81—Int. 1 deals with methods used to calculate 1944 metal can quotas. (1-24-44)

•

M-126—Amended order provides for relaxations of a few restrictions on the use of iron and steel for various civilian products. (2-1-44)

•

M-370—Order allocates chrome pigments. (1-21-44)

CMP Developments

• Dir. 45 to Reg. 1 provides for conflicts between production and delivery schedules. (Release No. WPB-4868)

•

• Internal Operating Instruction 33 defines how applications and inquiries received under Reg. 9A are to be handled.

•

• Bulletin 30, as revised presents an outline of the Class B product program for the second quarter of 1944.

•

• Dir. 10 under Reg. 5 which provided a method of obtaining welding rod has been revoked. Repair shops will now obtain welding rod by use of ratings assigned by Reg. 9A.

COMING EVENTS

Feb. 21 to 24—American Institute of Mining & Metallurgical Engineers, New York.

March 14, 15—National Association of Waste Materials, Inc., New York.

March 27, 28—American Society of Tool Engineers, Philadelphia.

March 30, 31—American Gas Association War Conference, Rochester, N. Y.

April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.

April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

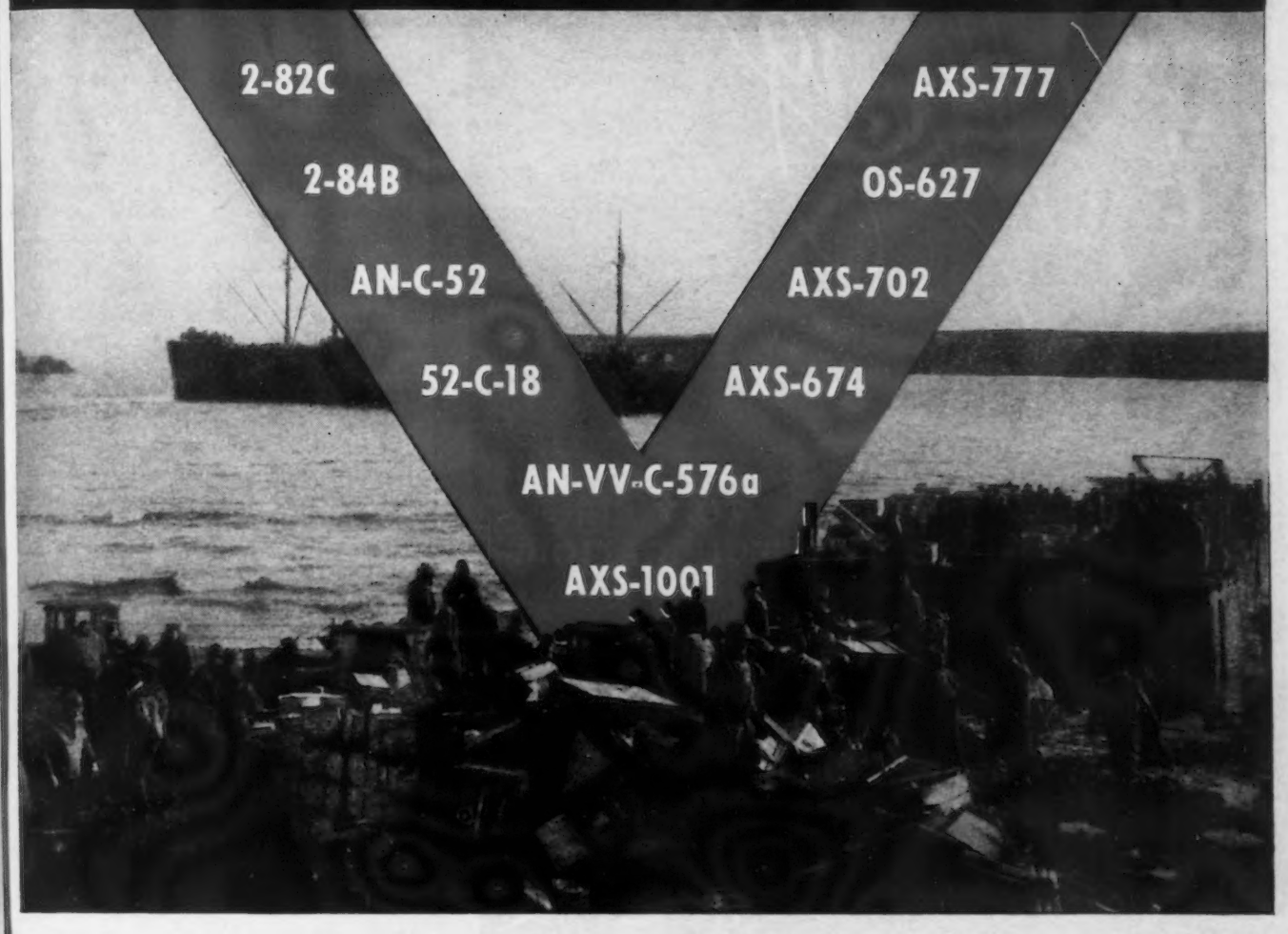
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.

Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.

Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.

Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.

"SPECS" THAT SPELL PROTECTION



Everyone concerned with packaging of metals knows what the above symbols mean.

They are government specifications for protection of metal parts and equipment, such as you see piled in the foreground of this landing view. All over the world our armed forces are putting into action the products that industry has made so well and so fast during these frenzied war production years.

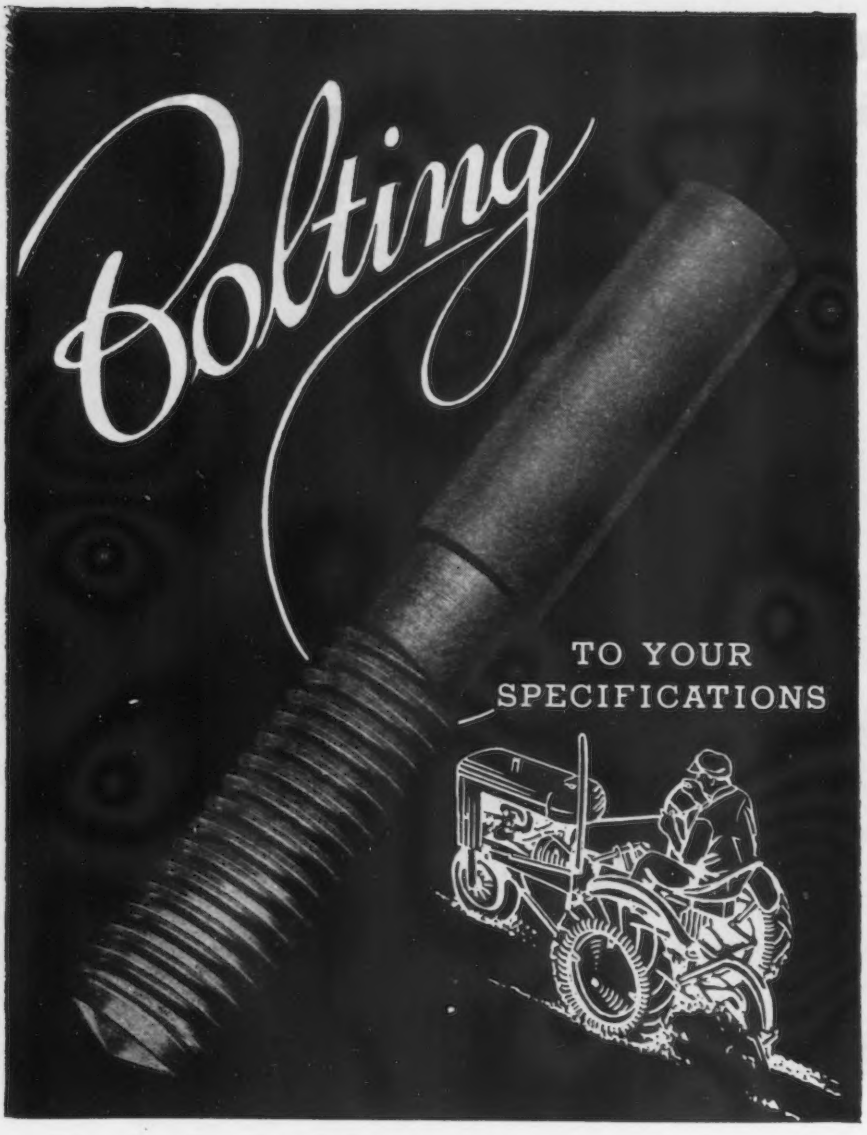
Will the contents of these packages be preserved, ready for immediate use when opened after long storage in damp climates? Uncle Sam says they must be, and has set up many "specs" as standards for packaging. The best known ones, for which there is most demand, are listed above.

E. F. Houghton & Co. supplies approved products to meet each one of those important specifications.

Ask the Houghton Man, or write direct for full information. And remember, please, that a concern making specialized oils and greases for 79 years has the edge when it comes to "beating," not merely meeting, today's crucial rust preventive requirements.

E. F. HOUGHTON & CO.
PHILADELPHIA
Sales and Service in all principal cities

Houghton's RUST Preventives



More Food—More Tractors and More of These Special Studs

This special Erie Acme Threaded Steering Gear Stud for a well known tractor may soon be ordered again into service in answer to the tremendous need for more equipment for food production.

A review of orders for Erie's Special Bolts, Nuts and Studs reflects the importance that Uncle Sam is placing on all war materiel for specialized bolting is a vital part of fighting machines and of machines for producing fighting machines.

[redacted]

Broadgate Explains Stockpiling Bill

Cleveland

• • • At the recent convention of the Institute of Scrap Iron & Steel, W. C. Broadgate, technical consultant to the Senate Small Business Committee outlined Senate action on stockpiling strategic minerals including scrap metals. The bill under consideration, S.1582, was introduced by Senator James G. Scrugham, chairman of the Senate sub-committee on mining and minerals functioning under the Small Business Committee. Mr. Broadgate gave a resumé of the status of this bill.

The domestic mining industry seems to be generally in accord with the stockpiling idea and differences of opinion are largely those of detail. There is one major split in fundamental thinking and that is whether stockpiling should be achieved by acquiring metal from domestic sources or principally from foreign sources.

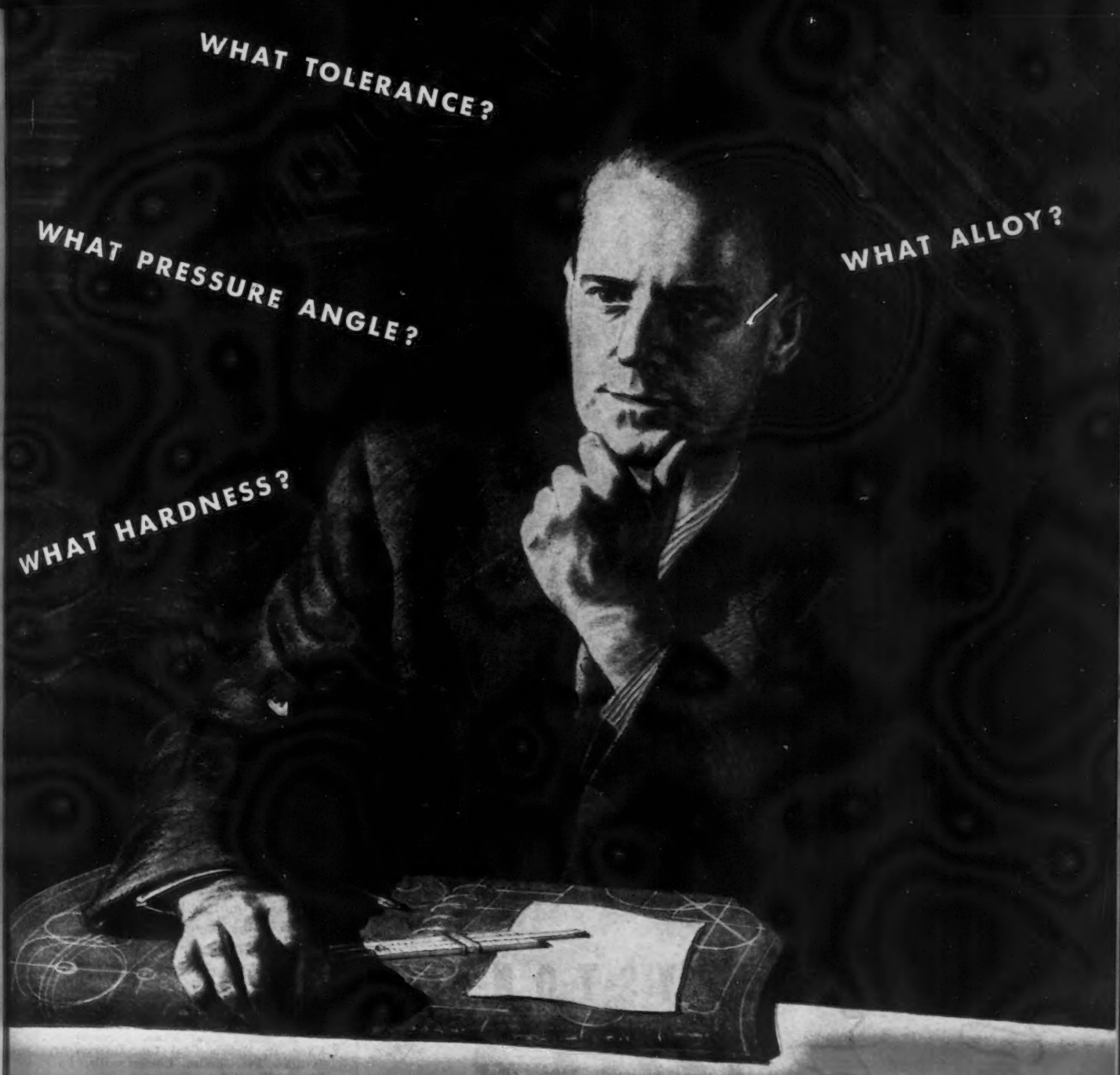
Objectives of the stockpiling bill are to assure an adequate supply of strategic and critical minerals for any emergency by holding intact all stockpiles owned by government agencies that survive the war and by augmentation thereof primarily from domestic sources.

The bill is designed not only to keep a nucleus of the domestic mining industry operating but also to accumulate large stocks of such materials for immediate use in the case of still another emergency. One feature of the bill would permit mining companies to work out their losses and offers a certain protection to the American mining industry.

Briefly, the Scrugham bill may be outlined as follows: (1) Mineral production from domestic sources will receive preferential price treatment. Only if the purposes specified in the bill cannot be fulfilled from domestic sources may any foreign purchases be made.

(2) For period of one year following termination of hostilities it is proposed to continue paying premium prices to those mines in which governmental assistance or investment, or private investment, is shown to have been made with intent and purpose of augmenting war or essential civilian production. Thereafter the *Minerals Stock Pile Control Board* set up in the bill may purchase domestic minerals at a price up to but not beyond the then current import price, duty paid, plus 25 per cent.

(3) Provision is made to continue



ILLINITE
PRECISION
METAL CUTTING TOOLS

Ground Hobs

Milling Cutters

Ground Form Tools

Shaper Cutters

Broaches

Special Tools . . . Gear Measuring Machines . . .
Gear Measuring Blocks . . . Die Filing Machines

Fundamentally, it is engineering ability which sets any manufacturing organization apart from its contemporaries . . . . The experience of "Illinois Tool" engineers in solving gear design and production problems is at your service.

OVERNIGHT TO ALL AMERICA . . . FROM THE HUB OF AIR TRANSPORTATION

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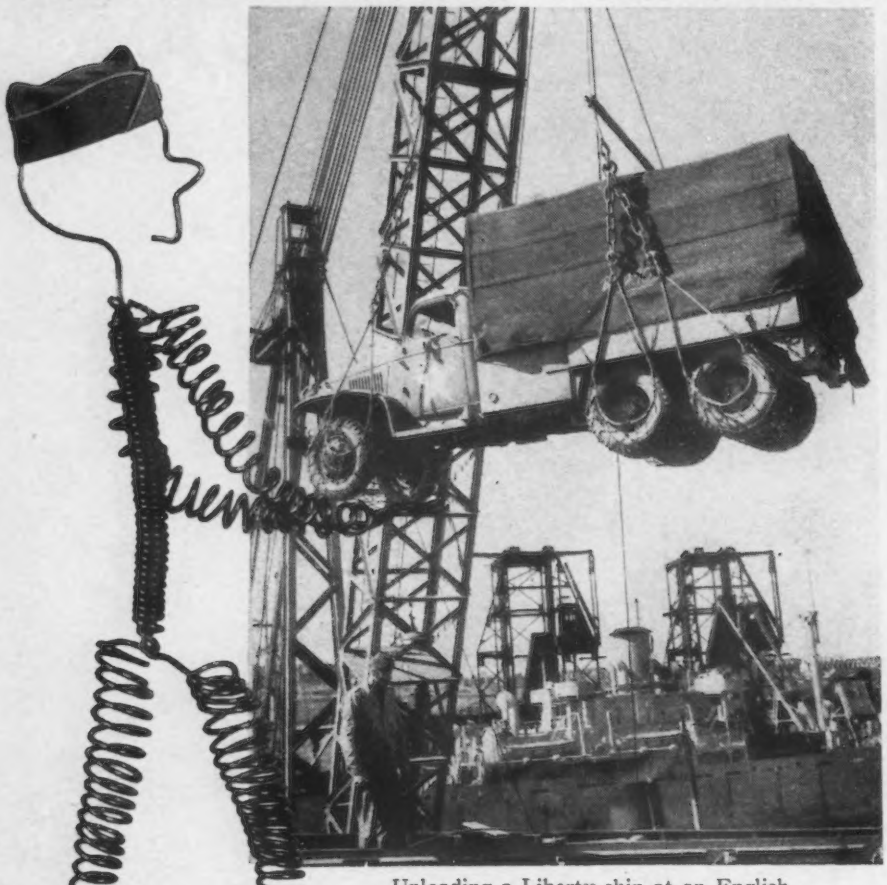
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

Modern Goliath at Work . .



Unloading a Liberty ship at an English seaport . . . *Wide World Photo.*

KEYSTONE *Wire*

With the skill and strength of a modern Goliath, multi-ton war "packages" are unloaded with ease from cargo ships. Strong wire cable supports the load as it is swung safely by crane from ship to shore . . . one of many herculean war tasks performed by products made from wire.

But while our industrial wire production is today devoted chiefly to war necessities, we are preparing for the postwar market that lies ahead. New, improved techniques and vastly increased facilities will help materially in meeting the tremendous pent-up civilian demand as soon as Victory is here.

KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE — KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Put idle SCRAP to work . . . help speed Victory!

the receipt of foreign commitments where contracts which the government has made for such commitments cannot be terminated prior to the end of hostilities. Such minerals as they are received will be frozen in the stockpiles. It is also provided that minerals and metals which may be acquired by reverse Lend-Lease shall be added to the stockpiles.

These might be termed the anti-dumping provisions and no stockpiles may be released until Congress deems it actually to be necessary.

(4) Nothing in the bill shall prevent domestic producers from selling freely in the open market nor prevent industry from privately importing minerals at will at the current prices prevailing after the OPA ceilings are removed.

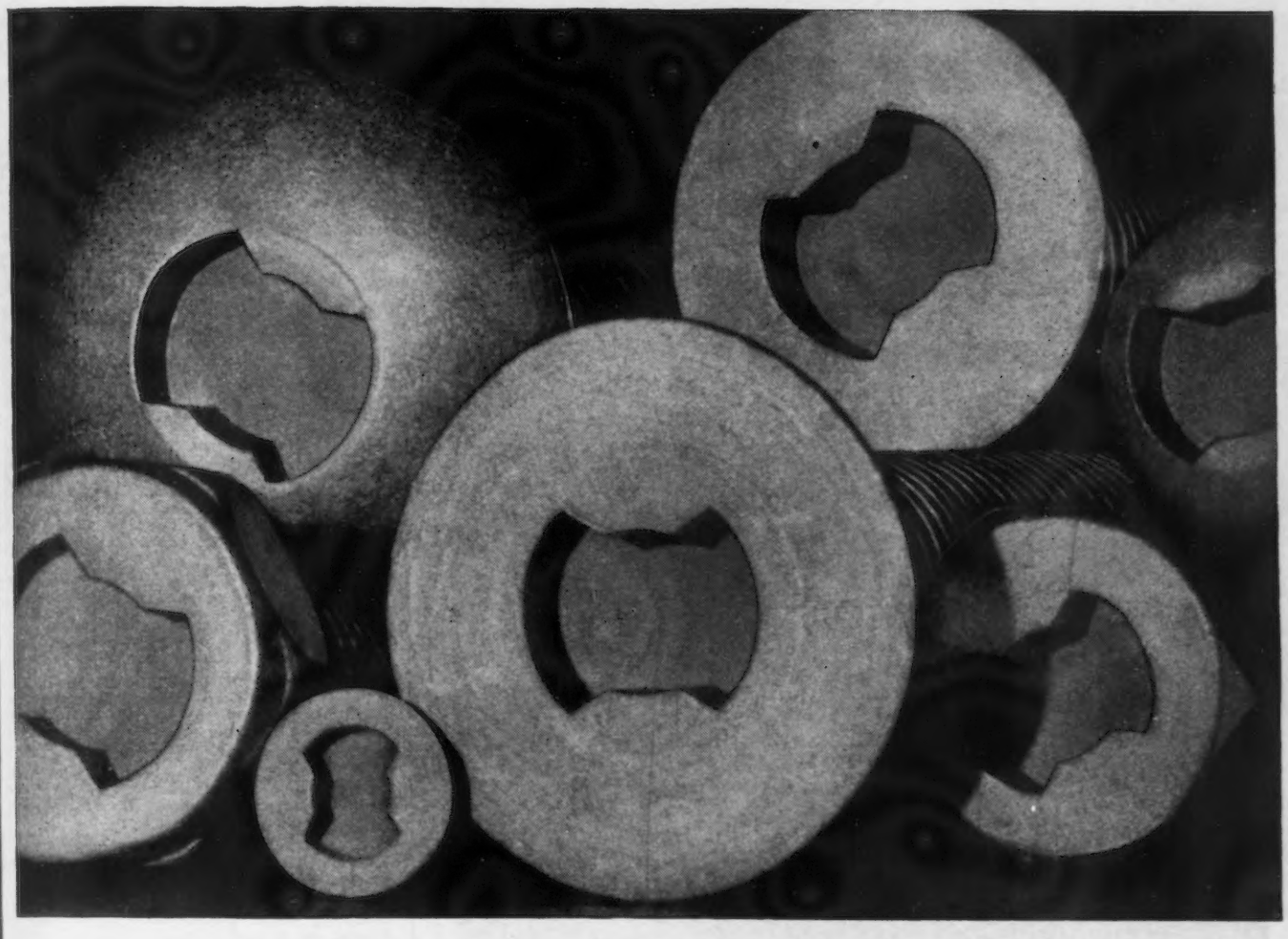
Ickes Releases 11 Mines to Owners; Still Controls 1909

New York

• • • **Of the 2385** coal mining companies that were possessed by the government on Nov. 1, 1943, under the direction of Coal Administrator Harold L. Ickes, because of the strike of the coal miners under the leadership of John L. Lewis, 1909 of these companies are still under government possession and control. A total of 476 mining companies have had their properties released following the release of 11 during the past week. These companies were:

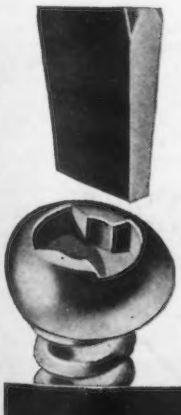
Chloe Elkhorn Coal Co., Pikeville, Ky.
W. A. Barnes, Masontown, Pa.
Lindey Bros. Coal Co., Slippery Rock, Pa.
C. D. Moore Coal Mine, Portersville, Pa.
Chas. D. Morris Coal Co., Harrisville, Pa.
William Piccolomini, Connellsville, Pa.
Simon W. Rider, Charleroi, Pa.
H. W. Smith, Lake Lynn, Pa.
Tri-County Fuel Co., Youngstown, Ohio.
Thomas J. Wolf, Lake Lynn, Pa.
Young & Taylor Coal Co., Oakdale, Pa.

Ickes claimed this week that an opinion from Attorney General Francis Biddle indicated that the Smith-Connally "Anti-Strike" act does not require the government to relinquish possession at this time of the coal mines seized in the November strike. While the act provides that the mines should be returned to the owners not later than 60 days after the restoration of the productive efficiency prevailing prior to government possession, the Attorney General ruled that "productive efficiency has not been restored within the meaning of Section 3 of the War Labor Disputes Act" even though the tonnage being produced may be equal to or exceed that of the period prior to the Government take-over. Physical volume of coal produced is not alone the determining factor.



They "Cancel-Out" a lot of Handicaps

The phrase isn't ours. It comes from the assembly lines . . . where new factors for speed, safety, simplicity, and lower cost are rated high. CLUTCH HEAD Screws "cancel-out" the handicap of slow-down hesitation. The wide roomy clutch offers an easy bull's-eye target for the "greenest" operator, inviting speed born of confidence . . . the automatic entry of the Center Pivot Driver into dead center of the recess speeds and eases the drive home . . . and that same definite torque grip assures the operator there is no hazard of slippage. Then there is the CLUTCH HEAD Lock-On feature which nullifies the handicap of fumbling around hard-to-get-at spots by uniting screw and bit as a unit for easy one-handed reaching. In field maintenance, too, CLUTCH HEAD simplifies operations by solving hitherto accepted problems. Service men prefer this modern screw because it may be operated with the ordinary type screwdriver . . . even with a piece of flattened steel rod in an emergency. They know also that, where screws have to be removed, saved, and used again, the CLUTCH HEAD Lock-On feature obtainable with the Center Pivot Hand Driver "cancels-out" the serious handicap of dropped and lost screws.



Get personally acquainted with these many exclusive features. Send for assortment of CLUTCH HEAD *Screws, sample Center Pivot Bit, and fully illustrated Brochure.*

CLUTCH HEAD Screws are contributing importantly to many phases of the war effort. They are available in Standard and Thread-forming types for every purpose . . . production backed by the extensive resources of this Corporation and by responsible Licensees.

CLUTCH HEAD · SCREWS ·

ECONOMY is an important feature of this Center Pivot Assembler's Bit. No "back-to-the-factory" shipment is necessary for reconditioning. A brief application of the end surface to a grinding wheel fully restores original efficiency.

UNITED SCREW AND BOLT CORPORATION

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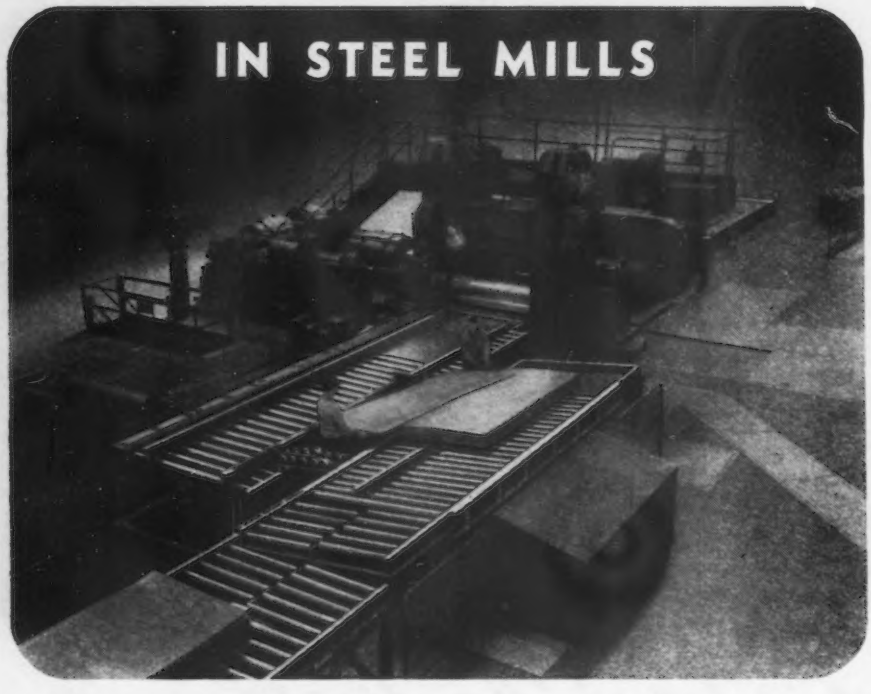
Logan Conveyors

HAVE PROVED

their worth

IN STEEL MILLS



IN THIS great steel mill, as in many others thruout the nation, a Logan handling system daily proves its superiority by eliminating waste of time, motion, space and — above all — irreplaceable man-hours. Here the power-driven Pack Tilter (adjustable up to 30°) aids manual transfer of sheets to the chain-driven, live-roller type Entry Conveyor serving temper mill. Sheets are delivered by belt conveyor to Roller Leveller, thence to Piler and Roller Gravity runout. Whatever your handling requirements may be, Logan engineers can help you meet them with maximum efficiency and economy. Write Logan Co., Inc., 545 Cabel, Louisville, Ky.

May We Send You This Book?

Our Catalog No. 22 may prove of untold value to you. It is full of illustrations and descriptions of many Logan Conveyor installations in actual steel mill operation. Ask for it.

PUT *FLOW* INTO PRODUCTION

Metal Fastening Equipment Listed In Enemy Patents

• • • **The thirteenth** list of seized enemy patents available on license from the Alien Property Custodian, bolt, nut, rivet, nail, and screw manufacturing equipment and accessories are covered. This series of seized patents started in the Nov. 4 issue of THE IRON AGE where information on rules and procedures was shown.

In the items shown, the sub-class number appears first, followed by the patent number, description, inventor's name and nation, and date of patent issuance. The patent description in full may be acquired from the Government in the manner described in the Nov. 4 issue of THE IRON AGE, page 95.

Class 10—Bolt, nail, nut, rivet, and screw making

(1) 1,816,282. Method and tool for securing wire screw-threads to wooden members. W. Heyner and H. Henkel, Germany. 7-28-31.

(2) 1,682,646. Machine for the production of wood screws from pressed blanks by slitting the bolt head, turning off of the head surfaces and cutting of the thread in the shaft. G. Weber, Germany. 8-28-28.

(5) 1,735,231. Screw-slotting mechanism for producing slots or incisions in the heads of screws or similar parts. L. Braren, Germany. 11-12-29.

(8) 1,624,746. Automatic machine for making the heads of slotted wooden or iron screws. K. Kumpmann, Germany. 4-12-27.

(10) 2,129,290. Method and apparatus for producing screw threads by cold method by forging by means of hammer jaws movable radially to the blank and provided with a female screw thread corresponding to the screw thread to be formed. W. Trurnit, Germany. 9-6-38.

(24) 1,618,445. Means for cold upsetting or heading blanks in the manufacture of set screws, cap screws, rivets, bolts, and similar headed articles. J. Kuhne, Germany. 2-22-27.

(24) 1,743,564. Ejecting implement for cold-pressed headed bolts. K. Nagel, Germany. 1-14-30.

(26) 1,918,910. Device for controlling the vertical slide on double acting bolt presses. C. Hilgeland, Germany. 7-18-33.

(27) 1,618,446. Method of manufacturing cold rivets, screw-blanks and similar headed articles by means of which a very great length of the stock or rod can be upset to form the head so that the size of the head for a certain diameter of material is almost unlimited. J. Kuhne, Germany. 2-22-27.

(27) 1,903,245. Manufacture of blanks and similar articles with jumped heads and more particularly to wood screws. M. Ruska, Germany. 3-28-33.

(27) 2,060,593. Method of producing a homogeneous metal element having a reduced portion which serves to increase the fatigue

What will your future **I.P.** *be?*

†† This is the Second of a series of advertisements presenting "Industrial Par" and its importance to your company in all future planning. Save this and succeeding I.P. advertisements as the basis for discussion and as a guide to your planning program.

So much from so little

The Annual National Investment* in machine tools represents only 2% of the total value of products produced by machine-tool-using industries.

YES — in the ten peace years 1927 to 1937 — the builders of machine tools produced a yearly average of 122 million dollars worth of equipment for American industry. The industries that bought and used these machine tools were able to produce an average of about 9 billion dollars worth of peacetime products annually in those same years. The annual investment in machine tools represented only about 2% of the total value of products created by these machine-tool-using industries — the makers of engines and turbines, agricultural and construction machinery, automobiles, planes, locomotives, household appliances and many other useful things.

In terms of productive power this is impressive — certainly "very much from very little." But what significance have these rather startling ratio "figures" to industrial management? Industrial statistics show that the national output per man-hour tends to increase constantly — its previous rate of 2½% per year compounded can be expected to advance to 4% or 50% increased output per man-hour every 10 years.

Manufacturers who intend to keep step with a high level of national prosperity — the volume production which means more goods for more people at lowest cost and security of jobs and wages for the greatest number of workers — must strive to attain the 50% increased output pace. Certainly full advantage must be taken of the inherent ability of machine tools to achieve the most with available man-hours, for only with the most modern machine tools can any manufacturer hope to compete successfully over a period of years as well as make workers' jobs safer, easier, and more productive.

Isn't it only logical to equip your plant with machine tools — those possessing the greatest sustained productive power, the ability to produce fast, accurately at lowest cost — the better to win your race with competitors in the world of peace production to come?

Back the attack **BUY MORE BONDS**

Spotlight facts for your future I.P. *planning*

* Production methods — developed in wartime — increase man-hour output; pent-up buying power — released in peacetime — demands increased production.
* The rate of 2½% increase per year output per man-hour, established by a 12 year record of industrial production, can be expected to reach at least 4% per year — compounded.
* Manufacturers must set a goal of 50% increased output per man-hour every 10 years — to maintain a high level of national prosperity and achieve its benefits in terms of security of jobs and wages for the greatest number of workers and the volume production of more goods for more people at lowest cost.
* Machine tools — the most modern, most efficient — are recognized as the most effective implements of mass production and increased output at lowest cost — but only continual replacements with the newest and finest machine tools assures full productive capacity. *Such replacements yearly should be equal to 10% of the total machine tool investment — in keeping with increased output.*
* The cost of machine tools is insignificant in terms of their productive power . . . from 1927 to 1937, according to census reports, American manufacturers had only a total of about 2% invested yearly in machine tools in ratio to a total volume of 9 billion dollars' worth of production annually.

†† **Industrial Par** — *the constantly increasing output per man-hour equal to approximately 50% every 10 years.*

KEARNEY & TRECKER CORPORATION

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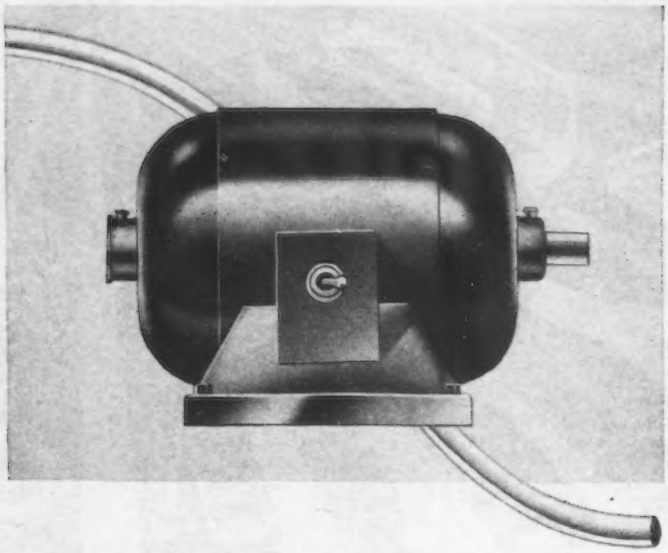
Milwaukee Machine Tools

PAGE *Stainless Steel* WIRE



BINDING WIRE FOR ARMATURES

may be one of the prosaic uses of **PAGE STAINLESS STEEL WIRE.** But its higher tensile strength and non-magnetic qualities have added no little to the performance of modern war-time AC motors.

Tensile strength, corrosion resistance and non-magnetic qualities of Page Stainless Steel Wire have called for its use in Aircraft Control Cables in planes for the American air arm and for our allies.

And **PAGE STAINLESS STEEL SPRING WIRE** controls the mechanism of one of the most effective of modern small arms.

Yes, the **PAGE** mill has been producing a large volume of Stainless Steel Wire for years and has acquired priceless data on the working qualities of "Stainless." Keep this in mind when planning ahead. We will be glad to cooperate with you at any time, even if current capacity is available only for war production.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, San Francisco, Portland

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

strength of the element. W. Schaurte and A. Thum, Germany. 11-10-36.

(27) 2,115,200. Stay-bolt of clad metal and method of manufacturing same. H. von Forster, Germany. 4-26-38.

(43) 1,642,597. Machine for manufacturing nails from wire wherein the clamping jaws and point cutters are journalled together side by side in one pair of operating levers whose axis of rotation is at right angles to the axis of the wire. J. Wikschtrom, Germany. 9-13-27.

(49) 1,860,564. Tool for manufacturing wire-tacks and nails by which a piece of wire is provided with a head and a point without waste. J. Wikschtrom, Germany. 5-31-32.

(50) 1,739,745. Machine for the manufacture of nails from wire consisting substantially in a special arrangement and drive of the levers carrying the clamping jaws and the point cutters. J. Wikschtrom, Germany. 12-17-29.

(73) 2,295,583. Method and apparatus for producing a fan type lock washer having overlapping flaps of substantially uniform thickness. E. Jordan, Germany. 9-15-42.

(86) 1,913,685. Method of manufacturing elastic locking nuts. H. Schalk, Germany. 6-13-33.

(86) 1,970,430. Method and device for manufacturing nuts from balls. W. Nussbaum, Germany. 8-14-34.

(105) 2,074,470. Screw cutting machine wherein the feed spindle is, alternately, fed and simultaneously caused to rotate in one direction and returned and simultaneously caused to rotate in the other direction. R. Herrmann, Germany. 3-23-37.

(107) 1,615,361. Machine for finishing bolt or screw blanks. A. de Fries, Germany. 1-25-27.

(123) 1,795,895. Die-stock whereby the feed of the dies can be adjusted by means of a spanner without detaching any part of the stock. K. Saito, Japan. 3-10-31.

(129) 1,760,702. Nut-tapping device for the cutting of female threads by means of an overflow tap having a curved shank. F. Kosfeld, Germany. 5-27-30.

(129) 1,887,649. Nut tapping machine with cutter guiding the nuts and with revolving tool. K. Kumpmann, Sr., Germany. 11-15-32.

(136) 1,991,927. Electrically controlled screw cutting machine. R. Herrmann and E. Herrmann, Germany. 2-19-35.

(141) 1,633,913. Screw thread cutter comprising for each turn of the screw a pair of first teeth adapted to cut a normal screw thread profile, and a plurality of second teeth, the bases of which being substantially equal to those of the first teeth while the lengths of these second teeth in the direction of the diameter being greater than those of the first teeth. E. Wille, Germany. 6-28-27.

(141) 1,693,768. Screw-thread tap consisting of a cylindrical body or core which is provided with the threads to be cut into a bore or bores. H. Steinruck, Germany. 12-4-28.

(141) 1,768,089. Screw thread cutting taps of that class in which the body of the tap is tapered toward its free end and is provided with a plurality of longitudinal grooves between which grooves are the racks of segmental cutting teeth. H. Lindner, Germany. 6-24-30.

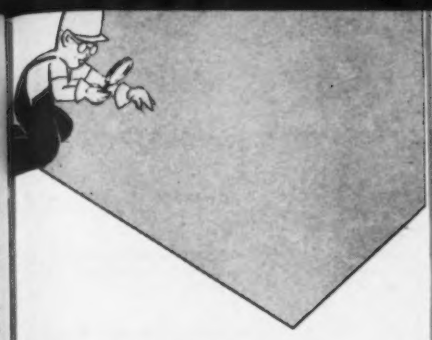
(141) 1,770,585. Screw tap with alternately wide and narrow teeth for the purpose of cutting the screw-thread passage with the narrow teeth, while the wide teeth finish to the desired dimensions the previously out thread flanks. H. Steinruck, Germany. 7-15-30.

(141) 1,789,237. Screw tap having curved shanks for use in screw threading pipe sockets or sleeves such as are used for gas pipes. F. Kosfeld, Germany. 1-13-31.

(145) 1,862,461. Boring and tapping tool for the manufacture of internally threaded sockets, the screwed surfaces of which taper in two directions with respect to the axis of the socket and form truncated cones. W. Birtel, Germany. 6-7-32.

(141) 1,874,378. Screw cutting tool comprising advance cutters and finishing cutters formed on different core diameters. H. Steinruck, Germany. 8-30-32.

(154) 1,913,930. Screw thread milling machine for producing screw threads in two in-



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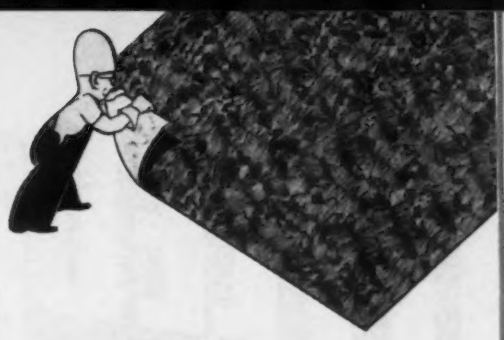
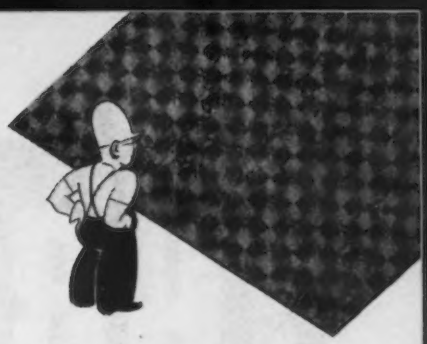
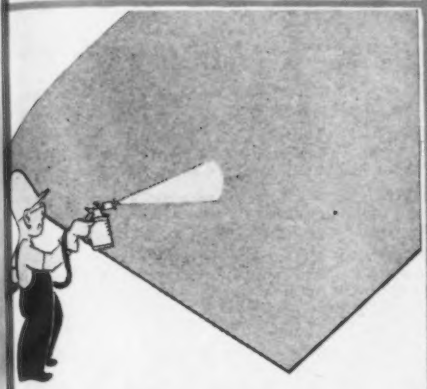
A special quality steel sheet that takes and holds fine finishes. Rust resistant. Easily fabricated, easily soldered.



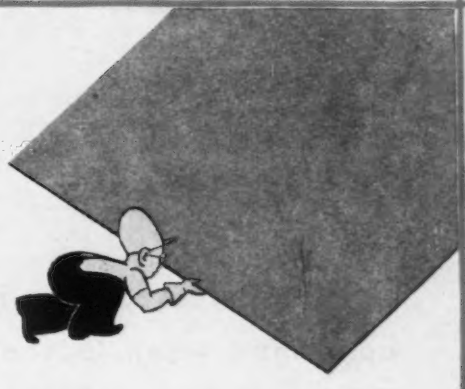
SUPERIOR GALVANIZED
A bright - spangled, commercial galvanized sheet with exceptionally good working qualities. Soft tempered and uniform.



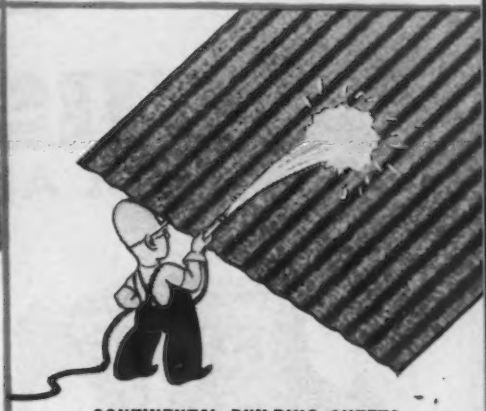
SUPERIOR CHECKERCOAT
Galvanized by the Superior Process with distinctive bright, checkered spangles. Pleasing to look at, fine to work with.



CONTINENTAL LEAD SEALED
New lead-alloy coated sheet resists rust longer, "takes" and "holds" paint, solders more easily. Fine for die-forming.



SUPERIOR LONG TERNE
A favorite with manufacturers. Open hearth steel base, tempered for accurate forming. Takes paint, resists rust.



CONTINENTAL BUILDING SHEETS
15 styles of modern steel roofing and siding including TYL-LYKE, Corrugated, V-CRIMP. All galvanized by the Superior Process.

If you don't see what you want

Ask for it!

Our production includes steel sheets with more than thirty different types of finishes, coatings and surface treatments—all made in our own mills from open hearth steel from our own furnaces. Postwar production will have no place for "jack-of-all-trades" steel sheets. That's why nearly every Continental and Superior sheet is a specialty, its properties designed to fit the requirements of a definite class of duty. If you are "shopping around" for steel sheets to meet particular wartime needs, or to fit exacting future plans, it will pay you to get full information about Continental-Superior sheets.

CONTINENTAL STEEL CORP., KOKOMO, INDIANA
THE SUPERIOR SHEET STEEL CO., CANTON, OHIO

SUPERIOR

CONTINENTAL STEEL CORPORATION

PRODUCERS OF STEEL SHEETS AND MANUFACTURER'S WIRE

CAN BE
THROTTLED
without building up pressure

GUSHER
COOLANT PUMPS

. . . and less power is consumed when Gusher Coolant Pumps are either partially or totally throttled. Easy adaptability for quick change-overs. No packing glands to leak, consume power or require adjustment. Learn about other advantages of Gusher Coolant Pumps. There's a model and type for your needs. Write for new complete catalogue.

Model 9040

Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed 1/4 h.p. motor.

THE RUTHMAN MACHINERY CO.
1821 READING ROAD CINCINNATI 2, OHIO
LARGEST EXCLUSIVE MANUFACTURERS OF COOLANT PUMPS

ternal and external oppositely disposed conical surfaces of the work. P. Kiefert, and P. Peter, Germany. 6-13-33.

(157) 1,650,525. Method and machine for the production of pins with headplates from wire and a strip of sheet metal. G. Krain, Germany. 11-22-27.

(2) 1,825,171. Automatic screw-threading machine particularly adapted for forming screw threads and points upon wood screw blanks. J. Arnold, France. 9-29-31.

(4) 1,731,036. Screw milling machine comprising a rotary milling cutter having a plurality of milling faces for successive operation on a blank. J. Arnold, France. 10-8-29.

(5) 1,679,063. Machine for slotting the heads of screws and the like. E. Spengler, France. 7-31-28.

(63) 2,014,746. Method of making nails. G. Robergel, France. 9-17-35.

(69) 1,814,952. Process and means for making horseshoe nails. H. Mustad, Norway. 7-14-31.

(71) 1,700,685. Manufacture of horseshoe nails. A. Moeller, Germany. 1-29-29.

(76) 2,266,961. Process for manufacturing the outside piece of a two-piece safety nut. E. Desbrueres, France. 12-23-41.

(89) 1,817,111. Machine for cutting threads on tubes, said machine being adapted to be demounted or detached in component parts for transportation, each by a single individual. P. Taureal, France. 8-4-31.

(86) 1,842,734. Arrangement for absorbing shocks and vibrations which is chiefly applicable for use as a door-holder for motor vehicles. L. Saives, France. 1-26-32.

(86) 1,992,102. Device for the manufacture of screw nuts in a cold condition. S. Syversen, Norway. 2-19-35.

(86) 2,287,691. Method of making self-locking nuts by pressing or stamping sheet or tubular metal pieces. E. Marchou, France. 6-23-42.

(102) 1,761,768. Apparatus for cutting threads applicable to all horizontal lathes. L. Auguste and R. des Moutis, France. 6-3-30.

(127) 1,681,655. Hand operated die-stock of the type comprising a carrier or frame for the die or die parts, provided with two operating handles and having means for centering the rod or the like to be screw threaded. H. Bernaudin, France. 8-21-28.

(137) 1,945,326. Machine for drilling, screwing, and tapping wherein any one of the available speeds, high or low, may be used at will either for the working stroke or for the return stroke according to the nature of the work. P. Marchal, France. 1-30-34.

(154) 2,189,867. Method of and apparatus for forming internal threads in a workpiece. G. Hagerman, Dayton, Ohio, assignor, by mesne assignments, to Societe d'exploitation des Brevets Moineau, Luxembourg. 2-13-40.

"IT'S A RAFFLE, THE WINNER GETS A SEAT ON THE BUS IN THE MORNING!"

A Completely Equipped Foundry has been added to Brake Shoe's Research Group

Vital war work demanded a full-scale foundry for experimental castings.

Such castings might be piloted in a production plant, but this would interfere with regular work.

Today this full-scale experimental foundry is ready for operation as part of Brake Shoe's Research Group.

To house this foundry, an unused factory building had to be dismantled and moved from Kansas City, Kansas, to Mahwah, New Jersey.

If engineers can take new ideas in foundry practice direct to the foundry and get all the kinks out before going into regular production . . .

It should effect important time savings.

It should accelerate necessary field testing and develop improved methods.

In addition to current concentration on problems directly connected with wear, experienced metallurgists and engineers of this Research Group are constantly working to improve products and production methods.

If you have a "punished part" problem, either in the structural or production phase, Brake Shoe's expanded research facilities should be helpful. They are available to manufacturers whose production calls for large runs of standardized parts.

Is Brake Shoe On Your Parts Source List?

Because many of the millions of parts produced by Brake Shoe for war have equally important peacetime uses, Brake Shoe will be ready for parts assignments in volume, the moment victory is won.

American Brake Shoe Company, 230 Park Avenue, New York 17, New York

AMERICAN **Brake Shoe** COMPANY

Brake Shoe's Research Group
1. Engineering Laboratory
2. Metallurgical Laboratory
3. Experimental Foundry

8 DIVISIONS, 59 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakeblok Division . . . . . *Detroit, Mich.*
Ramapo Ajax Division . . . . . *New York, N. Y.*
American Manganese Steel Division, *Chicago Heights, Ill.*
Kellogg Division . . . . . *Rochester, N. Y.*
Brake Shoe and Castings Division . . . *New York, N. Y.*
American Forge Division . . . . . *Chicago, Ill.*
Southern Wheel Division . . . . . *New York, N. Y.*
National Bearing Metals Corp. . . . . *St. Louis, Mo.*

"fingertip"

control

1.—Each of three switches assembled in a strong, light, dust-tight case, consists of two buttons, assembled as a unit. One switch controls the travel of the crane along the runway; another controls the movement of the hoist along the single beam of the crane, while the third switch regulates the up and down movement of the hook.

2.—Each button, as it is pressed inward, makes 5 electrical contacts, corresponding to 5 independent speeds in each direction of rotation.

3.—Emergency stop switch located at lower end of assembly opens all circuits.

means fast, accurate load handling

Shepard Niles Electric Cranes & Hoists go to work on the toughest handling jobs by simply pushing a button. Loads are lifted, conveyed, deposited—swiftly and safely—rehandling is eliminated—operating costs materially cut.

With dependability and accuracy, Shepard Niles selective, 5-speed, push-button control is master of every crane or hoist movement, whether accelerating or decelerating.

Shepard Niles Single Beam Cranes are available in "Push-type", "Hand-racked" and "Motor-driven" types of crane propulsion, in Over-running, Inner-running or Under-running construction. Capacities from ¼ ton to 10 tons.

MAINTENANCE MANUAL—FREE ON REQUEST.
Describes maintenance of Shepard Niles Cranes & Hoists—amply illustrated with line and sectional drawings. 106 pages.

Shepard Niles

CRANE & HOIST CORPORATION

356 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Briefly Told—

• A new industrial film, just released by the Cooper-Bessemer Corp., traces the development of the firm's engine production from its beginning 110 years ago to its present position as one of the foremost producers of Diesel and gas engines, compressors and foundry castings. The film is entitled "Continuous Performance" and skillfully blends important occurrences and dates in history with advances made by the company.

•

• Under the sponsorship of the Industrial Hygiene Foundation, Pittsburgh, a survey has been made of the health problems of women in industry. The study covered 54 plants in 10 states. While absences due to sickness were higher for women than men, accident rates on the whole were lower for women than for men. The problem of fatigue, common to married women with young children, due to lack of proper rest and recreation, has been alleviated in certain areas by the establishment of day nurseries. At present women can fill about 80 per cent of the jobs formerly held by men, and the outlook is they will continue in greater numbers, for the duration of the war. It is believed that they have made themselves a permanent place in industry, and that in the postwar period a greater number will be in industry than had been the case in the previous pre-war era.

•

• Dr. Harvey N. Davis, president of the Stevens Institute of Technology, announced the organization of the Stevens Research Foundation, a non-profit corporation to carry on scientific and industrial research in cooperation with the College. The Foundation is an outgrowth of the extensive program of research which Stevens has carried on in recent years which has expanded greatly during the war. Several of its laboratories are now engaged in confidential research for Government departments to aid the war effort, and they have also helped industry to increase and improve production in both war and peace.

•

• A new industrial instrument maintenance and repair course will be started on Feb. 1 by the Training School Division of Brown Instrument Co., Philadelphia. Changes have been made in the general outline of the course, especially that having to do with instructions in the two types of potentiometers, mechanical and electronic. The two types will be treated as separate subjects to make it easier for students to absorb the basic principles of each, and to meet the requirements of customers who send students to the school for the specific purpose of receiving continuous balance instrument instruction.

•

• Women war workers as well as men turned

SMITHway Electrodes in Action
A huge, all-welded machine structure, one of hundreds of jobs being done in the Smith plants to back the boys in battle.

It takes more than theory to make GOOD WELDS!

Theory has an important place in the development of any welding electrode. But theory only means something to you after it has been *proved in the shop.*

Right there you have the difference between SMITHway Certified Welding Electrodes and the run-of-the-mine variety.

We may *start* the development of an electrode on a theory—but *we don't stop there.* After the theory . . . after the research work . . . after the laboratory tests—then comes the showdown! The electrode goes out into our welding shops. There it is put through its paces *under actual shop conditions.* If it proves successful there, it has what it takes to prove up anywhere!

That is the kind of electrode we offer you in *SMITHway Certified Welding Electrodes.* There's theory back of them. There's scientific laboratory research and testing back of them. But best of all—they're *shop-tested* because what we want from an electrode is *better welds.*

That's what you want, too—isn't it?

Mild Steel...High Tensile...and Stainless Steel
WELDING ELECTRODES
made by welders . . . for welders

SMITHway Welding Monitor *cuts time cost of training welders as much as 33⅓%!*

SMITHway AC Welding Machine *—no arc blow; reduces spatter losses; saves power.*

A. O. SMITH Corporation
MILWAUKEE • WISCONSIN • HOUSTON • TEXAS
OFFICES AT NEW YORK, PITTSBURGH, CHICAGO, TULSA, HOUSTON, LOS ANGELES, SEATTLE

CUTTING FLUIDS DESERVE YOUR SERIOUS ATTENTION

Well informed authorities have made the statement that more intelligent application of cutting fluids and better tool grinding would make possible a 30% increase in metal-working production. In these days of man-power shortage, what a challenge that statement presents!

Be honest . . . in your plant are cutting fluid problems given the attention they deserve? Are your performance records accurate? Are you aware of what better cutting fluids can do for the job? Or is your attention centered on other fields until real trouble develops which might be traceable to improper use of cutting fluids? Hundreds of metal-working plants are getting the most out of their cutting fluids by working closely with the Stuart service engineer. They know that there is no universal cutting fluid, no magic compound—but when a Stuart product is put on the job they are sure they have every cutting fluid advantage that broad engineering experience and "know how" can give them.

A REQUEST OF STUART CUSTOMERS

Containers of all types are critically scarce. We urge you to cooperate with the W.P.B. program to conserve containers by observing these four rules for handling drums:

1. Do not drop.
2. Use a little oil to avoid stripping threads in removing plugs.
3. Replace plugs carefully when drum is empty.
4. Keep drums under cover when emptied.

To be sure you have all the advantages, work with the Stuart service engineer, representing a company which has specialized in metal-working lubrication since 1865.

We invite you to write for our new free booklet, "The 577th Oil," which contains twenty-two case histories, typical examples of how Stuart engineering is solving production problems (like your own), as well as other valuable metal-working data. State your name, company and title.

NEWS OF INDUSTRY

in top production ideas during 1943 at General Electric plants, and were well represented in the leading awards. The year's awards for accepted manufacturing suggestions were 47 per cent above the previous year's all-time G-E high. During 1943 the company accepted 23,841 as against 16,204 for 1942. The amount paid suggestors was $276,760 against $158,943 for the previous year, highest totals since the G-E suggestion system was established in 1906.

●

• ***Cutler-Hammer, Inc., Milwaukee, has completed settlement of its renegotiation of war contracts with the government on 1942 profits, resulting in a net adjustment of $948,352.50 in favor of the government. This will be charged against reserves of $1,250,000 which the company set up out of 1942 earnings and therefore does not reduce net profits shown for that year.***

●

• In the annual report for the fiscal year ended Oct. 31, 1943, Foote Bros. Gear and Machine Corp. reported net income of $858,303 after charges including a reserve of $750,000 against renegotiation of war contracts. Because renegotiation refunds are so indeterminate, no effort has been made to compute per share earnings. It compares with net income for the previous fiscal year of $686,114 after renegotiation refunds.

●

• Keystone Steel & Wire Co. reports for the three months ended Dec. 31, 1943, the second quarter of the company's fiscal year, net profit of $490,568 after all charges including federal income and excess profits taxes. For the six months ended Dec. 31, net profit amounted to $726,720, or 96 cents a share, compared with $456,931, for the same six months of last year.

●

• **The first instances of release of mechanics from war plants to local automotive service garages in the Springfield, Mass., area is noted. In each instance the mechanics originally worked in the garages, but left for more money in war plants. Now that overtime in many war munition plants has been drastically cut, the mechanics are anxious to get back on their old jobs.**

●

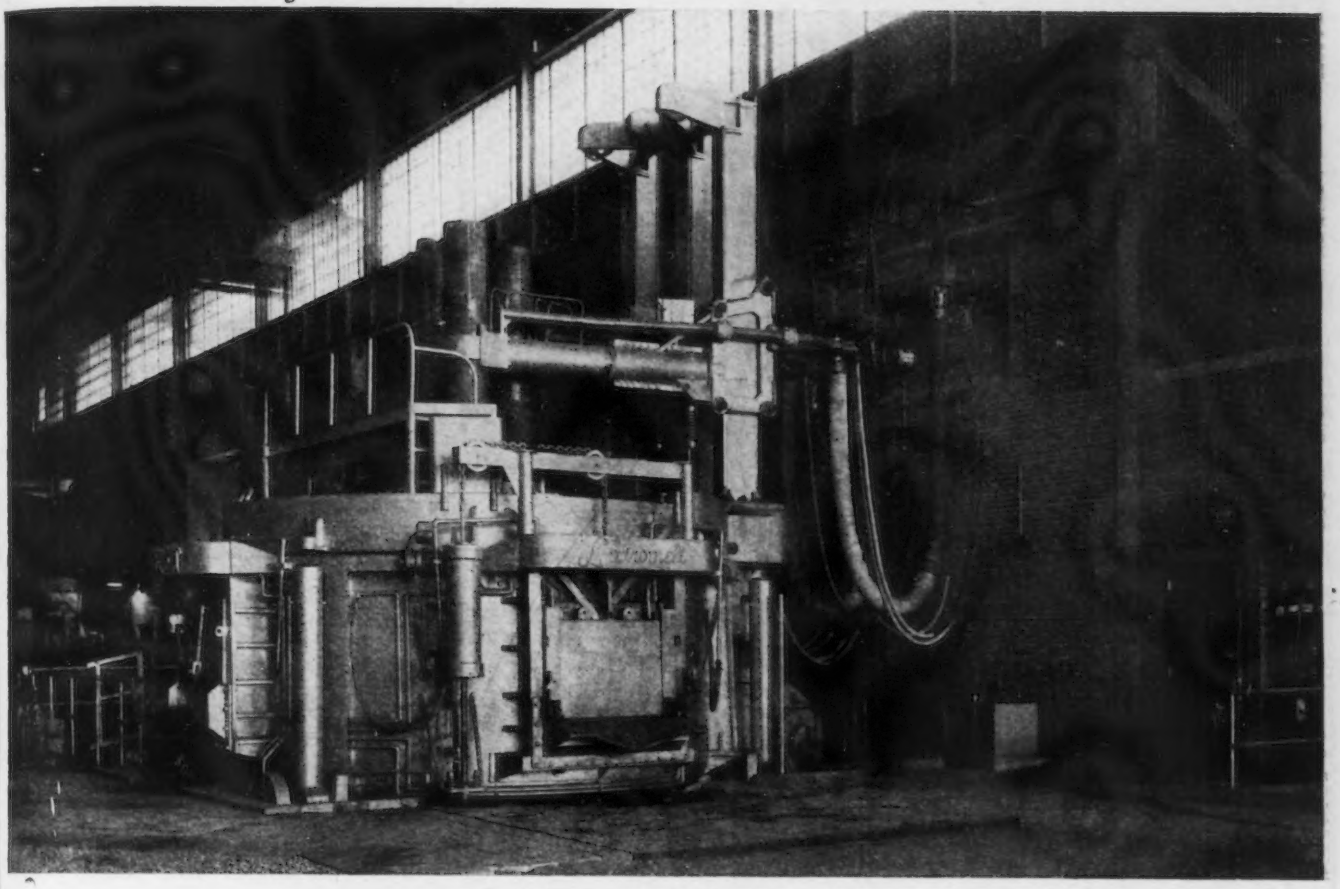
• Topping the list of misunderstandings regarding WLB rules, according to a recent check made by the Research Staff of the Labor Relations Institute, is the provision requiring "equal pay for equal work." Pointing out that this regulation does not apply to jobs which have been traditionally performed by women, the Institute reports that a woman worker is entitled to the same rate of pay as a man if the following three conditions are fulfilled: (1) The job must be the same as the one being performed by a male worker. (2) The women must turn out the same quantity and quality of work as the male worker. (3) The particular job in question, now being done by a woman, must once have been performed by a man for the same company.

●

• ***Ten plants produced 200 per cent more of the Army's new carbines during November than the combined production of Springfield and Enfield rifles in the record month of World War I, according to Col. Frank J. Atwood, chief of the Rochester (N. Y.) Ordnance District.***

●

• The Western Pennsylvania Safety



the Furnace of today and tomorrow

The illustration shows, in normal operating position, one of the largest top charge type electric furnaces in the United States. This is a 17' diameter, size KT, 50 ton capacity Lectromelt, and is now in production on alloy steel. Similar capacity Lectromelts are pouring plain carbon steel. This furnace is of the top charge type, in which the roof is raised hydraulically, and rotated to one side for quick charging with a drop bottom bucket. Both a main working door and an auxiliary side working door are provided for convenience in working a heat.

Top charge type Lectromelts increase steel production. Their use results in lower power consumption, lower electrode and refractory costs and increased tonnage per man hour. Top charge type Lectromelt Furnaces are built in standard sizes ranging from 100 tons down to 250 pounds capacity. Their rugged construction gives maximum production and long life. Write for complete information on Lectromelt Furnaces to meet your melting requirements.

MOORE RAPID
Lectromelt
FURNACES

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNA.

For **RAPID** and **ECONOMICAL** *Steel Production*

WORK BENCHES... NOT PARK BENCHES

Last year about 700,000 men came back from the armed forces. This year it is estimated that there will be over 1,200,000.

These men will have to be classified, tested and trained. Some who are partially disabled will need special help. All will need some sort of work. That is a promise Uncle Sam has made to these boys.

Your first thought is going to be, "With the cutbacks we'll get, and our reconversion problems, our plant can't possibly re-employ many of these men." You'll be absolutely right. Right here is where we need some new terminology in our economic setup.

In my opinion, "Industry" should be defined as that portion of our economic system that creates and produces. This takes in factories, farms and mines. The word "Business" should include that portion that has to do with transporting, selling, distributing and servicing the merchandise and goods that are produced. It also includes the professions and communication.

Now, if we go into past history on that basis, we find that "Industry" has never accounted for more than approximately one-third of all of the gainfully employed people in the United States. "Business" has accounted for the other two-thirds.

Yet "Industry" will be blamed for any failure to solve the postwar employment situation. Industry simply cannot sit back and let someone else try to figure out the solution.

The job is too big for Government. Even with the best intentions in the world, Uncle Sam, sitting in Washington, doesn't know your community. This is a community job. And if it isn't done right—*you'll* be blamed for it.

Geo. D. Trundle Jr.
President

1919-1944

THE TRUNDLE ENGINEERING COMPANY

Brings to Industry

25 Years **OF MANAGEMENT ENGINEERING EXPERIENCE**

GENERAL OFFICES • CLEVELAND • BULKLEY BUILDING

CHICAGO
City National Bank Bldg., 208 S. La Salle St.

NEW YORK
Graybar Bldg., 420 Lexington Ave.

Council, Pittsburgh, elected Charles R. Cox, president of National Tube Co. and of Tubular Alloy Steel Corp., U. S. Steel subsidiaries, as its president, to succeed Raymond A. Tucker. Mr. Tucker will continue as a director of the organization. Six vice-presidents were elected. They are: D. P. Hartson, vice-president, Equitable Gas Co.; F. Rhodes Henderer, Carnegie-Illinois Steel Corp.; J. P. Leonard, Blaw-Knox Co.; Donald M. McNeil, traffic engineer, City of Pittsburgh; Dr. E. A. Dimmick, associate superintendent, Pittsburgh Board of Education, and L. J. Bowker, Mine Safety Appliances Co. M. C. Conick, Main & Co., was elected treasurer, and E. J. Kreh, reelected secretary. The 20th annual Western Pennsylvania Safety Engineering Conference will be held in April.

•

• Production achievements of the valves and fittings industries were praised by Capt. J. O. Gawne, director of the Shipbuilding Division, WPB, at a meeting of representatives of these industries in New York. The meeting was called by WPB to review production problems. The valve industry has expanded its steel valve output to approximately seven and one-half times its pre-war level. Last year the industry produced valves of steel and other metals to an estimated total of 277,525 tons, or more than 99 per cent of stated 1943 requirements.

•

• *Bethlehem-Hingham Yard, recently discontinuing Sunday work, on Feb. 1 will eliminate its 11 P.M. to 7 A.M. shift, thereby bringing operating schedule down to two shifts. Also on Feb. 1, it will start discharging 10,000 workers.*

•

• **Because self-propelled ships are now available in sufficient numbers to handle cargoes of strategic bauxite, base of aluminum, a contract for construction of 26 non-propelled concrete barges has been cut to 20, the U. S. Maritime Commission announced. The contract is held by Barrett & Hilp, South San Francisco, Cal. Allocation to the Army, Navy, and the West Coast grain trade has taken care of the 20 already built or under construction. No use being found for the other six, their keels will not be laid.**

A.I.M.E. Schedules Its Forthcoming Meetings

• • • **Forthcoming meetings** of the American Institute of Mining & Metallurgical Engineers have been scheduled as follows:

April 20, 21—Twenty-seventh Annual Conference of the Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division. Pittsburgh.

Oct. 5, 6—Second Annual Conference of the Electric Furnace Steel Committee, Iron and Steel Division. Pittsburgh.

Oct. 16, 17, 18—Regular Fall Meeting, Iron and Steel Division and Institute of Metals Division. Cleveland.

Oct. 27, 28—Annual Fall Meeting, Ohio Section of Open Hearth Committee and Ohio Valley Section. Columbus, Ohio.

It's the "little" things . . . The successful completion of today's *big* war projects depend on "little" things . . . Like rugged floors that withstand punishing hours of wear . . . Safe floors that prevent costly falling accidents. "A.W." Rolled Steel Floor Plate can be cut and installed almost overnight without disturbing production. Illustrated is the "A.W." Super-Diamond Pattern which resists slipping in *any* direction. Oil-proof, heat-proof, fire-proof, crack-proof. Write for folder.

Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

Easy does it!

... with fast accurate Buffalo

BENDING ROLLS

• Yes, even difficult bending operations enjoy new simplicity—and the output keeps up with assembly line needs—with "Buffalo" Bending Rolls on the job. Inexperienced labor quickly gets the knack of these machines—turns out the work accurately. "Buffalo" Bending Rolls are adaptable to a wide range of shapes and sizes, producing rings, arcs, spirals and other circular shapes. Engineering data on request.

ARMY E NAVY

BUFFALO FORGE COMPANY
492 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" BENDING ROLLS

Cutting Tool Orders Dropping Toward Consumption Basis

• • • **With completion** of plant expansion programs, new orders for metal cutting tools have been dropping steadily and may soon be down to a consumption basis, WPB reported Jan. 25. Monthly shipments consistently exceeded new orders in the 13 months ending with November.

The data below are based on reports from 275 firms that ship over 90 per cent of the cutting tools. Only tools shipped for sale are included.

METAL CUTTING TOOLS

Orders, Shipments and Backlogs
Source: WPB

(Thousands of Dollars)

Month	Shipments	New Orders	Unfilled Orders (End of Month)
1942			
August	31,662	34,453	136,583
September	32,149	33,313	135,950
October	35,739	37,297	142,893
November	33,986	30,068	139,747
December	36,611	29,564	133,181
1943			
January	34,235	30,496	130,995
February	37,499	35,813	131,010
March	41,454	40,577	135,023
April	40,319	35,334	125,630
May	37,052	29,163	115,830
June	36,291	27,717	105,903
July	33,490	31,801	100,812
August	33,084	26,552	92,951
September	32,353	24,948	87,136
October	32,131	25,797	78,634
November	29,598	25,225	73,659

Hand Service Tools Shipments Total $8 Million for 11 Months

• • • **Shipments** of mechanics' hand service tools in the first eleven months of 1943 averaged over $8,000,000 a month, compared with approximately $6,000,000 a month for the corresponding period of 1942 and monthly averages of $2,000,000 and $2,300,000 in the pre-war years, 1939 and 1940, according to the Tools Division of the WPB. In addition to the huge demand from war factories, these tools are needed in large quantities for repair kits on aircraft, on tanks, jeeps, and other military vehicles, in ship repair rooms, at advance bases, and at air fields, and in other direct military uses.

Data for 1942-1943 cover approximately 150 manufacturers who ship over 90 per cent of the mechanics' hand service tools (pliers, wrenches,

etc.). Wood-working tools, edge tools, and such heavy forged tools as sledges, crowbars, etc., are excluded.

Mechanics' Hand Service Tools

Monthly Shipments and New and Unfilled Orders, in Thousands of Dollars

Date	Shipments	New Orders	Unfilled Orders (End of Month)
1939			
Monthly Average	2,080	.....	.....
1940			
Monthly Average	2,330	.....	.....
1941			
Monthly Average	3,810	.....	.....
1942			
Monthly Average	6,116	9,371	41,614
1943			
January	6,887	8,480	57,149
February	7,253	8,802	59,293
March	8,517	11,570	60,082
April	8,418	9,777	60,788
May	8,419	8,635	61,464
June	8,670	7,729	58,587
July	7,844	9,489	60,415
August	8,640	7,964	59,686
September	8,059	6,866	55,757
October	8,425	9,076	55,681
November	8,486	7,308	52,478
Monthly Average	8,147	8,699	58,307

War Pushes Electronics 20 Years Ahead of Applications

New York

• • • **Electronic research** under the impetus of the war has beaten a scientific path into the 1960's and created a vast reservoir of technique that waits to be tapped by the demands of the public and industry, Walter Evans, vice president in charge of the radio division of Westinghouse Electric & Mfg. Co., stated.

At Westinghouse alone, war radio equipment output has been stepped up to 51 times pre-war volume. Most pre-war problems are now subject to adequate solution because of improvements, simplification, and the use of multiple purpose circuits; of various types of automatic controls; of tubes using new elements and new principles; and of frequency bands opened up many times wider than the whole available spectrum when the war began.

Industrial electronics such as plastics curing, dehydrating, and reflowing tin on electrolytically coated tin plate, have also been rather recent developments.

Fight Rust and Wear . . .
Conserve War-Vital Metals . . .

. . with Low-Cost, Non-Critical

Careyclad BLACK COATING
FOR METAL SURFACES AND BUILT-UP ROOFS

CAREYCLAD protects metal against rust and weather—is extremely durable, abrasion resistant, and resistant to acid, alkaline and salt solution and to moist, atmospheric conditions. It is a practical, low-cost coating for metal buildings, iron sheets, structural steel, bridges, heavy machinery, and numerous sheet metal products.

Applied by spray painting or brushing, at everyday indoor or outdoor temperatures. Promptly available through CAREY Branches and Distributors. Write for details, address Dept. 26.

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Storm

Speedy and powerful, the Army's "Storm Boats" will slash through the water, dodging, turning and twisting to carry assault troops to enemy shores. They are powered by Evinrude Outboard Motors built with Fairfield Gears.

Fairfield is supplying gears to many of the nation's topnotch producers of tanks, guns, trucks, planes and other military equipment . . . gears turned out in huge quantities, but each carefully manufactured to exact specifications under control of the metallurgical, heat treating, machining, testing and inspection departments. *Remember Fairfield for Fine Gears*—spiral and straight bevel, spur, helical, herringbone, worm, hypoid and complete differentials.

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Hypoid
Spur
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Worms
Differentials

FAIRFIELD for FINE GEARS

FAIRFIELD MFG. CO.

305 S. Earl Ave. • Lafayette, Ind.

Weirton Uses Du Pont Halogen Electro-Tinning

Wilmington, Del.

• • • **One of the first** large installations of the E. I. du Pont de Nemours & Co., electrolytic tinning lines called the Halogen tin process, at Weirton Steel Corp., Weirton, W. Va., is now operating at full capacity. The Halogen tin process (described in THE IRON AGE, April 9, 1942, p. 115 and April 30, 1942, p. 35), is used in continuous high speed tinning of steel strip. Du Pont claimed at that time that strip steel for containers could be tin plated twice as fast with less electric power by this slightly acidic process than by alkaline electrotinning methods, and bath sludging is eliminated.

Tin deposited by this process can be heated without discoloration either when the tin plate is heated to obtain a bright finish (thermal reflowing) or when treated during the process of applying lacquers or enamels. Furthermore, at operating speeds of 1000 ft. per min. through the chemical baths, the thicknesses of the plate can be varied from 0.1 to 0.5 lb. per base box of tin plate.

The thinnest plates possible by the "hot dip" method require about 1.25 lb. of tin to cover 435.4 sq. ft. of base metal surface, the standard unit of measurement in the container industry. By the Halogen process, and quite possibly by other electrolytic tin plating methods, tin required amounts to only 0.25 lb. per 435.4 sq. ft. of base metal. Weirton, at present, is using abount 0.5 lb. of tin per unit of base metal surface.

One of the Weirton lines is operating at 1050 ft. per min., with the metal being in the 24 cell tin electrolyte bath some eight seconds. The process is continuous, with each coiler accumulating 25,000 lb. of coated strip, and then the strip is directed onto a second or alternate coiler.

Non-CMP Material Requests To Be Made on New Form

Washington

• • • **WPB warned** business firms and individuals who normally apply for priority assistance on WPB Form 541 for the acquisition of equipment or materials other than controlled materials, that effective Feb. 1 only applications made on the new revised version of that form will be considered. The old form, PD-1A, will be honored only until Feb. 1.

factory accuracy *in field adjustments*

LAMINUM shims provide those quick-precision adjustments which—as in aircraft—are as vital in the field as in the original assembly.

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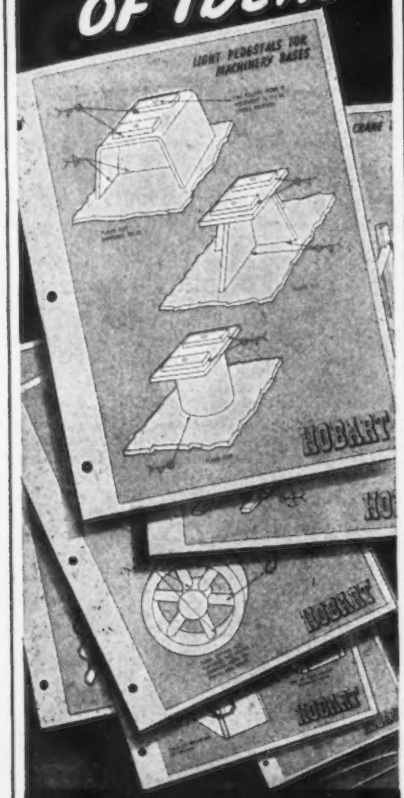
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"One of the World's Largest Builders of Arc Welders"

NEWS OF INDUSTRY

Toasters May Share Shelves with Wheaties

Buffalo

• • • **General Mills, Inc., is reported planning to make electric irons, toasters and waffle irons for sale in neighborhood groceries after the war. Presumably it will use its present ordnance shops for such production. The appliances may be offered as premiums. For two years General Mills' mechanical division has been producing special precision Navy equipment.**

Committee to Aid in Production Shifts

Washington

• • • **In preparation for** shifts in war production and to eliminate as many bottlenecks as possible that might result, WPB established a committee for identifying critical products. This action was taken upon the recommendation of the Requirements Committee and all the claimant agencies are requested to cooperate.

The committee will aid in eliminating material and component bottlenecks, identifying those products (including components, materials, and producers' supplies and equipment) which limit or prospectively limit the completion of approved programs, and directing the attention of the responsible claimant agencies and organizational units of the WPB to the need for remedial action.

The committee is to maintain constant contact with all claimant agencies and Industry Divisions who shall report evidences of bottleneck areas and in other needful ways cooperate with the committee. Recommendations of the committee shall be recommendations of the chairman, who shall also indicate any major differences of opinion developed by committee discussion. The committee is to:

1—Prepare and keep current a list of critical products based on:
(a) a working definition of critical products formulated by the committee. (b) evidence from procurement officials and other field sources as to difficulties of procurement, and (c) other relevant information on supply-demand positions in currently or prospectively critical products.

2—With respect to these critical products, direct the attention of the responsible claimant agencies and appropriate WPB organizational units to the need for a possible means of remedial action within their respective jurisdictions.

3—With respect to products no longer critical, direct the attention of the responsible agencies to the possible desirability of relaxing existing controls.

4—Identify individual bottleneck plants and recommend their inclusion in the several general categories of appendix A to program determination No. 500.

FREE!

THIS 24" x 32" WALL CHART GIVES ROCKWELL, BRINELL, SCLERO, VICKERS HARDNESS AND TENSILE STRENGTH CONVERSIONS

• If you are a production executive whose responsibility includes the hardness testing of metals, you will certainly want one of these new charts for your office, shop, or laboratory. Handsome in appearance, printed in three colors, with the very minimum of advertising, it will prove its value every hour of every day. Type is large, easily read at a distance of several feet, yet the chart itself is only 24" wide and 32" high—about the size of a calendar.

Although a chart like this is relatively expensive to produce, and the quantity is rigidly limited, a copy is yours—free for the asking—if you request it on your letterhead.

Write Dept. IA, CLARK INSTRUMENT, INC., 10200 Ford Road, Dearborn, Michigan.

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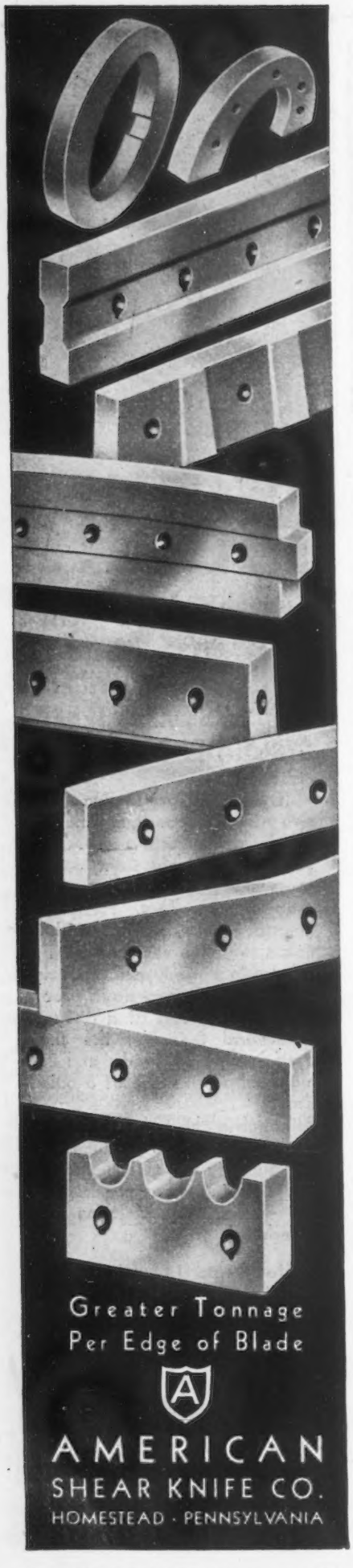
TOMORROW'S ACCURACY TODAY
HARDNESS TESTER
FOR "ROCKWELL" TESTING



Time Cycle for Procurement

• • • **Products** that were formerly shelf items are now critical components. Consequently, claimant agencies and prime contractors must take this into account, and orders must be far enough in advance so as not to delay production cycles or delivery, or not delay some other program by using AAA's or directives to obtain necessary materials. The following schedule, computed by WPB based on conditions as of Nov. 1, 1943, shows the time lapse, between normal ordering and delivery of various components. This time lapse includes time for engineering, procurement of materials and components, and field erection or installation, but excludes manufacturers' backlogs.

I Industrial Machinery and Equipment

Component	Total Weeks
Air & Gas Compressors	
1—Over 300 h.p.	28
2—15 h.p. to 300 h.p.	16
3—Below 15 h.p.	10
4—Portable	4
High Pressure Blowers	
1—Multi-stage	
a. Large	45
b. Small	32
c. Blast furnace	65
2—Single stage—under 50 h.p.	15
3—Single stage—over 50 h.p.	23
4—Rotary type	15
5—Positive displacement	21
Fans	
1—Heavy duty critical	19
2—All others	9
Material Handling Equipment	
1—Conveyor systems	19 to 39
2—Mechanical power transmission	15 to 24
3—Gears & speed changers	18 to 35
4—Elevators—average size	18
5—Industrial trucks	
a. Gasoline	26
b. Electric	26
c. Hand	9
Heat Exchangers	
1—Shell & tube type—large, above 3000 sq. ft.	50
2—Shell & tube type—medium, 1500 sq. ft.	43
3—Shell & tube type—small, below 1000 sq. ft.	35
Pressure Vessels	
1—Drums	35
2—Simple fractionating towers	43
3—Simple fractionating towers (alloy lined)	50
4—Field erected pressure vessels	43
Motors & Controls	
1—Integral h.p. motors and generators—a.c. to 500 h.p.	23
2—Navy motors and generators—a.c. to 500 h.p.	27
3—Fractional h.p.	18 to 34
4—d.c. motors—1 to 500 h.p	23 to 31
5—Navy d.c.—1 to 500 h.p.	23 to 31
6—Motor controls	
a. Navy controls	25 to 36
b. Maritime controls	24 to 30
c. Special industrial controls	12 to 24
d. Standard industrial controls	8 to 12
7—Small air circuit breakers	8 to 12
Welding Equipment	
1—Resistance	13
2—Gas	6
3—Arc	
a. Electric drive	8
b. Gas drive	12
c. Diesel drive	16
4—Electroplating and anodizing	21
5—Welding rods and electrodes	12

II Diesel and Gasoline Engines

Component	Backlogs	Total Weeks
Crankshafts		
Small (up to 200 cu. in. engines)	22	11
Medium (201 to 500 in.)	25	12
Large (over 500 in.)	39	16
Camshafts		
Small & medium (under 500 in. engines)	17	11
Large (500 in. and over)	29	13
Friction Bearings (Flanged & sleeve type)	34	10
Diesel Fuel Injection Equipment		
Nozzle	30	6
Holder	30	10 to 13
Pump	30	10 to 13
Diesel Engines (Liquid Cooled)		
Up to 50 h.p.	26	13 to 17
51 to 100 h.p.	43	17
101 to 150 h.p.	37	17
Over 150 h.p.	47	26
Gasoline Engines (Liquid Cooled)		
Up to 50 h.p.	29	17
51 to 100 h.p.	29	17
101 to 150 h.p.	34	21
Over 150 h.p.	41	21
Gasoline Engines (Air Cooled)		
Up to 35 h.p.	21	6 to 10

III Ship Propulsion and Operating Machinery

Component	Backlogs	Total Weeks
Propulsion Turbines—Geared	95	40 to 35
Main Reduction Gears	95	45 to 38
Main Propulsion Turbine Electrics	75	48 to 42
Diesel Engines		
1—Heavy	64	25
2—Light		20
Reverse and Reduction Gears (Diesel and Gasoline Engines)		
0 to 250 h.p. engines	22	16
250 to 2700 h.p. engines		25
Steam Engines	30	22 to 16
Marine Boilers	45	20 to 18
Steering Gears	40	21 to 14
Speed Reduction Gears	32	12

*IV Tools**

Component	Material Procurement, Weeks	Total Weeks
Anti-Friction Bearings	23	35
Mechanics Hand Service Tools		
Adjustable wrenches	10	13 to 21
Socket wrenches	10	8 to 17
Monkey wrenches	10	13 to 21
Pliers (side cutting)	10	13 to 21
Metal Cutting Tools		
Thread chasers for die heads & collapsible taps	10	8 to 12
Precision Measuring Tools		
Micrometers	10	16
Internal Micrometers	10	14
Calipers, pocket slide	10	18
Planer gages	10	65
Thickness gages	10	17
Telescope gages	10	22
Precision levels	10	43
Parallels	10	13
Protractors	10	56
Solid squares	10	28
Steel rules	10	17
Calipers	10	13
Vernier gear tooth gages	10	26
V-blocks	10	53
Forging Hammers	14	21 to 26
Presses, Mech. & Hyd. (Metal working)	14	17 to 21
Extruding Machines (Metal)	14	26 to 30
Machine Tool Attachments & Fixtures		
Lathe chucks	10	13 to 17
Die heads	10	8 to 12
Collapsible taps	10	8 to 12
Machine Tools		
Surface broachers	10	17 to 22
Planers, dbl. housing	10	32
Thread milling machines	10	26
Thread grinders	10	22
Cylindrical grinders	10	17
Precision boring machines	10	30
Special & way drilling machines	10	30
Spur & helical gear shaping machines	10	22
Special machines	10	35 to 39

*Time required for placement of orders in advancement of completion date of project or end product—includes average backlog.

DPC Contract Awards

• • • **Defense Plant Corp.**, RFC subsidiary, has authorized the following contracts:

International Minerals & Chemical Corp., Chicago, to provide additional facilities at plants in Carlsbad, N. M., and Austin, Tex., at a cost in excess of $175,000, making a total commitment of more than $18,850,000.

Chrysler Corp., Detroit, to provide additional facilities at a plant in Detroit at a cost in excess of $2,000,000, making a total commitment of more than $4,450,000.

Wallington Tube Corp., Wallington, N. J., to provide additional facilities at a plant in Wallington at a cost in excess of $200,000, making a total commitment of more than $2,200,000.

Lakey Foundry & Machine Co., Muskegon, Mich., to provide additional equipment at a plant in Muskegon at a cost in excess of $30,000, making a total commitment of more than $750,000.

Monarch Machine Tool Co., Sidney, Ohio, to provide machinery and equipment at a plant in Sidney at a cost in excess of $630,000.

S. K. Wellman, Cleveland, to provide additional equipment at a plant in Cleveland, at a cost in excess of $300,000.

Williamette Iron & Steel Corp., Portland, to provide additional facilities at a plant in Portland at a cost in excess of $55,000, making a total commitment of more than $1,570,000.

Williamette Iron & Steel Corp., Portland, to provide additional facilities at a plant in Portland at a cost in excess of $120,000, making a total commitment of more than $300,000.

American Bosch Corp., Springfield, Mass., to provide plant facilities at Chicopee, Mass., at a cost in excess of $1,350,000.

The Baltimore Pure Rye Distilling Co., Baltimore, to provide additional facilities at a plant in Baltimore at a cost in excess of $315,000, making a total commitment of more than $385,000.

The War Department announced:

Authorization for construction of runways, taxiways and installation of permanent night lighting facilities at Gunter Field, Montgomery, Ala. The initial authorization is $500,000. Work will be supervised by the Mobile, Alabama District Office of the Corps of Engineers.

Authorization for construction of additional runways, taxiways and parking apron at Matagorda Island, Texas. The initial authorization is $500,000. Work will be supervised by the Galveston, Texas District Office of the Corps of Engineers.

Among the Week's Trade Notes

Formica Insulation Co., Cincinnati, manufacturers of laminated plastics, will increase its capacity between 20 and 25 per cent by installation of new treating equipment involving infra-red heating.

•

Electric Controller & Mfg. Co., Cleveland, has opened an office at 732 Barr Building, Washington 6. A. W. Hartman will be in charge.

•

Electro Plastic Processes, Chicago, has taken over the new process of metal plating on plastics, glass, etc., developed by Precision Paper Tube Co. Stronger unity of bond between metal and plastic is claimed for the new process.

•

Bay State Abrasive Products Co., Westboro, Mass., has adopted a new identification mark, consisting of the wording "Blue-Flash" plus a symbol of a lightning flash, for the complete line of Bay State abrasive products.

•

A. B. Farquahar Co., Ltd., York, Pa., announces that from Jan. 1 it will operate as a corporation under the laws of Pennsylvania and will be known as A. B. Farquahar Co.

•

Kropp Forge Co., Chicago, announces that Charles L. Foley has been appointed engineering sales representative for New York and adjacent territories.

•

H. K. Porter Co., Pittsburgh, has opened an enlarged New York office at 50 Church Street, New York. The office will serve as an export office and as an Eastern center for the company's entire line of locomotives, process equipment and pumps.

•

National Electric Welding Machine Co., Bay City, Mich., has purchased the Electric Steel Castings Co. of that city. Edward Smith has been appointed president of both firms; C. C. Keegan was named secretary-treasurer and general manager.

•

Titeflex Metal Hose Co., Newark, N. J., will hereafter be known as Titeflex, Inc.

•

Graham Transmissions, Inc., Milwaukee, has added five more sales engineering organizations as representatives. They are: Fitch Bosworth, 7816 Delmar Boulevard, St. Louis 5; Enterprise Agencies, Ltd., 1400 Stanley Street, Montreal; I. I. Solzman, Pasol Engineering Co., World-Herald Building, Omaha 2, Neb.; John L. Underwood C., 139 Edgewood Avenue, Atlanta 3; William J. Cottrell, 131 S. W. 4th Avenue at 9211, Portland, Ore.

•

North American Philips Co., Inc., Dobbs Ferry, N. Y., announces the purchase of Philips Metalix Corp., including grounds and factory at Mount Vernon, N. Y.

•

DeBardeleben Coal Corp., Birmingham, has notified the trade that effective April 1 the corporation will sell direct to the consumer the by-product coke produced at its 60-oven Holt, Ala., plant, instead of through a sales agency.

•

Victor Spencer, president of Pioneer Gold Mines, Ltd., has purchased the Vancouver, B. C., plant of Hamilton Bridge Western, Ltd.

•

Colonial Broach Co., Detroit, has opened district offices at 1217 Grant Building, Pittsburgh 19, and 1109 Fletcher Trust Building, Indianapolis 9.

•

Maryland Bolt & Nut Co., Mt. Washington, Baltimore, has been acquired by the American Chain & Cable Co., Inc., Bridgeport, Conn. No changes in policies or personnel are contemplated.

•

Allen-Bradley Co., Milwaukee, has appointed Rietze & Co., 1017 E. Broadway, Louisville 4, as its sales representative for the Allen-Bradley line of electric controlling apparatus.

•

Kent-Owens Machine Co., Toledo, has appointed the Satterlee Co., Minneapolis, as exclusive agents for its milling machines in this territory.

•

American Foundrymen's Association, northern Illinois and southern Wisconsin chapter, meeting at Rockford, Ill., on Feb. 8, will be addressed by A. J. Edgar, technical adviser of the Gray Iron Founders' Society.

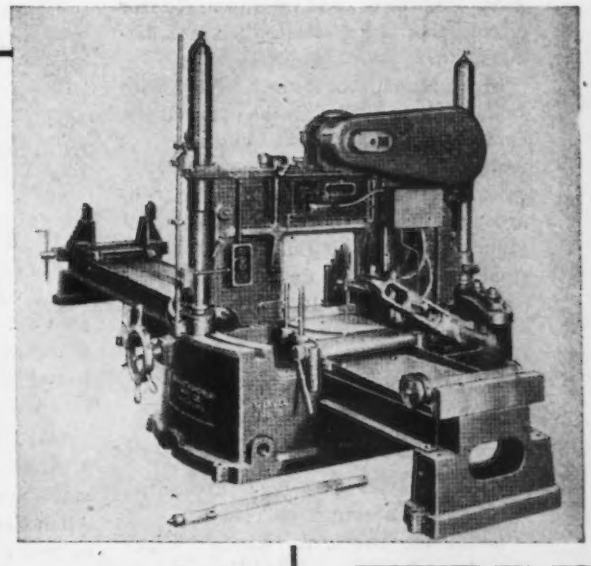
•

Cambridge Industrial Research organization, which controls the Arthur D. Little, Inc., laboratories, reelected all officers at its annual meeting. The company's officers are: Earl P. Stevenson, president; Raymond Stevens, Thorne L. Wheeler and Roger C. Griffin, vice-presidents; Henry G. Powning, treasurer; Frank N. Houghton, secretary, and Russell H. Stephens, comptroller.

•

The National Association of Fan Manufacturers meeting in Detroit, Jan. 19, elected the following officers for the ensuing year: C. T. Morse, president; J. M. Frank, vice-president, and L. O. Monroe, secretary-treasurer.

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal-cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"
Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

L. P. McALLISTER, JOSEPH G. ALTHOUSE and WILLIAM TAYLOR, left to right, have been appointed assistant to the general superintendent, metallurgical engineer and engineer of tests, respectively, of Lukens Steel Co.

PERSONALS

• **L. P. McAllister,** who has been metallurgical engineer for Lukens Steel Co., Coatesville, Pa., since 1936, has been appointed assistant to the general superintendent with specific duties of quality control. Also **Joseph G. Althouse** has been made metallurgical engineer, and **William Taylor** engineer of tests, succeeding Mr. Althouse.

Mr. McAllister has been with Lukens since 1922. He has served the company as assistant engineer of tests, engineer of tests, metallurgical sales engineer and metallurgical engineer. Mr. Althouse has been engineer of tests at Lukens since November, 1935. He first came to the company in July, 1917. Mr. Taylor entered the employ of Lukens as an apprentice metallurgist in September, 1936. In January, 1939, he became assistant engineer of tests.

• **R. H. Davies** has been appointed welding engineering representative in Washington, D. C., for Lincoln Electric Co., Cleveland. Mr. Davies has had wide experience in the industrial engineering field.

• **John M. Hodge** has been appointed development engineer, steel heat treating, of Carnegie-Illinois Steel Corp., Pittsburgh. He will represent the department of research and technology in the coordination and supervision of development work on heat treatment of steels and heavy forgings. Mr. Hodge has been with the corporation since 1933.

• **B. J. Brugge** has been appointed welding engineer in the Detroit office of the Lincoln Electric Co., Cleveland. Mr. Brugge, who has been associated with Lincoln since 1931, has served in the Los Angeles and Houston, Tex., offices and, until his transfer to Detroit, has been located in Washington, D. C.

• **B. M. Staley** has been appointed factory manager of Kaydon Engineering Corp., Muskegon, Mich. For the past 12 years, Mr. Staley has been with the rotary pump division of National Transit Pump & Machinery Co., Oil City, Pa.

• **Albert T. Taylor, Jr.,** has been made production manager for William Allen Son's Co., Worcester. For several years he was associated with Leland-Gifford Co. in production engineering work and prior to that was with the Morgan Construction Co. engineering department.

• **Thomas F. Wilson,** has recently been appointed assistant to senior vice-president **Frederick A. Stevenson** of American Car & Foundry Co. Also **E. J. Finkbeiner,** who has served in the operating department of the company since May, 1922, has been appointed assistant vice-president to Mr. Stevenson.

• **Richard W. Corns** has been appointed assistant general traffic manager of the B. F. Goodrich Co.

• **H. N. Arbuthnot,** formerly assistant general manager of sales of the Allegheny Ludlum Steel Corp., Brackenridge, Pa., has been appointed to fill the newly-created position of regional manager of the Detroit territory of the corporation, with headquarters at the Allegheny Ludlum plant and branch sales office in the Ferndale section of the city.

• **Stanley S. Weiser** of Gas Purifying Materials Co., Long Island City, N. Y., has been made assistant vice-president and purchasing agent for the company.

• **W. O. Franklin** formerly superintendent of the Radford division of Norfolk & Western Railway has been promoted to assistant to the general manager of the railway, and **S. J. Hale,** assistant superintendent of the division has been advanced to superintendent, succeeding Mr. Franklin.

• **Thomas P. Gorter** has been elected vice-president of Pullman - Standard Car Mfg. Co., Chicago. Since 1928 Mr. Gorter has been in charge of the company's Washington, D. C., car sales office and for the last two years he has been an assistant vice-president.

JOHN A. HAGAN and JAMES E. MOREHOUSE, left to right, have been made general manager and assistant general manager of the production planning department, Carnegie-Illinois Steel Corp. as announced in the Jan. 27 issue on page 96. At the same time HERBERT F. BYRNE has been made assistant to the general manager.

• **Lowell F. Whisler** has been made manager of purchases and expediting, and **Glenn R. Evans**, production manager for the Waukesha Motor Co., Waukesha, Wis. Mr. Whisler was with Haynes Automobile Co. and the Indiana Truck Co. before joining Waukesha Motors and Mr. Evans was with Fairbanks-Morse, Beloit, Wis., J. I. Case Co., Racine, Wis., and the General Refrigerating Co. previously.

• **Ralph R. Cheney**, manager of the lamp division of the Westinghouse Electric Co., Milwaukee division, for the last five years, has been appointed metropolitan manager in Chicago. He is Wisconsin chairman of the Illuminating Engineering society.

• **George J. Hubert** has been appointed manager of the newly created contract termination department of Mack Trucks, Inc. Mr. Hubert joined the Mack organization in 1917. In 1940 he went to Mack's Allentown, Pa.. plant to control inventories and act in other executive capacities.

• **D. I. Packard** has been appointed Chicago district manager of the Baldwin Locomotive Works, Philadelphia. He succeeds **Charles Riddell**, who after 61 years of service will continue with the Chicago office as special representative. Mr. Packard, prior to this appointment, served on the WPB assisting in arranging for the production of components for the locomotive construction program.

• **L. W. Schellhammer** has become affiliated with the Cincinnati sales office of the Inland Steel Co.

• **William G. Owens**, recently resigned from the local staff of the WPB after about a year's service, has resumed duties with the sales department of Wheeling Steel Corp., Wheeling, W. Va. He will be located at the general office and cover territory designated as the Columbus district. Also **Virgil C. Dollman** is transferring from the tubular sales division to the Cincinnati district office to cover sales territory to Indiana.

• **Enoch Perkins** has been elected vice-president of the Mutual Chemical Co. of America, Jersey City, in charge of the company's mining and ore department. Mr. Perkins has had wide mining experience. In recent years, in addition to supervising the company's mining operations in New Caledonia, he has visited the South African fields as well as the rich Turkish mines.

• **James Terry** has been appointed district manager of the Cincinnati sales office and warehouse of the Columbia Tool Steel Co. He will take the position which became vacant upon the recent death of **W. G. Sonderman.** Mr. Terry has been connected with the company for several years and now fills the position held for over 26 years by his father, **F. A. Terry**, now retired.

• **Henry Ford II**, already a director of the Ford Motor Co., has been elected a vice-president. He will devote his attention to merchandising and sales, as did his father, the late **Edsel Ford.**

• **F. A. Burley** has been appointed purchasing agent of Link Aviation Devices, Inc.

• **Francis J. Byrne** has retired as assistant director of the Du Pont public relations department, with which he has been associated for 27 years. He has reached the retirement age of 65 years.

Mr. Byrne went to the Du Pont company in February, 1916, when the publicity bureau was established.

• **George E. Westerholm** has been appointed an abrasive engineer for the Milwaukee territory by the Norton Co., Worcester, Mass., where he will assist **F. W. Grant.**

• **James A. Dwyer** has been appointed general manager of sales and branches of Crane Co. with headquarters in Chicago. Mr. Dwyer joined the Crane organization in 1917.

• **Burt W. Wetherbee**, research manager of Globe Woven Belting Co., Buffalo, has been appointed manager of technical services of American Resinous Chemicals Corp., Peabody, Mass.

J. L. WOOD, assistant vice-president, American Car & Foundry Co.

• **J. L. Wood,** since December, 1936, mechanical engineer of American Car & Foundry Co., New York, has recently been appointed assistant vice-president. Mr. Wood has served the company for 38 years, beginning his association in 1906 in an engineering capacity. In 1928 he transferred to the New York office as assistant mechanical engineer in the engineering department, and in 1936 was appointed mechanical engineer.

• **Michael B. Dwyer,** district sales manager in charge of the St. Louis office of the Pennsylvania Salt Mfg. Co., Philadelphia, has retired from active duty with the company.

• **W. Wallace Kellet** has recently resigned as chairman of the board of Republic Aviation Corp., in order to devote his efforts more fully to the affairs of Kellett Aircraft Corp., of which he is president. Mr. Kellett became associated with the present Republic company in November, 1933, as a member of the board and executive vice-president. Re-organizing the company which had less than 200 employees, he was elected president in June, 1939. He continued as president until May 1, 1941, when **Ralph S. Damon** became president and Mr. Kellett was elected chairman of the board.

• **Jean A. Hollander** has been named director of consumer information of the Can Manufacturers Institute, Inc.

• **James N. Morrell** has been made sales manager of limitorque valve control division of Philadelphia Gear Works, Philadelphia, and **Thomas V. Withington** relinquished his position as chief engineer to become assistant sales manager of the limitorque division. **William F. Plume** succeeded Mr. Withington as chief engineer, and **Robert E. Richards** has been appointed assistant chief engineer.

• **Paul W. Polk,** vice-president of the Sheffield Corp., Dayton, Ohio, has been granted a leave of absence to accept a commission as lieutenant in the Navy.

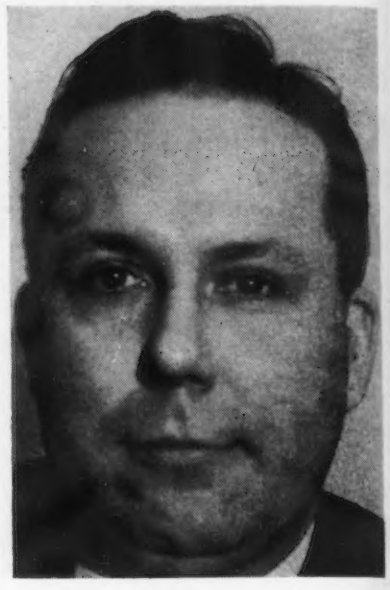
• **John F. Hazen,** for the last 16 years manager of sales of the wire and wire products division of Bethlehem Steel Co., recently retired from active service, because of illness. He is succeeded by **Ralph E. Sharp,** who for several years has served as his assistant.

• **F. W. Wells,** former assistant to the vice-president in charge of production for the J. I. Case Co., Racine, Wis., has accepted a position with A. O. Smith Corp., Milwaukee, where he will be on the staff of President, W. C. Heath.

• **H. R. Loxterman** has been appointed engineer in charge of sales of Blaw-Knox furnace equipment throughout the Middle West. His office will be in Chicago. Mr. Loxterman has been in charge of similar work in the Pittsburgh district and is a graduate of Carnegie Institute of Technology.

• **William J. Massey** has been appointed general lamp sales manager of the Westinghouse lamp division with headquarters at Bloomfield, N. J. In his new position, Mr. Massey will have charge of all lamp sales activities of the lamp division including district sales offices; the illuminating engineering, commercial engineering and advertising departments.

• **Dr. Charles A. Getz,** director of the research division of Cardox Corp., Chicago, has been elected to fill the newly created position of vice-president in charge of research of that company.



CARL L. ZAK has been appointed manager of tubular sales for Pittsburgh Steel Co., as announced in the Jan. 27 issue, page 137.

• **W. M. Stearns,** manager of trade relations and special contracts, General Electric Co., Schenectady, N. Y., retired recently after 39 years of service. Mr. Stearns will be succeeded by **W. A. Sredenschek,** who for the past three years has been assistant manager of trade relations and special contracts. In 1904 Mr. Stearns entered the service of the Fort Wayne Electric Works, a General Electric constituent company which later became a main apparatus plant of G.E. The following year he became manager of the Fort Wayne company's Atlanta, Ga., office, serving in this capacity until 1909. After holding several supervisory positions he was named, in 1927, manager of special contracts in the commercial general department. In 1940 he was appointed to his present position.

• **Noel Poux,** who has been in charge of the plastic research department of Talon, Inc., Meadville, Pa., for several years, has been advanced as manager of the works engineering division of all Talon plants. **C. C. Judd,** formerly manager of the Erie plant, has been promoted to production manager of all slide fastener manufacturing both at Erie and Meadville. **D. Case** has been promoted to general superintendent in charge of the Erie plant, and **M. S. Ramsey** has been promoted to production superintendent, in charge of plant 5, Meadville, slide fastener operations.

• **Howard A. Flogaus** has been elected vice-president in charge of engineering for the J. G. Brill Co., Philadelphia. Mr. Flogaus, who has been with the company approximately five years as chief engineer, has been identified with the motor coach industry since 1924.

• **Robert R. Hirsch** of Bunting Brass & Bronze Co., Toledo, Ohio, has been made director of sales, succeeding **George H. Adams**, recently named executive vice-president of the company.

• **Albert W. Hendrickson** has been appointed director of employee services, in charge of employment and personnel activities, at Farrel-Birmingham Co.'s three plants at Ansonia and Derby, Conn., and Buffalo, N. Y.

• **H. M. Comstock**, for more than 15 years director of sales for the Simplex Products Corp., Cleveland, has been made engineering sales representative of Kropp Forge Co. and Kropp Forge Aviation Co., for the Southern California territory.

• **H. B. Lilley**, formerly assistant chief inspection engineer, has been promoted by the steel and tube division of the Timken Roller Bearing Co., Canton, Ohio, to the position of sales development engineer. He will specialize in the application of mechanical tubing to machine tool products and other engineering applications.

• **Baird Tewksbury, Jr.**, formerly attached to the Houston office of the Jones & Laughlin Steel Corp., in sales work, has been transferred to the Philadelphia office.

OBITUARY...

• **William J. O'Connor**, director of contracts and counsel for the frontier division of Bell Aircraft Corp., died Jan. 20, in Buffalo General Hospital. He was 45 years old.

• **Paul Niegsch**, for more than 31 years a member of the Pemco Corp., died suddenly of a heart attack on Dec. 14.

• **Harvey Hanes**, chief technician of the experimental department of Remington Rand, Inc., died January 21 at his home in Tonawanda, N. Y.

• **David W. Rodger**, vice-president, secretary and sales director of Federal Mogul Corp., Detroit, died Jan. 4. He was president of the National Standard Parts Assn. in 1934-35.

• **Laurence A. Nye**, Buffalo district engineer and sales representative of the Sterling Grinding Wheel Co., Tiffin, Ohio, died January 21 at his home in Snyder, N. Y. He was 58 years of age.

• **Alfred A. Ziegler**, retired manufacturer of railroad signals, died Jan. 17 in Milton, Mass. Born in Switzerland 79 years ago, he came to Boston as a boy and attended Massachusetts Institute of Technology.

• **Arthur H. D. Altree**, vice-president in charge of sales of the American Bosch Corp. until he retired in 1930, died recently. He was born in Manchester, England, 77 years ago.

• **Alfred V. Sims**, University of Pennsylvania graduate and manufacturer of pumps and valves, died at Hamden, Conn., Jan. 21. He was 80 years old.

• **Lyle H. Olson**, outstanding appraisal expert, vice-president and executive committee chairman of the American Appraisal Co., Milwaukee, died recently at his home in New Rochelle, N. Y. He was one of the organizers of the firm and in 1920 moved to New York to supervise the firms' eastern operations and foreign business.

• **Allan E. Hall**, well-known mill machinery authority, manager of the milling machinery department at Allis-Chalmers, Milwaukee, for more than 20 years, died at a hospital there Jan. 17 at the age of 70 after several months' illness. He came with Allis-Chalmers in 1909 with the Seattle district office. He formerly was president of the Cereal Machinery Assn. and of the Multiple V-Belt Drive Assn.

• **Allen N. Bradford**, general manager of the Russell, Burdsall & Ward Bolt & Nut Co. plant at Rock Falls, Ill., died late in December at Sterling public hospital following a few days' illness. Mr. Bradford, a nationally known figure in the industry, had been associated with the bolt and nut business practically all his life.

• **Maxwell R. Berry**, founder and president - treasurer of the Electric Products Co., recently died after a brief illness in a Jacksonville, Fla., hospital.

• **Frank H. Whelden**, 75, secretary of the Detroit Star Grinding Wheel Co., died recently.

• **Mason P. Rumney**, vice-president and director of Detroit Steel Products Co. for 18 years, died recently.

• **John G. Mattes**, organizer and former president of the Standard Sheet Metal Works, Milwaukee, died Jan. 7 in a hospital at Beaver Dam, Wis., where he had lived since his retirement three years ago. He was 78 years old.

• **Edward J. Frost**, founder and president of the Frost Gear & Forge Co., Jackson, until 1939, died recently after a long illness. He was a past president of the American Gear Manufacturers Assn. and the Drop Forge Assn.

• **Lawrence H. Dunham**, assistant manager of the metallurgical department of the American Steel & Wire Co., died suddenly in Pittsburgh, Jan. 19. Mr. Dunham was born in Chicago, Ill., in 1891. He began working for the American Steel & Wire Co. in December, 1916. Mr. Dunham was made assistant manager of the metallurgical department in April, 1942.

• **Alfred Fritzsche**, vice-president in charge of sales of Automatic Sprinkler Corp. of America, died in New York City on Jan. 18 after a long illness. Mr. Fritzsche was 74 years of age and had spent his entire business life in the sprinkler industry.

• **Ernest L. Brandt**, managing secretary of the Engineering Society of Detroit and secretary of the Michigan Engineering Society died recently. He had been active in engineering circles in Michigan for 20 years.

MACHINE TOOLS

. . . News and Market Activities

Cleveland Automatic Converts for Clark Job

Cleveland

• • • **Typical of the steps** machine tool builders are taking to maintain shop volume in the face of failing orders and reduced backlogs is the subcontract now in progress in the converted plant of Cleveland Automatic Machine Co. here. The contract which first came through last August amounts to about $10 million and entails the complete construction and assembly of roughly 3000 Clark Utilitrucks under a patent-free arrangement for the Army and Navy.

To accommodate the construction of these gasoline driven utility trucks Cleveland Automatic was required to reconvert nearly its entire shop. The reconversion required few new tools but meant rearrangement of the shop. This was complicated by the necessity of maintaining partial capacity to produce Cleveland die casters and automatics while arranging a production and assembly line for the new truck contract. Conversion was mainly completed by mid-December and parts are now flowing toward the nearly completed assembly line. Delivery of the first truck is expected about Feb. 1.

Many complications have impeded the production of the product to date including the necessity for redesigning certain parts not obtainable from former Clark suppliers, the necessity for building a large number of jigs and fixtures and copying Clark patterns to insure complete interchangeability of parts.

Illustrating also the complex network of contracts behind each prime product, Cleveland Automatic estimates that in addition to being a subcontractor itself some 33 per cent of its contract has been sub-let.

o o o

WPB Gives Chicago Pneumatic Probation Reprieve on CMP

Washington

• • • **The Chicago Pneumatic** Tool Co., New York, was put on probation Jan. 26 until April 1 after assuring the WPB that it will comply with all WPB orders, including CMP regulations. The probationary order resulted from a hearing on WPB charges that the company had violated controlled materials plan regulations in its Detroit, Cleveland and Franklin, Pa., plants.

According to the WPB, the violations included acceptance of deliveries of materials in violation of CMP inventory regulations and failure to maintain records of CMP allotments.

•

Foote Brothers Report for 1943

Chicago

• • • **In the annual report** for the fiscal year ended Oct. 31, 1943, Foote Bros. Gear & Machine Corp. reports net income of $858,303 after all charges including a reserve of $750,000 against possible refund of profits through renegotiation of war contracts. It compares with net income for the previous fiscal year of $686,114 after renegotiation refunds.

Net sales for the last fiscal year amounted to $26,284,943 compared with $18,368,180 for the previous year. Because of contract price reductions in the current year which cut dollar sales for 1943 by an aggregate of approximately $5,500,000, the sales figures for last year do not fully reflect the increase in production over the 1942 fiscal year, W. A. Barr, president, stated.

All facilities to be furnished by the government, totaling approximately $12,000,000, have now been constructed or acquired. The company has made arrangements for a regulation "V" loan of $5,000,000 which replaces a loan agreement under which borrowings to date have amounted to $2,000,000.

Employees now number 6400 as compared with 2800 a year ago.

60,000 R.P.M. MOTOR FOR MACHINE TOOL INDUSTRY—*This super-fast motor designed by Westinghouse engineers, is used for grinding, polishing and routing metals. Formerly the high speeds necessary for these applications were obtained through use of belts and pulleys. The new motor is induction type and is supplied with power from a 1000-cycle generator. The rotor that turns at 60,000 r.p.m. is 1¾ in. in diameter by 2 in. long. Centrifugal stresses at the surface reach about 15,000 lb. per sq. in.*

•

National Machinery to Build Manville Cold Headers

Tiffin, Ohio

• • • **Movement of drawings** and patterns of the E. J. Manville Machine Co., Waterbury, Conn., to the National Machinery Co., Tiffin, Ohio, is now in progress, but the E. J. Manville Division of National will not begin operations for several months. National acquired the Waterbury concern last November and will produce Manville cold headers and thread rolling machinery under the Manville brand name. None of the machinery is being transferred and National will not operate the Waterbury plant. National produces upset forging machines and bolt making equipment.

•

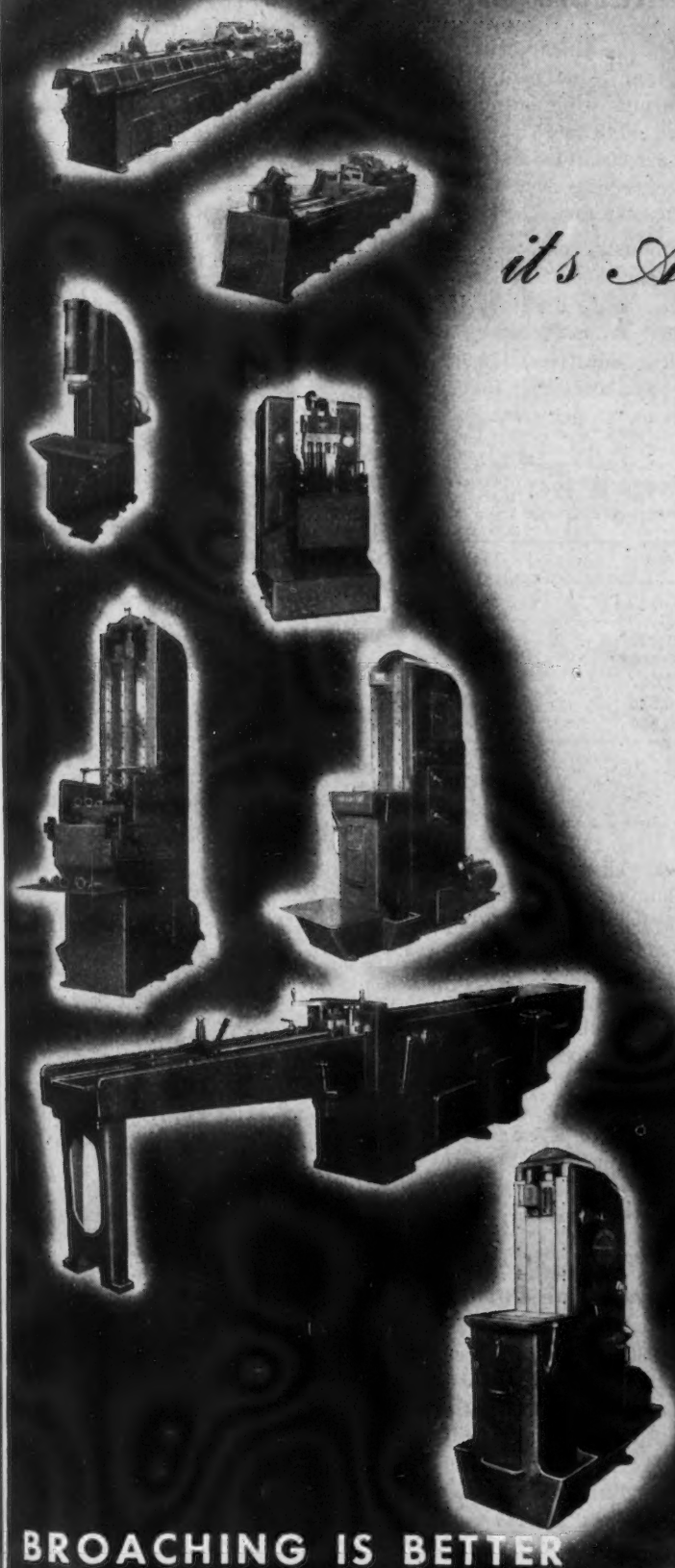
Layoffs Held to Minimum

Cincinnati

• • • **The downward curve** in production of machine tools continues, although some slack in the manufacturing tempo has been eased by conversion to other production and to jobbing contracts. So far, there has not been a sufficient amount of this to take up all the slack. At the same time, manufacturers are loathe to release plant personnel because of hope for improvement in the situation as the year progresses, and accordingly, layoffs are being held to a practicable minimum. Outlook for the industry in this area appears to be optimistic from reports of manufacturers of inquiries that they have received from other industries contemplating reconversion.

THIS AIRCRAFT ENGINE PLANT NOMINATES

it's All-American Team



So high is the production-with-precision obtained by broaching that one machine is ample for most metal working plants. Few have as many as 10 or 15.

Consider, therefore, the importance of this particular aircraft engine plant in the broaching picture, with 91 American machines!

Their personnel *knows* broaching. They know the value of dealing with an old-line company whose principals have been identified with broaching since the turn of the century. They know, too, the importance of a *complete* broaching service—machines, tools, and engineering — for winning war production, profitable post-war production.

Significant is this overwhelming vote of confidence in American Broach equipment.

BROACHING IS BETTER
THE *American* WAY

American
BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN
•
BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

DIVISION OF SUNSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS U.S.A.

NON-FERROUS METALS

. . . News and Market Activities

Bauxite Output in 1943 Sets Record

• • • **Estimates of bauxite** mine production totaled 7,026,040 net tons, more than double 1942's record output of 2,966,221 tons. Data on imports of foreign ore are not available for publication, but imports reached a new all-time record, more than 60 per cent greater than in 1942. Domestic production and imports in 1944 are expected to be considerably less than in 1943 owing to the recent cutback in alumina and aluminum production announced by WPB and to the large stockpiles of bauxite held both by Metals Reserve and private industry.

Production of low-silica bauxite, containing less than 8 per cent SiO_2, totaled 2,329,600 tons while output of high-silica restricted, 8 to 15 per cent SiO_2, reached 4,228,000 tons and non-restricted ore, containing over 15 per cent SiO_2, was 468,440 tons.

The alumina industry used 4, 771,-000 tons or 89.3 per cent of the total, while the abrasive and refractory industries consumed 347,000 tons or 6.5 per cent, chemical industries, 179,900 tons or 3.4 per cent, and other industries 42,100 tons or 0.8 per cent.

Bauxite Output, Shipments and Consumption, 1939 to 1943
in net tons, dried equivalent

From: U. S. Bureau of Mines

Year	Mine Production	Shipments from mines	Consumption	Total Stocks end of year
1939	436,792	420,344	971,000*	**
1940	486,789	491,493	1,200,600*	**
1941	1,049,496	1,001,475	1,928,052	776,231
1942	2,966,221	2,768,343	2,820,525	1,759,597
1943†	7,026,040	6,752,250	5,340,000	4,928,000

* Apparent consumption.
** Not available.
† Estimated.

Collapsible Tubes to be Made

• • • **Plans for resumption** of the manufacture of aluminum collapsible tubes for a wide variety of civilian and military needs, have been announced by Aluminum Co. of America. The release of aluminum for collapsible tubes has been made possible through stepped-up aluminum production, which has now reached a point where there is a growing surplus over and above all military needs.

Conservation order M-115, recently signed in Washington, lists the following products which may now be packaged in aluminum tubes—Ointments and other preparations for ophthalmic use, sulfa drugs in ointment or jelly form, diagnostic extracts—allergens,—morphine for individual dose hypodermic injection, sold directly to the Army or Navy, preparations for introduction into the body orifices, and dental cleansing preparations. Shaving cream is not included in the present order.

The speed of resumption of the manufacture of aluminum collapsible tubes at Alcoa's Edgewater, N. J., works and the blanks which the company will supply to other manufacturers for the making of aluminum tubes, will be determined by the amount of competent help which can be obtained without diverting manpower from essential war production.

Customers are asked to cooperate by holding their immediate demands for aluminum tubes to a minimum and by placing their orders subject to mill schedules determined by the needs of the war program.

•

Canadian Mineral Value Down

• • • **Production in minerals** in Canada during 1943 of an estimated value of $524,426,850 showed a decrease of $42,800,000 for 1942, largely due to reduced output of gold, according to report by the Canadian Bureau of Statistics. The Bureau estimated the value of metals as a group at $357,269,458, down 9 per cent from the year immediately preceding.

The combined value of copper, nickel, lead and zinc in 1943 was $180,271,613, 7.6 per cent more than in 1942.

Another group of strategic metals, including antimony, bismuth, cadmium, chromite, cobalt, magnesium, molybdenite, tin and tungsten, reached $7,079,350 as compared with $4, 338,808 in the previous year.

Others, including arsenic, iron ore, mercury, selenium, tellurium and titanium ore, increased in value to $8,059,002 from $6,132,674.

•

MRC Purchases Be Cu Scrap

• • • **Because beryllium** copper scrap is overcrowding generators' plant facilities, the Metals Reserve Co., through Clifton Products, Inc., Painesville, Ohio, has arranged to purchase such scrap from generators only. These purchases, it was emphasized, will in no way interfere with normal purchases by the producers and approved smelters mentioned in general preference order M-160-a.

Metals Reserve will purchase beryllium copper scrap in accordance with the following price schedule, with freight collect, subject to weighing, grading and analyzing by Clifton Products, Inc.

	Per Lb. Alloy, Wr'ght	Per Lb. Alloy, F'dry	Be Contained Wr'ght	Be Contained F'dry
2 Per Cent Be Content (Cu A 9C*)				
Heavy:				
Grade 1 (uncontaminated)	$.18	$.16	$4.50	$3.50
Grade 2 (for rolling alloy after sorting)	.14	.13	2.50	2.00
Grade 3 (for casting alloy or for rolling after extensive processing	.11	.11	1.00	1.00
Grade 4 (for electrolytic separation)	.10	.10	.50	.50
Light:				
Grade 1	$.14	$.13	$2.50	$2.00
Grade 2	.12	.12	1.50	1.50
Grade 3	.11	.11	1.00	1.00
Grade 4	.10	.10	.50	.50
0.5 Per Cent Be Content (Cu A 9C*)				
Heavy:				
Grade 1	$.1125	$.1075	$4.50	$3.50
Grade 2	.1025	.10	2.50	2.00
Grade 3	.095	.095	1.00	1.00
Grade 4	.0925	.0925	.50	.50
Light:				
Grade 1	$.1025	$.10	$2.50	$2.00
Grade 2	.0975	.0975	1.50	1.50
Grade 3	.095	.095	1.00	1.00
Grade 4	.0925	.0925	.50	.50

*To be corrected to market or OPA ceiling.

Definition of terms used on the attached price schedule.

Grade 1 (uncontaminated): Free of all contamination other than organic matter, corrected to clean weight.

Grade 2: Containing less than 2 per cent of metallic contaminants, including iron, corrected to Be Cu—clean weight.

Grade 3: (A) borings and turnings containing less than 2 per cent of metallic contaminants, including iron, aluminum and aluminum copper.

(B) Punchings and punched strip. Metallic coated or containing less than 15 per cent of all contaminants. Both corrected to beryllium copper—clean weight.

Grade 4: Must have at least 70 per cent distinguishable beryllium copper content.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Alloy Scrap Shipments Decline Mills Buying on Monthly Basis

New York

• • • **Major changes** in the scrap market during the past few weeks have been a tightening up of mills in accepting alloy scrap either mixed or segregated, and closer buying controls. U. S. steel led the field with regard to alloy scrap acceptances by notifying dealers that such shipments were not wanted. Several mills, however, have started buying all types of scrap on a month to month basis, or on 30 to 60-day commitments.

This general trend reflects the continually easing situation with regard to scrap supplies. In many areas, some types of scrap cannot be sold at ceiling prices, and on the West Coast it is reported that melting scrap is bringing $1 to $2 under the ceiling. Plans are being made in that area to ship some of this scrap, mainly from shipyards, back to mills in the Middle West while mills on the coast prefer not to have the material moved out of the district, supplies are accumulating faster than they can be used and mills are unwilling to accept scrap that will make their inventories too large.

Many mills, especially in the western Pennsylvania-eastern Ohio area, have been out of the scrap market completely and are expected to remain out for several weeks to come. This, of course, indicates that stocks are sufficiently large to obviate any necessity for purchased scrap. Supplemented by the constantly recurring home scrap, the current mill stocks are sufficient for current high production rates.

•

PITTSBURGH — Dealers could sell more scrap here if it was available, but there is no extreme shortage at any location. Demand and supply are fairly well balanced, and the lack of tight spots is probably due to the open winter weather.

•

BUFFALO—Scrap receipts were light this week while demand held fairly steady. All items were reported moving but specialties slumped, electric furnaces appearing to be well supplied. District scrap contracts now are being based on 60 and 30-day termination clauses, with unshipped tonnage at the end of each contract period subject to cancellation.

•

CLEVELAND — For the past week largest buyers have remained out of the market locally. Blast furnace demand has fallen off after light buying. Supplies, while small, appear to be sufficient in all grades except cast. Buying is expected to be conducted on a month to month basis for the balance of the year. Local buying is expected to resume toward the middle of February.

•

CINCINNATI—The district scrap market appears well balanced, with consumers showing more interest in taking material. A special improvement in open hearth scrap has been noted, although cast material continues to be sought after by foundries. Alloy items continue to be a surplus on the market. Some of the current buying interest is believed to be stimulated by reports of tightness in other areas, particularly in the east for scrap and local consumers are moving to prevent a pinch to them here.

•

BOSTON—A further drop in supplies of metal working shop scrap emphasizes the quietness of business. The 3000 tons of American Steel & Wire Co., Worcester, scrap was taken by General Scrap. The Worcester mill has bought 100 tons of street car rails from Chicopee at $15.90 a ton f.o.b., or 90c. more than WPB offered for the rails. The WPB has requisitioned a 500-ton state bridge in central Massachusetts.

•

BIRMINGHAM—The scrap market here remains extremely dull and if there is any change in the trend so far as demand is concerned it is downward. There is little movement of material either to dealers' yards or to mills.

•

PHILADELPHIA — Demand for open hearth grades continues high. Several mills here are anxious to build up inventories. WPB's attempt to solve the alloy scrap problem is having little effect since mills have refused to accept the alloys for use in open hearths. U. S. Steel has even notified suppliers that it will not accept alloy scrap whether mixed or segregated. Railroads would like to ask for bids for their scrap rather than the present method of allocation of railroad scrap. Mixed ferrous and non-ferrous scrap was sold by the Navy Yard last week to Max Bailis & Sons at $14.89.

•

NEW YORK—No changes can be noted here. Open hearth grades are readily moved while low phos demand continues to be weak. Turnings containing nickel from Wright Aeronautical have been sold at machine shop turnings price.

Steel mills are well supplied with scrap. Several companies report additions to stock piles during January. Commitments by mills do not extend beyond a month or six weeks.

Better Scrap Segregation Urged

•**COLUMBIA STEEL CO.'S** *drive to improve scrap segregation resulted in these photos of the "good" and "bad" examples. The "bad" shown above, slows charge, impedes production and contaminates heats.*

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Co. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.00	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	18.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.; at Memphis, 50c.; Great Lakes ports, $1; New England, $1.25. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.00	24.00	24.25	24.50
Chicago, Philadelphia Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21 00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

	BASE PRICE SEGREGATED Solids, Lb. Cont. W	Turnings, Lb. Cont. W	BASE PRICE UNSEGREGATED SOLIDS	BASE PRICE UNSEGREGATED TURNINGS
Type 1	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2	1.60	1.40		
Type 3	1.25	1.25	$1.15 per lb. contained W if over 1% and less than 5%.	$1.00 per lb. contained W if 1% and less than 5%.
Type 4*	0.125	0.105		
Type 5*	0.135	0.115	$0.80 per lb. contained Mo if 1½% or more.	$0.70 per lb. contained Mo if 1½% or more.

*Per lb. of scrap material.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 1, 1944	Jan. 25, 1944	Dec. 28, 1943	Feb. 2, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 1, 1944	Jan. 25, 1944	Dec. 28, 1943	Feb. 2, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 135-147.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Feb. 1, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia[a]
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2 10¢	2.20¢	2 10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3 05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3 60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3 35¢		3.45¢	3 35¢		4 00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4 55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2 10¢		2 75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2 80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2 95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 } Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 } Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3 05¢						3 15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2 15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2 50¢	2 80¢	2.25¢	2. 49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2 15¢	2.15¢	2.15¢	2.15¢					2 50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2 15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2 15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)		(Weirton = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢) 2.35¢		2 45¢	2.65¢	2.32¢	2 29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢a	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢e	2.10¢	(Bethlehem = 2.10¢)				2 45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[6]	$5.018[a]	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$8.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	8.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.837	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.004	3.70	5.90[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.78[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.857	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.61[315]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.33[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ 25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ 60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.... $54.80
6-in. and larger, del'd New York... 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

Per Gross Ton

Old range, bessemer, 51.50 ..... $4.75
Old range, non-bessemer, 51.50..... 4.60
Mesaba, bessemer, 51.50 ..... 4.60
Mesaba, non-bessemer, 51.50 ..... 4.45
High phosphorus, 51.50 ..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

WE'RE SEEKING

JUST THE RIGHT MAN TO HIRE AS

SUPERINTENDENT

One of the leading and long established small arms manufacturers of America wants a plant superintendent of outstanding ability. We are looking for a man who will strengthen our organization and play a major part in our post-war operation for which we contemplate a permanent personnel of approximately one thousand workers. Our plant is located in New England.

The man we want must have the experience, background, and proved ability for this highly important position, for which we will gladly pay an ample and commensurate salary.

In applying, state in detail your experiences, education, age, condition of health and other points we ought to know about you. Please include references and, if convenient, your photograph. All applications will be considered as strictly confidential.

APPLY BY LETTER ONLY

ADDRESS BOX B-166

Care *The Iron Age*, 100 E. 42nd St., New York 17

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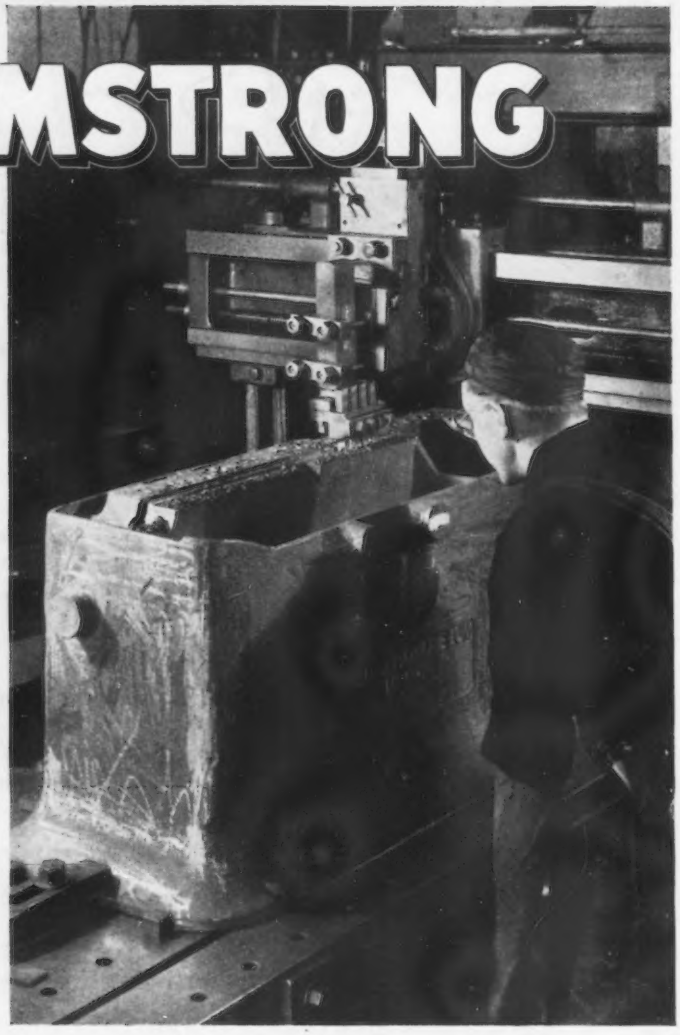


Make each planer do the work of two . . . each ounce of high speed steel, the work of ten

● To double your output on planers use ARMSTRONG Gang Planer Tools that reduce surfacing time from 50 to 75%. To make your high speed steel go farther, use ARMSTRONG TOOL HOLDERS that "Save: All Forging, 70% Grinding and **90% High Speed Steel.**" (Tests carried out covering some of the largest plants have proven that the saving in high speed steel is even in excess of "90%").

There are ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers, and for many operations on turret lathes and screw machines. Each is a permanent multi-purpose tool that does the work of a complete set of forged tools. Each is a stronger, more efficient tool than can be forged and will stand up to the highest speeds and heaviest feeds. Each makes an ounce of high speed steel go as far as 10 ounces will go in a forged tool.

Use ARMSTRONG TOOL HOLDERS wherever possible. On all types of work, the heaviest as well as the lightest, they save man-hours, increase machine tool output and cut high speed steel requirements to a tenth.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. FRANCISCO AVE. CHICAGO 12, U. S. A.

Eastern Warehouses & Sales Office: 199 Lafayette St., N. Y.

Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

•Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $34.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

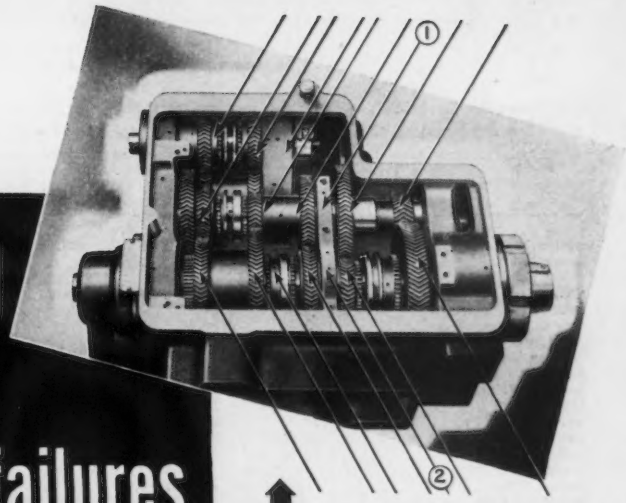
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.



Headstock of Sidney Lathe. Numerals 1 and 2 point to center bearings; other arrows indicate 14 Ampco bushings in the gears.

Guarded against costly failures

. . . with bushings and center bearings of wear-resisting Ampco Metal . . .

When you buy machine tools or other heavy equipment, it pays to look for parts of Ampco—the metal that stands up and gives several times the life of ordinary bronzes. Used by over 90 leading machine tool manufacturers.

Ampco is not an ordinary alloy, but a special metal produced by an engineering and research staff of metallurgical specialists under strict laboratory control, and applied with the cooperation of the national organization of Ampco Field Engineers. The range of Ampco grades provides unusual combinations of physical properties to resist wear, corrosion, shock, etc.

Send for bulletins which will aid you as a buyer and user of machinery — or let us help you specifically with your design problems. Write today.

Design for wear resistance —at lower cost with welded overlays of

AMPCO-TRODE

For bearing surfaces and other points subject to constant wear, corrosion, or other severe conditions, it is often unnecessary to provide a solid piece of wear-resisting metal. Ampco-Trode coated welding rod is widely used to overlay such surfaces with a deposit of Ampco Metal which gives the same result at a fraction of the cost. Any grade of Ampco can be welded to practically any other metal. 5 grades to meet your special requirements.

Write for bulletins.

For replacements

When you experience the failure of bronze parts—perhaps installed years before Ampco became widely known — replace them with Ampco. Ask nearest Ampco Field Engineer for suggested procedure and Ampco Metal stock list to meet the specific needs of your Maintenance Department.

Ampco Metallurgical Specialties

Ampco Metal (a special alloy of the aluminum bronze class) . . . Ampcoloy (general industrial bronzes) . . . Special Custom Copper-base Alloys.

• • •

Sand Castings . . . Centrifugal Castings . . . Extruded Products . . . Precision Machining . . . Ampco-Trode (coated aluminum bronze welding electrode) . . . Ampco Non-Sparking Safety Tools.

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Please send ☐ File 41—Engineering Data Sheets
☐ Ampco-Trode Bulletins
☐ Information on Maintenance Uses

Name..... Position.....

Company.....

Address.....

City..... (.....) State.....

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston (3)	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (5)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass (3)	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (4)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company. Effective Feb. 1, 1944, Mystic Iron will be sold without the above OPA price relief grant of $2 per ton.

(4) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(5) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	$3.15

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham: spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

How Amsco Met Requirements for Easy Machining Non-Magnetic Alloy Parts.....

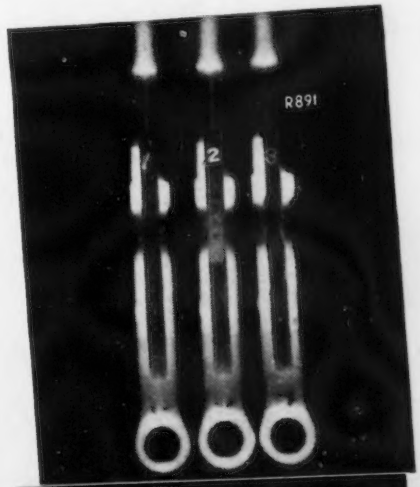
Non-magnetic parts having high tensile strength were required for special tractors. Amsco received an inquiry for a quantity of steering lever sets, with austenitic manganese steel specified; but the large amount of machining required ruled this metal out as the extreme toughness which gives it its durability also makes manganese steel difficult to machine with tools.

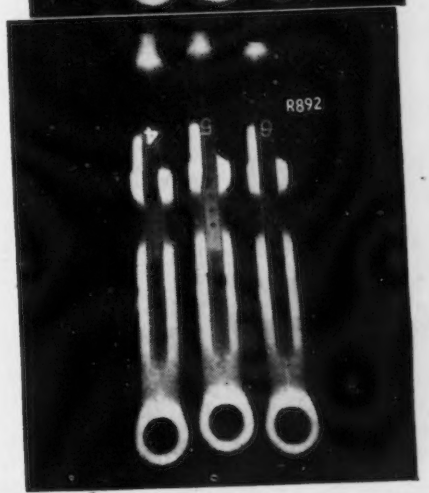
Amsco Alloy F-8N, a variation of the well known 18-8 grade of chromium-nickel alloy, having a magnetic permeability of approximately 1.003, was found satisfactory for these parts.

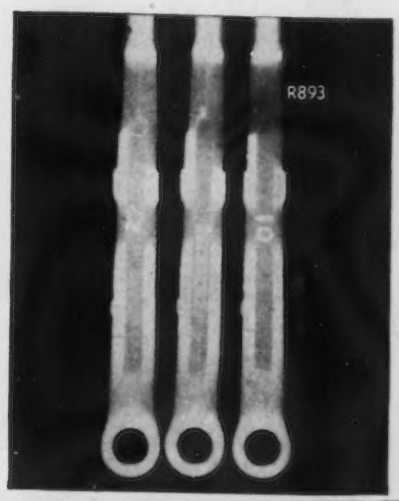
Small areas on each casting were to be flame-hardened (on the original cast steel specification). As it is not practicable to harden this particular grade of Amsco Alloy, a special hard-surfacing welding rod was developed by Amsco for the job. The castings were then coated on the required areas with this rod, before finish grinding.

Pictures R-891, 892 and 893 are reproductions of radiographs showing progressive stages in chill and heading practice to prevent shrinkage in the lever castings. The problem in producing these castings was the necessity of exceptional soundness. The shrinkage voids shown in R-891 and 892 were finally obviated (as seen in R-893) by various expedients that concentrated the shrinkage areas in a position where a feeder head could supply the necessary metal.

Inquiries regarding unusual requirements are always welcome at Amsco.







Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
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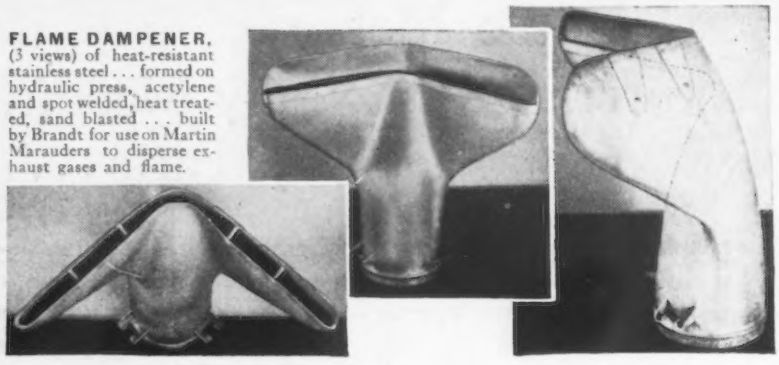

FLAME DAMPENER, (3 views) of heat-resistant stainless steel . . . formed on hydraulic press, acetylene and spot welded, heat treated, sand blasted . . . built by Brandt for use on Martin Marauders to disperse exhaust gases and flame.

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Eastern Office: 114 Liberty Street, New York 6, N. Y.

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn: penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher or 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(Per gross ton, delivered, carloads, bulk)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

PRICES

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. producer's plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. or more	$1.90
Ferrovanadium, 30-35%, contract basis, f.o.b. producer's plant, usual freight allowances, any quantity, per lb. contained vanadium.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroborom, contract basis, 17.50% borom minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$6.25
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.
Less ton lots	9.75c.

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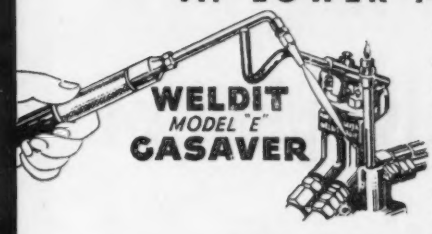
AT LOWER PRODUCTION COSTS



The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

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How many WORDS in a speech?

Usually too many, we think. We're not very long on words here at Dunbar's. Springmaking is our business and we prefer to stick to it. We'd rather show you how your spring may be improved, perhaps at lower cost—or possibly at savings in assembly time. We like to work on new spring developments, too. It's sort of a hobby with us.

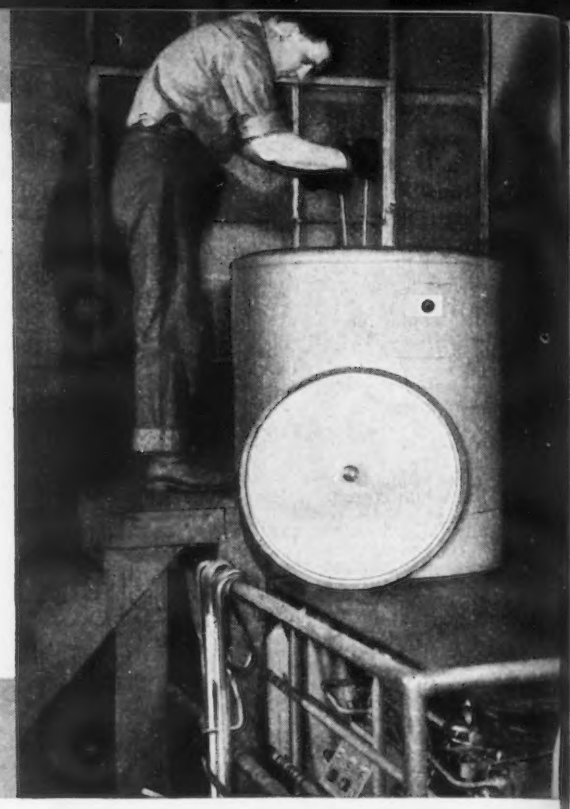
Good spring action speaks louder than words!

DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.
Division of Associated Spring Corporation

COLD TREATING now permits salvaging of broken cutting tools!



Chilling in Deepfreeze at -120° F., After Brazing Operation, Restores Original Hardness to H.S.S. Formed Cutter...

The 8¾" x 1¼" special formed milling cutter shown above was broken in two in a prominent machine tool manufacturer's plant.* Ordinarily this expensive tool would have been scrapped because welding or brazing would soften the cutting edge. However, this company had previously hardened tool steels by chilling in a Deepfreeze, and thought it possible to restore hardness to the cutting edges of the brazed tool. After a brazing operation and sharpening to its original form, the cutter was chilled at −120° F. for two hours in a Deepfreeze Cascade −120° F. Industrial Chilling Machine. The result was that the original hardness of the teeth at the point of the weld was restored.

Now with this new method of treating welded and brazed cutting tools it is no longer necessary to scrap all broken tools. If it is possible to restore a broken tool to working condition by welding or brazing, cold treating will return the cutting teeth at the point of weld to their original hardness. Thus it is often possible to salvage expensive tools that otherwise would be scrapped. In addition, production delays and costly machine downtime are eliminated.

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Let Deepfreeze engineers assist you in obtaining the advantages of cold treating. Send an outline of your problem together with parts or prints for a preliminary analysis or test. There is no obligation.

Deepfreeze

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NORTH CHICAGO, ILLINOIS

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFICE

Industrial Chilling Equipment for Shrinking, Testing, Hardening and Stabilizing Metals

Division of Motor Products Corporation, Detroit, Michigan

The
IRON AGE

ESTABLISHED 1855

o o o

FEB. 10, 1944

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President and Editor

C. S. BAUR
Vice-President and General Manager

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A. H. DIX
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Jobs for Disabled Soldiers

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America will owe these boys more than that. It will owe them an opportunity to make a living. They will expect that and rightly so.

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The question arises as to whether government or private industry should take these boys in hand and try to fit them for doing useful work. I personally think that this is a job and a responsibility for private enterprise. It knows more about the work that it needs to have done than does government and is better fitted to train these boys for that work.

Due to the great advances in industrial mechanization, the opportunities for fitting partially handicapped people into industry are now almost unlimited. Brain today is a much greater industrial employment asset than is brawn.

One of the psychological hurdles in this is the attitude of the crippled soldier to himself. If he is led to believe that nobody wants him it is just too bad. If, on the other hand, he is led to believe that the loss of an arm or leg entitles him to a sinecure job for life, that is too bad also. Somewhere in between is the answer.

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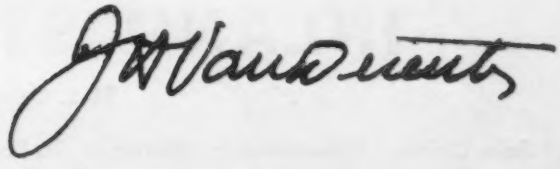

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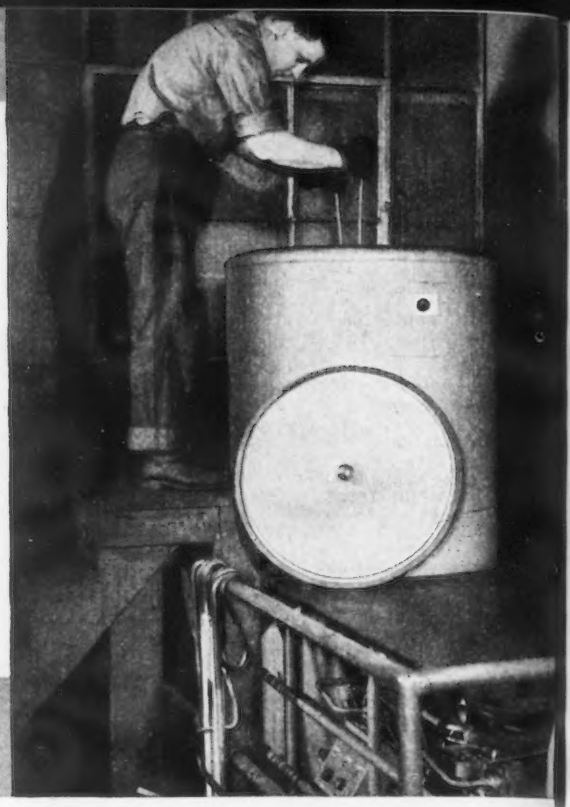

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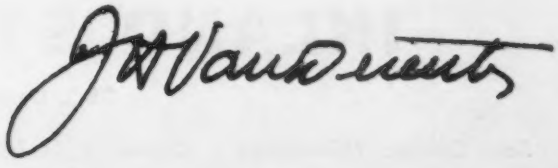
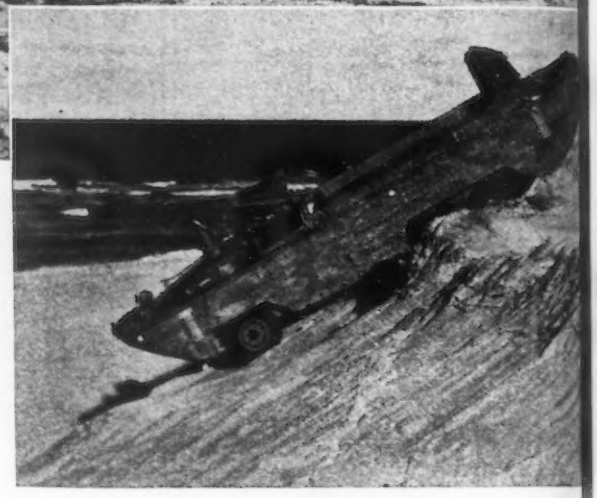
That is a job for every American employer to undertake right now. You are proud of having turned out material with which to win the war. Be ready to be even prouder of having arranged to take into your factories and offices those who have really sacrificed to win the war.





"Ducks" Made of Inland Steel

Our fighting men call this 2½-ton amphibian truck the "duck", because it travels equally well either on land or in the water. Its water-tight steel hull encases the frame assembly below which are mounted the springs, brackets, and wheels—it is a motorized boat on wheels. In the water the "duck" is driven by a rear mounted propellor.

At battle fronts these seagoing trucks serve our fighters by establishing beach heads and bridge heads, by carrying men and supplies from ocean freighters—across beaches, lakes and rivers to inland depots. They are used in reconnaissance work in coastal waters, and over land where roads and bridges do not exist. They can often be seen pulling artillery into position.

Inland Steel Co. supplies thousands of tons of plates and sheets used in the construction of these unique amphibian trucks—or "ducks." Other large tonnages of flat rolled products move daily from the Inland mills to builders of many types of transport, such as ships, trucks, barges, etc.

When the war is won steel from Inland will again be used to fill the peacetime transportation needs of the country.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Sales Offices: Milwaukee • Detroit • St. Paul • St. Louis • Kansas City • Cincinnati • New York

The IRON AGE
FEB. 10, 1944

NEWS FRONT

► This year's quota for Lake Superior ores has been set at 90 million gross tons by WPB's Iron and Steel Advisory Committee.

► Attacking the WLB because it considers each labor problem individually rather than a segment of the broad labor panorama, UAW has promulgated a counter-plan of equal pay for equal work. Brought out at General Motors negotiations, the union has divided skills into six general classifications with equal compensation in the various plants.

► Aircraft electrical systems have undergone continuous evolution. Early planes used a 6-volt d.c. system, patterned after the automobile. Larger and larger planes led to the adoption of 12-volt systems and later to 27-volt d.c. now in wide use. Very large bombers now in production have such large power requirements that a 400-cycle, 120-208 volt a.c. system has been adopted.

► Recent German hit-and-run raids against English coastal towns were over so fast that 6 sec. was the average time for a Bofors engagement.

At first gunners were shaken by this new technique, but batteries were changed round and crews given physical training to fit them for split-second reactions. Now the gunners are again bringing anti-aircraft scores up to previous levels.

Another outstanding feat of British A.A. gunnery was the destruction of a Me 109G photographic reconnaissance machine flying at an altitude of seven miles over Portsmouth. Mixed batteries of 3.7 and 4.5 guns brought this plane down.

► An electrically-induced protective coating for magnesium alloys, said to make these alloys as non-corrosive and abrasion resistant as aluminum alloys, has been announced by Consolidated Vultee Aircraft Corp. The finish is very smooth, and there is a possibility that dyes can be introduced into the solution with subsequent production of a wide variety of colors.

► On Feb. 3, the first open hearth furnace of the Geneva Steel Co. was charged. Two more of the 225-ton basic open hearths will be brought into production at weekly intervals.

Also scheduled for starting in February are 63 by-product coke ovens.

► Home-made 45-lb. rails are now being produced for Brazilian railways at the Compania Siderurgica Belgo-Mineira plant. Rails heavier than 65 lb. will be made when the new National Steel Co. of Brazil plant is completed.

► The power of rumor! A month ago the Port of New York Authority received a letter from Syracuse University asking, "if there is any truth in the published story that green coffee is being dumped in New York Harbor to such an extent that navigation is impeded."

► The German State Police recently announced they were searching for 40,000 deserters.

Award of Germany's top medal, the Ritterkreuz (the Knight's Insignia of the Iron Cross, corresponding to the Pour le Mérite of the 1914-18 war) progressively declined during 1943, particularly for the Luftwaffe. In 1940 fighter pilots got the award after 30 air victories; a year later, when the Russian invasion had started, the minimum number of "kills" was fixed at 50; while today the "kills" seem to vary between 100 and 150.

Furthermore, German papers have recently complained that too many of the awards are going to generals and staff officers, or what is called the "chairborne forces."

► Vitallium, an alloy developed in halcyon days for denture casting and orthopedic applications, is now being cast to form GE turbosupercharger buckets.

From a metal master pattern, made by conventional machining methods, a bismuth split mold is cast sufficiently oversize to allow for shrinkage. Into this mold, wax is injected. These wax patterns are then embedded in a refractory investment and later melted out, leaving a cavity into which Vitallium is poured under pressure.

By this method, castings weighing up to 1 oz. and requiring a tolerance of 0.005 to 0.010 in. are now being produced on a mass production basis. Castings as large as 5 lb. are being tried.

Applications to both old and new alloys impossible to forge or machine are foreseen for precision casting.

Precision Castings of Turbosupercharger Buckets

. . . War's demand has created a commercial application for a technique used heretofore only in the dental and surgical appliance field. Small buckets for the G.E.aircraft turbosupercharger are now being made by the million out of a non-ferrous alloy called Vitallium that is difficult to machine and forge. The author describes the history of the development of the investment casting technique for this metal and illustrates the various steps in the process of making precision castings from wax patterns, the so-called lost wax process.

o o o

By ALBERT W. MERRICK

Chief, Research Department,
Austenal Laboratories, Inc., New York

o o o

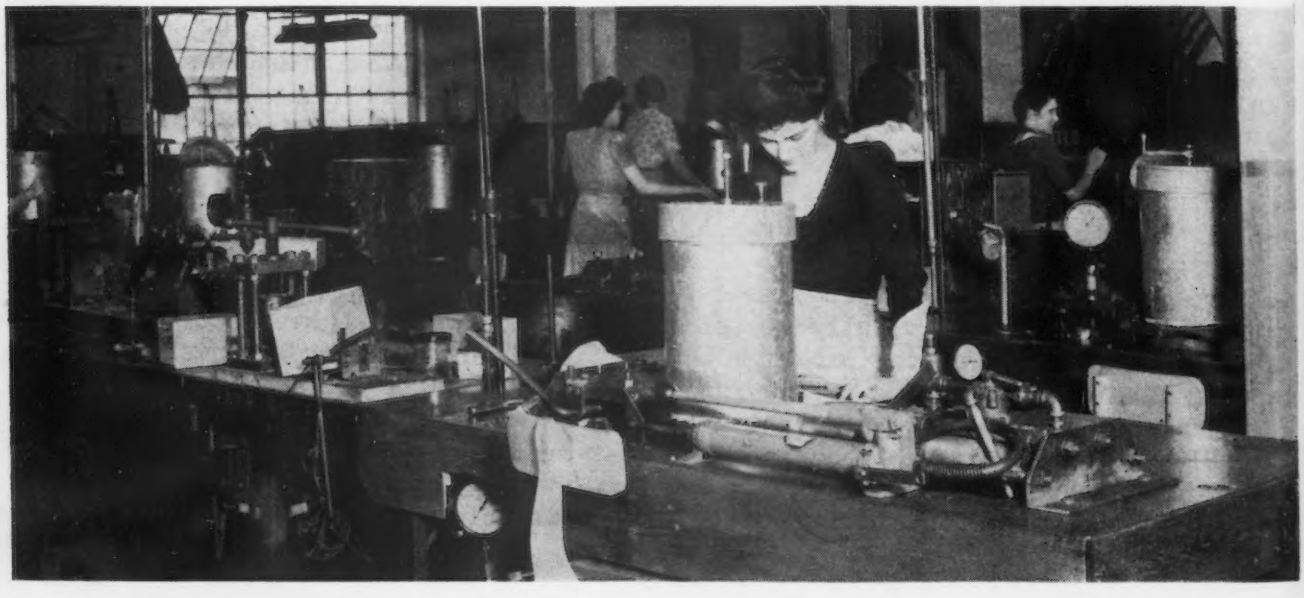
DURING wartime, many technological advances are made and the tempo of changes in techniques and methods of manufacture is greatly accelerated. Often these methods have been known and used in limited applications but not until the stress of war production are they more widely introduced and used. Such is the case of the development of precision casting, known variously as investment casting, the "lost" wax process or the dental wax process.

In the first world war, the airplane played a relatively minor part, but in the present global conflict it is playing a major role. Present conditions call for routine flight at altitudes unapproachable, even as a stunt, prior to about 1920.

The application of supercharging made flight at high altitudes possible, and the General Electric turbosupercharger has been the device most prominent in the attainment of the ever mounting ceiling altitudes. The turbosupercharger uses as a source of power the stream of incandescent exhaust gases from the engine and the turbine buckets are subjected to a combination of relatively high temperatures and stresses, vibratory and tensile, the latter due to centrifugal force.

The writer was associated with some of the metallurgical phases of the problem of alloys for certain of these applications in the late 20's. At this time, several alloys were made that had good properties at high temperatures, but were virtually un-

FIG. 1—View of the waxing department of the War Products Division of Austenal Laboratories, Inc. The girl in the foreground is forming the wax patterns for producing G. E. turbosupercharger buckets of Vitallium alloy by the investment method. The molds are made in split halves of a special alloy from a master pattern and provide for five buckets. Wax formulation and proper temperature and pressure control are essential in obtaining a precise wax pattern that will not deform during later handling.



DR. SANFORD A. MOSS, who has pioneered in the development of the turbosupercharger at General Electric Co. Precision casting of the individual buckets of the gas turbine end of the supercharger illustrated is the subject of the accompanying article.

Development of the G.E. Turbosupercharger

The father of the modern turbosupercharger, which is responsible for putting our bombers and fighters up in the stratosphere, is Dr. Sanford A. Moss of the General Electric Co. By coincidence, he began studying the basic problem of the gas turbine as a project for his doctor's thesis at Cornell University in 1903, the same year that the Wright brothers made their historic flight at Kittyhawk. Dr. Moss continued his research on the gas turbine with General Electric and also played an important part in the development of the centrifugal compressor which could be directly connected to the wheel of a turbine operating on the exhaust gases of an internal combustion engine.

The next significant step in turbosupercharger development took place in 1917 when the National Advisory Committee for Aeronautics asked General Electric to undertake the development of turbosuperchargers for lifting the "ceiling" of fighting planes, which even by that time were being operated at altitudes as high as 20,000 to 24,000 ft. The first such unit was installed on a Liberty engine in 1918 and was tried out experimentally on Pike's Peak (elev. 14,109 ft.) At that altitude a 350-hp. Liberty engine could deliver only 230 hp. With the turbosupercharger, the output was stepped up to 356 hp. That same year a plane was flown at 18,400 ft. with a turbosupercharged engine and by 1920 the ceiling had been pushed up to 38,180 ft. and a year later to 40,800 ft. General Electric's development of the turbosupercharger continued in cooperation with the Army Air Corps engineers during the 1930's and today it has become standard equipment for most of our high-altitude fighters and bombers.

When production of superchargers began to grow in 1939, a forged dovetail type of bucket was being used, made of special Cyclops alloy 17W, which was the best material for the high temperature service required that G.E. knew of at the time. Although this material at 1600 deg. F. would stand the stresses imposed at the standard rated speeds of two styles of impellers, in cooperation with the Army Air Forces every effort was made to develop bucket materials with greater strength at this elevated temperature so that superchargers could be run at a higher speed. By thus increasing the air pressure in the manifold, the planes could be operated at higher altitudes. Improved strength of bucket materials was also desired to obtain longer service life of the bucket.

The precision casting of supercharger buckets made of Vitallium alloy was worked out with Austenal Laboratories, Inc., and is described in the accompanying article. Tests have proved that superchargers with Vitallium buckets could be operated at higher speeds resulting in gains of 3000 to 5000 ft. in the altitude at which planes can be flown at full power.

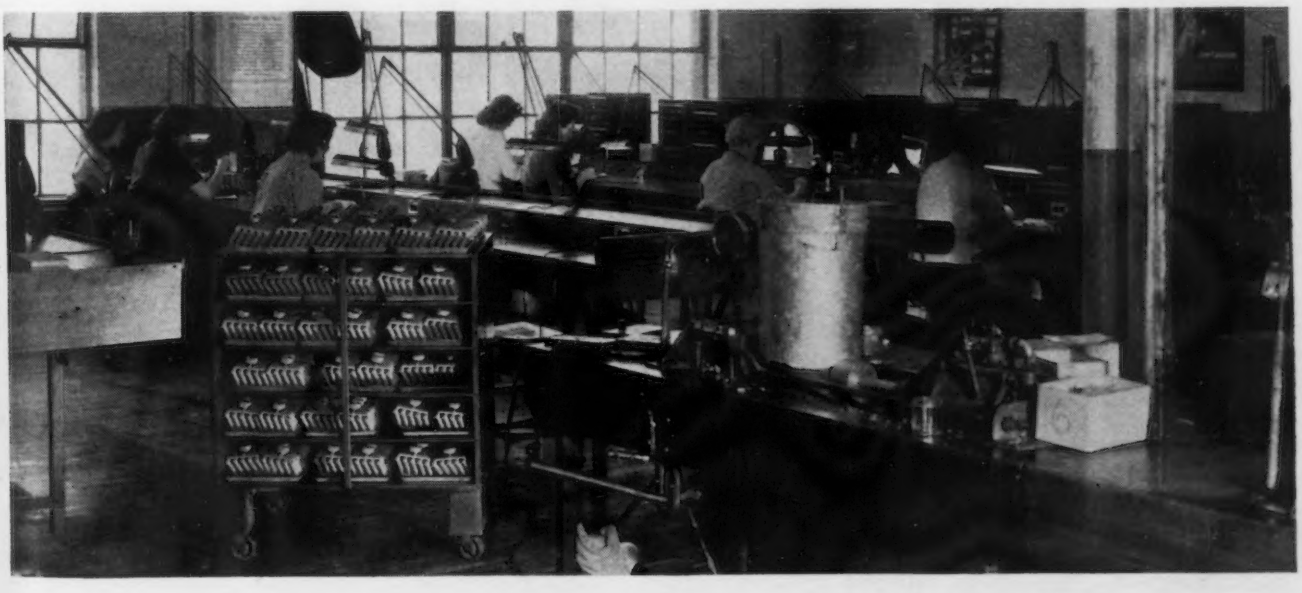
Originally the change to cast Vitallium was made using the same conventional dovetail or roll-and-neck design as employed with the forged bucket. Holding the same tolerances in the cast dovetail as for the machined bucket proved difficult and the drilling and slotting of over 100 holes was costly and consumed many manhours. The next logical development was the use of cast Vitallium buckets with the base so designed that they could be automatically welded to the rim of the wheel. (Fig. 10.) This technique has progressed to the point where today the majority of turbine wheels made have welded cast Vitallium buckets which not only provide for improved performance at high altitudes but also greatly reduce the number of manhours required to manufacture a wheel.

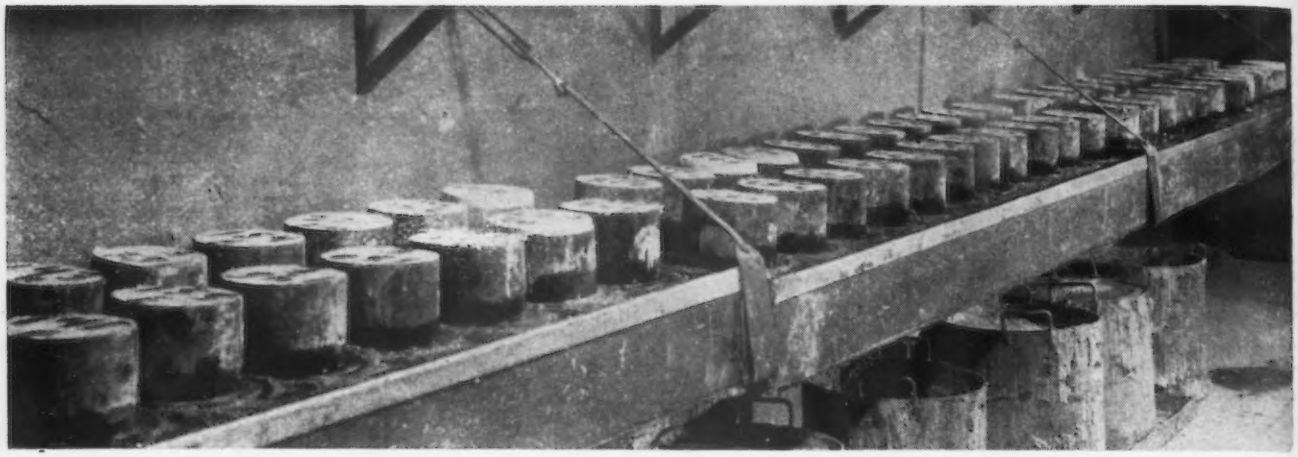
forgable and machined with great difficulty. Casting was considered, but small parts of special alloys, weighing less than 1 oz. in weight, just did not fit into the techniques and equipment of the existing state of the casting art at that time.

In 1933 the writer joined the organization of Austenal Laboratories, Inc. This corporation grew out of an older company, Erdle & Prange, founded by Reiner W. Erdle and Charles H. Prange, who are now president and vice-president respectively of Austenal Laboratories, Inc. This firm was engaged primarily in the dental field at this time and had developed alloys in conjunction with Haynes Stellite Co. Austenal further developed and patented an alloy for denture work, called Vitallium,* that was meeting with unprecedented success in the form of small castings for the construction of full and partial dentures. Vitallium is a cobalt-chromium-molybdenum (or tungsten) alloy, with a melting point of approximately 2500 deg. F., which is 750 to 1000 deg. F. above that of the customary gold alloys used for similar dental applications.

*Registered trade mark of Austenal Laboratories, Inc.

FIG. 2—Another view of the Austenal waxing department. Girls at the benches are connecting with runners four sections of wax patterns and are attaching the riser, which is formed separately from the bucket pattern sections. All that is needed for wax pattern assembly is an electric iron.





ABOVE

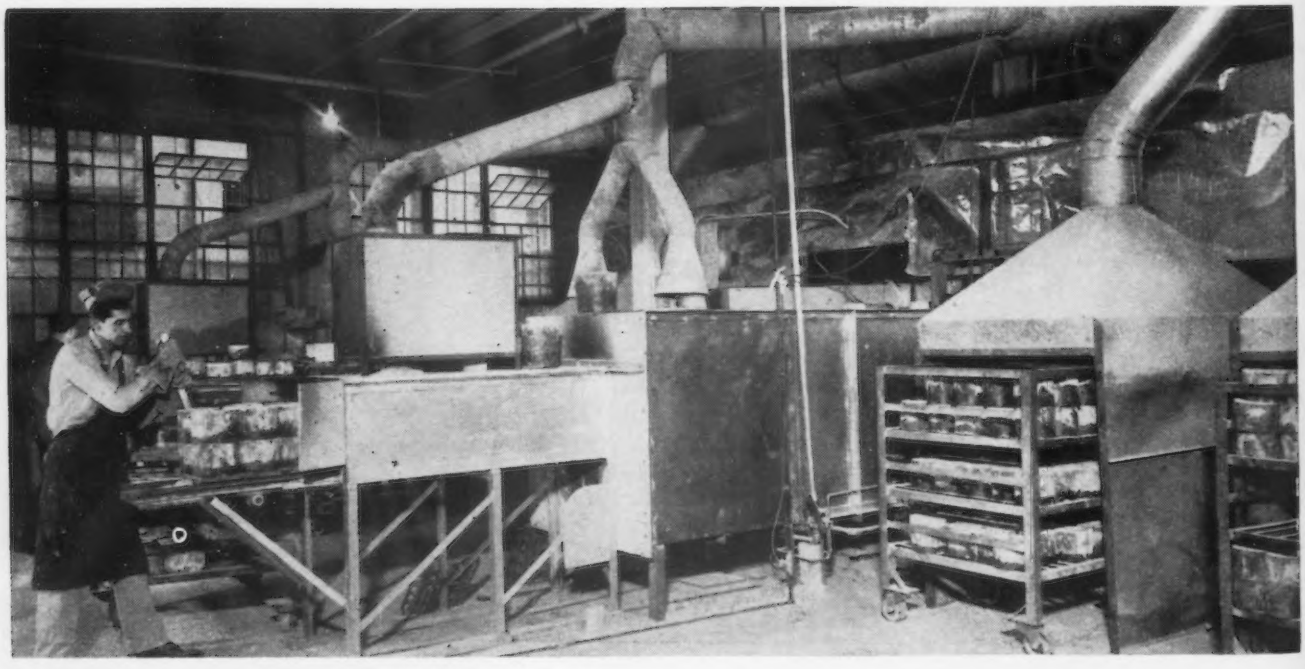
FIG. 4—Over these steam tables the flasks or cases are inverted, allowing the wax patterns to melt and run out, to be collected in the large buckets below. The wax can be reclaimed and used over many times.

LEFT

FIG. 3—Here the investment material, which contains a highly refractory sand, is poured around the wax molds in elliptically shaped flasks or cases made of a high nickel-chrome alloy. Facing material is first applied on the wax patterns and allowed to dry, depositing refractory material in fine crystalline form (see racks at rear). The investment sand is being mixed at the right in buckets or troughs. After the flasks are filled with what appears to be a wet cement, they are vibrated mechanically on the tables shown in the foreground.

BELOW

FIG. 5—In this battery of gas-fired furnaces, the flasks are baked at temperatures rising above 1800 deg. F. at the discharge end. Here a worker is shown racking a tray load of flasks into the charging end of the furnace. This action pushes the whole line of trays forward. Cases are upside down to keep dust out of molds. At the right is an exhausted booth for drawing heat off poured molds.



In order to produce sound, smooth castings from such an alloy, a totally new technique was devised, employing highly refractory mold materials, called "investments" in the dental field, that were suitable for the alloy.

Denture Casting Technique

In the making of a denture casting, a model is first formed by pouring the investment into an impression. This is removed when the "set" has taken place and on this model, a wax pattern for the casting is executed by hand, by a highly skilled technician. Sprues are attached and the model placed in a flask (metal ring) and more of the investment poured over it. After this has set, the mold is dried, placed in a furnace and gradually heated to some temperature above the red range, often as high as 2200 deg. F. The wax melts out in the early stages and the heated mold is taken out and cast by one of several methods, usually centrifugally or by air pressure.

The possibilities of this process for other forms of castings naturally appealed to one whose prior experience had been entirely in the industrial field. The problem of turbine buckets from refractory alloys for superchargers suggested itself but there was little development work of this kind going on at this time.

Austenal, however, had certain applications of its own, for which special techniques and equipment were developed, and various types of castings, other than dental, were made from time to time. Using these techniques, for example, dies were cast for use in molding ceramic parts and also dies for use in molding plastics by compression. Some castings made were as large as a die for a one piece molding of a small table model radio cabinet, others were only a fraction of an ounce in weight.

By 1934 a complete technique for the casting of Vitallium finger rings was developed and for some years these were made on a small scale as novelties. These had such an appeal on account of their clean-cut detail and finish that a regular business developed in rings which hit its seasonal peak for the Christmas trade each year. This department flourished until the demand for strategic metals during the war cut it off.

Concurrently with these developments was another that from small beginnings was destined to occupy an important place in Austenal's prewar business activities.

A Texas dentist, Dr. Taylor Wheat, who was an enthusiastic user of Vitallium alloy in partial denture practice, had an orthopedic surgeon friend, Dr. Charles S. Venable, who was interested in research on the effects of metals on bone. Plates and screws of most metals are very irritating to bone and tissue and for this reason were never widely employed in the fixation of fractures. When used for fixation of a long bone in the limbs of the body, the simple elemental metals like gold or silver are too weak for the mechanical stresses. On the other hand, the alloys that are sufficiently strong are chemically attacked by the fluids of the body and this leads to unpleasant and sometimes dangerous reactions at the fracture site.

Dr. Wheat suggested to Dr. Venable that he try Vitallium screws in the dogs being used for the experiments in this research. Vitallium proved to be just "what the doctor ordered" and what he and thousands of his colleagues continued to order in increasing amounts from that time on. Plates, nails and screws soon became a standard line and many other parts have been added to the catalogue since. By 1937 the preliminary cases had been under observation sufficiently long to justify all the hopes for Vitallium in orthopedic applications, and it was announced commercially to the surgical profession by means of advertising in the orthopedic surgical journals.

All these things, dies for plastic and ceramic molds, finger rings, orthopedic appliances and other incidental items were cast out of Vitallium by Austenal's techniques. The possibilities of other applications were realized, but Austenal's expand-

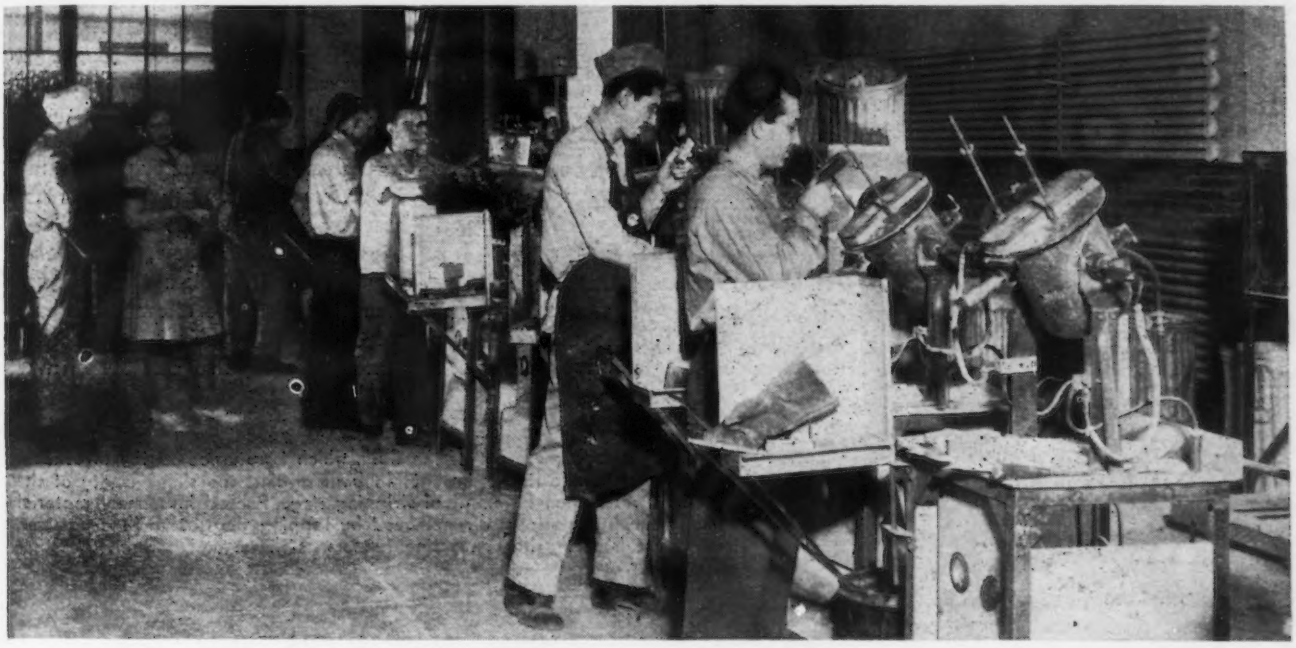


FIG. 6—Battery of 12 small tilting electric casting machines in which the Vitallium alloy is melted at 2900 deg. F. Red hot flasks are removed by tongs from the baking ovens, just out of sight to the left and are clamped to the top of the furnaces which are a special Austenal patented design. By rocking the furnace 180 deg. on its trunnions the entire charge (less than 2 lb.) is dumped into the flask. Air pressure assures a full mold and absence of blowholes. The third man from right has just poured a mold and brought it back to unloading position. Girl is handling optical pyrometer for checking heats.

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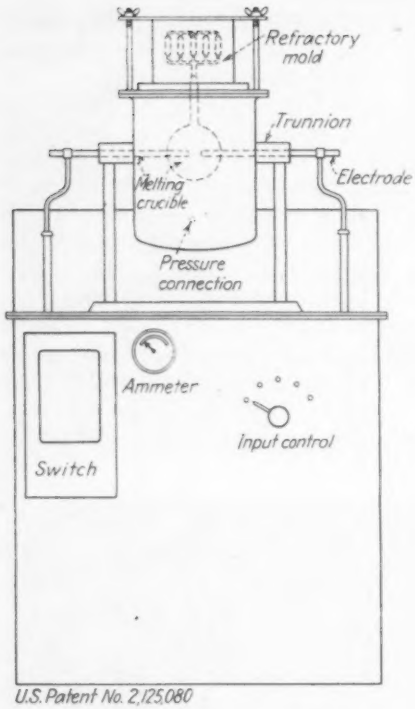

U.S. Patent No. 2,125,080

FIG. 7—Sketch of Austenal patented electric arc casting machine corresponding to the units shown in Fig. 6. The trunnions are pressure packed where the carbons pass through so as to maintain the air pressure when the melt is poured. This is done by tilting the crucible downward.

ing demand for its own products absorbed the major part of its attention. However, alloys such as Colmonoy, Stellite and stainless steels were cast for varied applications.

Then came the war, with its great demand for planes and more planes. Long before Pearl Harbor and the entry of the United States into the war, industry was overtaxed and many bottlenecks had already appeared. None were more serious in the beginning than machine tool shortages, and manufacturers bestirred themselves to cope with this situation.

A casting process that can produce parts of intricate design, that are of accurate dimensions and have smooth surfaces, requiring little if any machining or finishing operations, in the field of high melting point alloys, holds similarly attractive possibilities that die castings do in the lower melting range of metals and alloys.

Now the various threads of this story weave together in a completed pattern of accomplishment.

The manufacturers of General Electric turbosuperchargers for war planes soon were overwhelmed by the demand and looked about eagerly for help. Metallurgists in G.E.'s research laboratories had developed several alloys that were too refractory to forge and machine readily, but which had the properties required for the severe dynamic and thermal stresses to which the bucket vanes of the gas turbine of the supercharger are subjected. These buckets parts are small, require accurate dimensions and have intricate shapes and sections.

Vitallium in Aircraft

Austenal was approached by W. E. Ruder of General Electric's research laboratory. Sample castings and test bars were cast from these G.E. alloys and others, including Vitallium. Tests revealed that certain of the alloys tried were superior in the cast condition, and X-rays revealed the soundness of these materials as cast. Compared with other cast materials Vitallium showed excellent hot strength under test and incidentally has good corrosion resistant properties against hot products of combustion from highly leaded fuels.

This material was approved by the Army Air Forces and General Electric and two Austenal plants were set up to produce Vitallium buckets. Although the company had moved into expanded quarters in July, 1941, to take care of this business, this space was soon taxed to capacity and by the following January space was taken in an adjoining building. Meanwhile other manufacturers were licensed to use the same techniques and were given technical advice as to procedures and equipment as some of the controls are quite critical if best results are to be obtained. The companies are subcontractors under the producers of the superchargers, chiefly General Electric and their licensees, Ford Motor Co. and Allis-Chalmers Mfg. Co., and include the Haynes Stellite Co., which also supplies the basic alloy material to all producers of Vitallium buckets.

Views showing the step-by-step process of producing supercharger buckets in the Austenal New York plant are shown in the accompanying photographs. The initial steps differ somewhat from those used in making Vitallium dentures, mentioned earlier in the article. A master pattern must be produced in metal such as brass or steel by conventional machining methods. From this master, a split die or mold is made of bismuth metal sufficiently oversize to allow for a calculated amount of shrinkage. To some extent this is also offset by invest-

FIG. 8—Stripping the investment out of the flask, which is returned to the investment department. The pneumatic ram is brought to bear against the shrink cavity of the gate while the flask rests upon an elliptical stripping ring. Packed investment material (left) surrounding the buckets is readily removed by tapping the gate with a hammer, leaving the buckets with connecting runners as shown at the right.

FIG. 9—Vitallium buckets being sawed apart from the connecting runners with this abrasive cut-off machine. Final operation is to tumble and blast the buckets to remove the last vestiges of the investment material and obtain the surface finish desired.

ment expansion due to heating of the flasks. Into the metal mold, wax is injected under pressure.

Investment Molding

The next step consists of embedding this wax in a suitable liquid mold material called an investment. The binder for these investments is usually ethyl silicate, an organic chemical developed by Carbide and Carbon Chemicals Corp. On standing, this fluid silicate is converted to solid silica. Joggling the flasks removes air and settles the refractory material about the wax pattern, which may be of intricate shape, as in the case of 20 buckets hooked together with sprues, runners and a central gate. By inverting the flasks on a steam table, the wax runs out, leaving the cavity undisturbed. Vibrating or tapping a wood pattern from a sand mold, on the other hand, always enlarges the mold somewhat and destroys any initial accuracy.

Air drying of the flasks takes place in racks, after which they are pushed through a baking oven under constantly rising temperature. The molds are poured while hot (2000-2200 deg. F.) to assure fluidity of the Vitallium metal which is cast under pressure at a temperature well above the melting point of this material. This also assures proper filling out of the mold and sound castings. It will be noted that small carbon arc furnaces (see cross-sectional view) are employed and that pouring is effected by clamping the red-hot flask to the top of the furnace and then inverting it. Because of the hardness of the baked investment, stripping from the flask has to be done by power. Most of the investment clinging to the casting is dislodged by tapping with a hammer. The rest comes off the work when the buckets are being separated from the sprues and runners by abrasive cut-off wheels or during tumbling.

Future Applications Seen

With the cessation of hostilities, much of this war business will cease abruptly, but manufacturers, engineers, executives, etc., have seen enough of precision casting to realize its wider application in times of peace and when competition for business becomes the normal condition again, many industries will find themselves either using or making precision castings of old and new alloys, making parts that would be virtually impossible by forging and machining methods. The designing engineer will not be limited by the restrictions imposed by established machining practices. Unconventional or complicated shapes,

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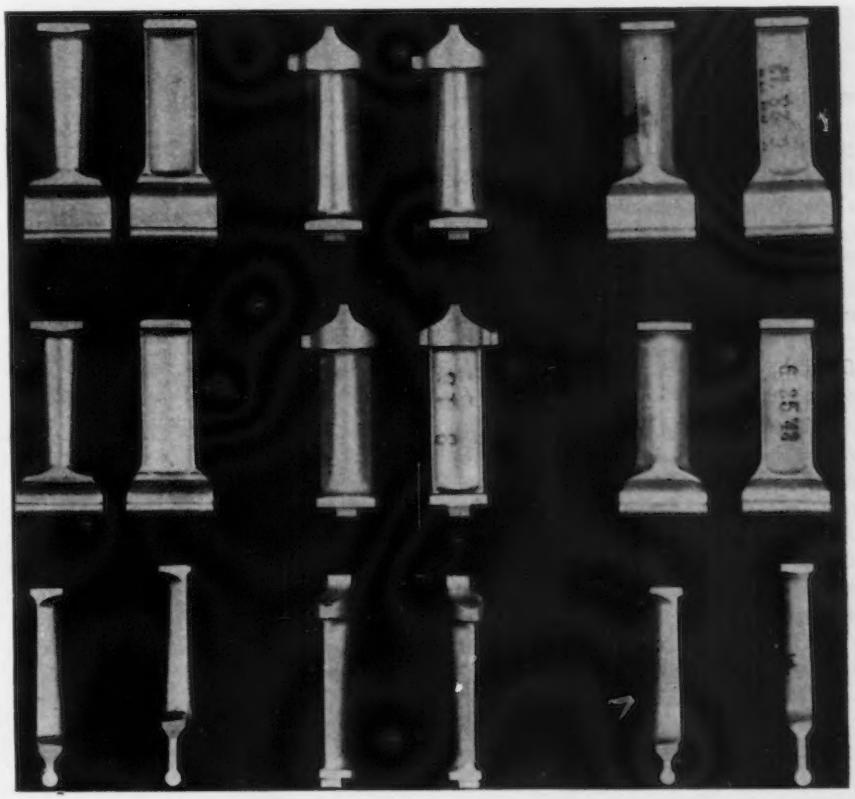
FIG. 10—Turbosupercharger buckets, dovetail and welded types, made from Vitallium by the precision casting process.



including complicated internal coring, can be cast that would be the despair of any machine shop.

The micro-cast technique has made it possible to produce castings usually weighing less than a pound in a variety of ferrous and non-ferrous alloys which approach the accuracy of die castings. Improvements in the technique of making wax patterns make it possible to obtain uniform results with very little variation from pattern to pattern. It is also possible to compensate for all metal shrinkage by overexpanding the refractory investment molds. In actual practice, however, it is usually not practical to elevate the temperature of the refractory mold in order to compensate for metal shrinkage. Shrinkage allowances are made at present in the master patterns so that the wax patterns produced from the resulting molds are somewhat larger than the finished casting.

Castings weighing up to 1 oz. and requiring a tolerance of 0.005 to 0.010 in. are being produced on a mass production basis at present. On certain parts of these castings, tolerances of 0.003 in. have been successfully maintained. At present, work is under way on castings as large as 5 lb., and it is safe to predict that the tolerances that can be maintained will be far closer than can be maintained by ordinary foundry practice.

For alloys difficult to forge and machine this technique is virtually a must, if their use is not to be foregone. With more conventional alloys, readily machinable, the merits of each case must be judged individually.

This new type of casting is a permanent contribution to the art of founding and many possibilities as yet untouched await unfoldment under its future development.

The government has the whole subject of precision castings under organized research study through the Office of Research & Development of the WPB, Washington. The War Metallurgy Committee is participating in the study of applications to other war products than turbine buckets.

Anodic Films on German Aluminum Alloys

SAMPLES of anodically-treated aluminum alloy parts have been taken from several German aircraft, chiefly from the airframes, according to the British Ministry of Aircraft Production. These have been examined for type and nature of the anodic films. In all, 19 parts have been examined. The names of the castings, the aircraft from which they were taken, the appearance of the anodic films, and the corresponding type of British material, are indicated in the accompanying table. Scratch tests and bend tests showed that the films were adherent, hard and brittle. The film on the cock body was very hard.

Chemical Tests. — Chemical tests were made on samples of the films after removal of the films by scraping. Sulphate was detected in all the films except that on the cock body. Chromium was detected in all the yellow films, but not in the buff-colored film on the cock body. It is evident that all the films except that on the cock body had been produced in sulphuric acid baths, and that the yellow films had been sealed in dichromate solutions.

Observations on film thickness were made by removal of the films by chemical means and by microscopic examination of transverse sections. A boiling solution of phosphoric and chromic acids was used, as recommended by J. D. Edwards (A.S.T.M. Preprint No. 19, 1940), since sealed films are not readily removed by cathodic treatment in hot chromic acid solution. The thickness of the films was calculated from the loss in weight on stripping. In the calculation of film thickness, the density of the film was assumed to be 2.8. It is known, however, that the density of anodic films on aluminum alloys varies with the conditions during formation of the film, etc., and that the values obtained in this way vary by ± 25 per cent from the actual values of film thickness. Transverse sections of the samples were prepared, and the anodic films were examined microscopically. The examination revealed no unusual feature. The microscopical method of observing the thickness of anodic films on aluminum is generally considered to be the best.

The anodic film on the cock body appeared not to have been sealed. The film was very hard, was 15 microns thick, and appeared to have been produced by the "Eloxal GX" process; *i.e.*, by D.C. treatment in an oxalic acid bath. As the plug (steel) of the cock seats directly upon the light alloy body, a hard anodic film on the latter should be of advantage in this application. Part of the cock body was cleaned and retreated in an 8 per cent oxalic acid bath at 60 volts, 18 to 20 deg. C., 60 min. The new film resembled the original one, but was 22 microns thick. The anodic films on the other items examined had all been produced on sulphuric acid electrolytes. It is therefore most probable that the D.C. sulphuric process known in Germany as the "Eloxal G.S." process had been used. Most of these films had been sealed by treatment in dichromate solutions to provide increased efficiency of protection. The thicknesses of the films, 5 to 15 microns, are not unusual for films produced by this method. The depth of color of the yellow films appeared to be roughly proportional to the thickness of the films. The films on the external surfaces of the oxygen bottles had not been sealed by dichromate treatment, but had been dyed blue. The film on the gun mounting ring casting was of dark gray color, due to the aluminum alloy containing a high percentage of silicon.

Anodic treatment of aluminum aircraft parts in Germany had been described in an article in "Dornier Post." The conditions of operation are 15 to 20 amp. per sq. ft., 11 to 22 volts, 16 to 24 deg. C., and sulphate of aluminum content of bath not greater than 45 grams per litre. Hot potassium dichromate solution (90 to 95 deg. C.) is used to seal the films.

Anodic Films taken from German Aircraft Testings

Sample No.	7	15	19
Aircraft:	JU 88A4	JU 88A4	HE 115BB
Date of capture	23/2/42	18/1/43	—
Component	Mounting ring nose gun	Pipe coupling	Cock body
Material	Al alloy (9 per cent Si 0.5 per cent Cu)	Al alloy (2 per cert Mg.)	Al alloy (4.85 per cent, Mg. 1.11 per cent Si)
Appearance of film	Rough, dark gray	Pale yellow	Buff
Thickness in microns by chemical method	10	—	—
By microscopical method	15	6	15

Machining Plastics

. . . Because of the nature of the material, cutting speeds for machining plastics are generally higher than for metals. Different results are obtained with the various grades of plastics. Some materials can be finished smoothly with a bronze cutting tool. On the other hand, sometimes abrasive fillers are present in the material which will dull even the usual high speed steel cutting tools and necessitate the use of a hard cutting tip such as tungsten carbide. In this article the author summarizes current practice in machining plastics.*

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TECHNOLOGICAL developments have greatly influenced the trends in the plastic industry. New materials, equipment, methods and applications indicate continued growth and expansion. Plastics are not crystalline in nature; they respond differently to the action of cutting tools than does metal and therefore a different technique must be applied. For example, in turning cast resins a bronze tool bit is used for small production and will not require dressing for the first 100 or 150 cuts. However, for large production high speed steel tools are preferred on all types of operations.

In the preparation of bronze or high speed steel tools a carefully honed job is essential to smooth production pieces which frequently can move right from the production lathe or screw machine to the polishing operation without sanding or ashing. On the other hand, the first two or three cuts from a high speed steel tool may give unsatisfactory results because it is too sharp. Succeeding cuts, however, will prove to be smooth and free of pits until the tool is dull and begins to rub. Nearly all work is done dry, but coolants of the non-alkaline type may be employed although rarely required.

In turning, tools are sharpened very much as for brass work. There should be plenty of clearance, 10 to 20 deg., and a slightly negative or zero rake is desirable. The tool should be set at right angles to or 1 or 2 deg. above the center of the material and cutting edges should be in condition to produce long ribbon shavings. Special grades of tool materials are not required, although many hard bronze tools are employed and these can be filed without removal from the holders. Stellite, cemented carbide or high speed steel tools may be used when it is desired to get the longest possible runs without frequent delays for resharpening or resetting the equipment. The spindle speeds in turning operations range from about 450 to 6000 r.p.m. depending upon the specific work being done and the diameter of the material, and should be regulated to a surface speed of 600 ft. per min.

Machining Laminated Plastics

In machining laminated plastics and vulcanized fibers practically the same rules apply as in machining brass and it is advisable to use the highest possible speeds and to keep tools sharp. Slow speeds will not only curtail production, but will make tools dull rapidly. Cemented carbide tool tips such as Carboloy are especially recommended for turning and boring as they permit higher speeds and reduce grinding.

A sharp tool, plenty of clearance (at least 30 deg.) will contribute greatly to the successful machining of laminated plastics and vulcanized fibers. Extremely hard and tough, and slightly elastic, these materials are inclined to impinge against the back of the tool generating heat and dulling edges. Sufficient clearance eliminates the abrasive rubbing action characteristic of these materials.

Laminated plastic and vulcanized fiber tubes, rods and washers can be successfully machined in automatics and hand screw machines. It is well to note that tubes are not always exactly concentric, and if concentricity is required, it is advisable to specify the tubes a little smaller on the inside or use rod stock and drill concentric. It occasionally happens that rods turned from sheet stock will work where molded rods are not found practical. The recommended cutting feeds on automatics are as follows:

Feeds In. Per Rev.	
Drilling	0.007 to 0.015
Turning	0.010 to 0.015
Cutting off...	0.002 to 0.005
Forming	0.002 to 0.003

Water hardened steel should be used for form tools due to increased hardness and lengths of runs between grinds. Cut-off tools with carbide tips will be found well worth while. The spindle speeds recommended for various stock sizes are:

Hand screw machines	
1 in. diam. and over	800 to 1000 r.p.m.
Under 1 in.....	1500 to 2000 r.p.m.
Automatic machines	
Larger than ⅝ in. diam.	2500 r.p.m.
7/16 to ⅝ in.	3600 r.p.m
⅛ in. and less.....	5000 r.p.m

Satisfactory results may be obtained in drilling holes up to 3/16 in. diameter by using the regular standard high speed drills with a slightly

*Excerpt from material appearing in the 1943 edition of the Plastics Catalog by permission of the publisher, Plastics Catalog Corp.

negative rake ground on the cutting lip. It is advisable to back out the drill often to avoid buring since very high speeds are advocated. Speeds ranging from 2800 to 12,000 r.p.m. are used for small holes, or 100 to 300 ft. per min., but when the material has high abrasive qualities, the speed may be reduced to approximately 75 ft. per min. A thin jet of compressed air directed as near the hole as possible and directly on the drill hole helps to keep it cool.

Specially designed drills for plastics are available and should always be used in drilling holes larger than 3/16 in. diameter. These drills have highly polished flutes, maximum chip clearance, slow helix for pierced holes, fast helix for blind holes with a 55 deg. point ground for thin sections and a 90 deg. point for thick sections. The method of grinding drills for plastics includes a slight radius at the end of the lip which helps to maintain hole size. However, due to the abrasive action of some materials, drills sometime cut as much as 0.003 undersize, necessitating frequent inspection.

When drilling methyl methacrylates use a drill with a flute angle of 17 deg. with a lip angle of approximately 70 deg. and lip clearance angle approximately 4 to 8 deg. The lands should be polished one-fourth the width of the heel. Drill lubricants aid in chip removal, carry away heat and improve the finish. The best lubricant for drilling methyl methacrylate resin is a warm, mild soap solution, although oil performs satisfactorily but requires an extra cleaning operation.

High speed drills are recommended or drilling used at highest speed possible without burning the drill. A ¼ in. drill should be run at least 2500 r.p.m. for best results and 10,000 r.p.m. would not be excesive for a No. 60 drill. Dubbing the lip of the drill and giving it plenty of clearance will let it cut freely and will tend to prevent any splitting and grabbing. Drills should not be forced and if kept sharp only slight pressure will be necessary.

In drilling, these materials have a tendency to bind on the drill and close in when the drill is removed. It is advisable, therefore, where tolerances are close to use a drill a few thousandths larger than the size wanted. It is well to try out the material before ordering jigs to assure correct size of hole since jigs should be made with a plate beneath the piece to prevent breaking out as the drill passes through. The special drills made by most manufacturers especially for plastic materials, have wider clearance grooves and will give much better results than standard metal cutting drills.

Reaming

Although it is sometimes necessary, reaming plastics is not recommended, it is best accomplished by the use of expansion reamers with self-centering floating holders. A speed of not over 50 to 100 r.p.m. is used with a very fast feed. Close inspection is necessary on all reaming operations due to the abrasives in the materials rapidly dulling the sharp cutting edges of the reamer, causing a binding and squeaking condition that is likely to cause breakage as well as producing undersize holes. It is often advisable to drill the hole to within 0.001 in. in size and burnish it to the required size by the use of a very highly polished hardened rod pushed through the hole.

Threaded Parts

Threads may be molded or tapped in almost all plastic materials and the American National Form of thread is preferable. Other threads, such as a rolled thread for fuses and lighting fixtures and a round profile thread for closures and bottle tops can be molded readily, but not tapped.

In general threads above ¼ in. diameter should be molded and smaller threads tapped. Tapped inserts are used where maximum strength or frequent use is required. Threads smaller than size No. 8 or finer than 36 threads per in. are not molded, because fine and shallow threads tend to fill with pure resin and are brittle. Molded threads are stronger and will hold their dimensions better than tapped threads which tend to swell where the resin has been cut. Do not retap a molded thread.

Since the shrinkage of the compound affects the diameter and lead of a molded thread, long molded threads will fit mating parts of the same plastic better than metal mating parts because the two molded parts will shrink the same amount. Tolerances of plus or minus 0.005 in. may be held on diameters up to 2 in. on molded threads, but to assure best dimensional stability, parts with molded threads should be baked. Molded threads should begin and end abruptly. A hole extending below a molded thread should be smaller than the root diameter of the thread, and tapered if possible. If the member forming the thread is stationary in the mold, provisions must be made to unscrew the molded parts.

Tapered or pipe threads are not molded unless unusually heavy sections are to be joined because the pressure created by the taper will crack the molded part. For closure or liquid tight threaded sections, allow at least one complete turn, and more if possible.

Threaded holes for tapped threads or for drive screws should be slightly countersunk to prevent a ridge around the hole which would keep the screw from being seated. In every design for threaded parts, consideration must be given to the parts of the mold that are to form the thread. The part designer may facilitate molding and decrease maintenance by providing proper radii fillets and grooves in molded parts.

Tapping

Threads can be tapped as fine as 56 threads per in., but tap threads over ¼ in. in diameter should not be tapped. Mineral filled compounds are brittle and are difficult to tap without chipping, and fabric filled materials tap readily but the exposed cut surface will tend to swell when moisture is absorbed. Tapped threads can be held to a class 2 fit on low moisture absorbing materials on diameters under ¼ in. When molded or drilled holes are to be tapped, allow for an adequate cross-section and make them small but adequate (taps will clog on long holes) and tap through the hole if possible.

Regular standard taps may be used for tapping cast resins, but the ground high speed steel taps have proven more satisfactory and chrome plated taps with highly polished flutes are recommended for long production runs. Very little rake and plenty of clearance are desired as some of the highly abrasive materials occasionally cause the taps to cut very close to size and binding is often experienced in backing out. This condition will be improved if clearance is ground on the sides of the threads. Three flutes instead of four give better results and longer tap life.

A speed range of 40 ft. per min. has been recommended for 0.736 in. taps and 54 ft. per min. for 0.0590 in. taps. Water has proven more efficient than oil or kerosene, but dry tapping is even better for the least wear. Due to the abrasive action of some cast resins the taps are inclined to cut very close to size and as wear is experienced the holes will become undersize. Therefore, close inspection is advised where tolerances are low. Most fabricators of plastics prefer to use taps that are oversize to the high limit, thereby greatly decreasing the possibility of rejected parts due to undersize threads.

In tapping laminated plastics and vulcanized fibers, high speed taps

0.002 to 0.005 in. oversize are recommended and a little oil will help. As many as 3000 holes can be threaded in ¼ in. material with a 10/32 tap without sharpening. A drill suitable for 75 per cent full thread will facilitate tapping and cut down tap breakage and a slight chamfer around the edge of the hole before tapping will prevent uplift. For larger holes over 1¼ or 1½ in. collapsible taps are available which step up production and give satisfactory results.

External Threads

External threads may be molded in split halves. This will make the thread out of round by 0.005 to 0.015 in. and will leave a slight ridge across the threads, however, it provides a fairly serviceable thread and is cheaper to mold.

External threads may be produced by the use of self-opening dies with high speed steel chasers that extend out in front, having less chamfer than the standard chasers. Circular chasers give much longer service than the standard chasers. Plenty of clearance is essential and dies should be kept sharp at all times. Thread cutting in lathes is accomplished in exactly the same manner as in brass or steel. The fine threads sometimes required in radio coil forms, for example, can be cut to advantage with a V tool on small bench lathes equipped with a threading attachment and an expanding collet. Where only a few pieces are to be threaded, the work can be done in an engine lathe with a V tool. It may be necessary, however, to make several cuts which should not start more than 0.007 to 0.010 in. deep and decrease as the cut deepens.

Thread milling machines are excellent for milling medium or large diameter threads, as the hobs or cutters used in these machines are very accurately ground to size and to the number of threads per in. The hobs are made for the desired length of the threads and are usually made of high speed steel to stand up under the high speeds desired in production. By the use of cams installed in the machines one complete revolution of the piece is all that is required to produce a smooth milled thread that can be held to very close tolerances.

When threading or tapping methacrylates to fit a metal bolt or nut, allowance should be made for the difference in the coefficient of thermal expansion of the two materials. A slight increase over normal metal clearance is usually ample. Either hand or machine tools may be employed for threading or tapping and the material also works well in lathes or automatic screw machines where standard taps can be used without modification. In cutting threads the tap or die should be operated at a speed of about 25 per cent slower than for brass or cellulose plastics. Higher speeds develop frictional heat and gumming of chips and taps should be backed out frequently to prevent jamming. In hand tapping small holes 3/16 in. or less, it is not necessary to use a lubricant if care is exercised. On larger holes, however, a lubricant such as a mild soap solution is recommended for drilling. For machine tapping or threading, the work should be flooded with lubricant and in hand tapping lubrication will assist in producing a smooth accurate thread.

Milling

Milling operations may be accomplished by the use of any standard milling machines using standard cutters. However, the carbide tipped variety is especially recommended for long production runs due to the increased speed available and valuable time saved with a corresponding reduction in the machining cost per part. Parts may be held in any standard milling vise or chuck clamped down to the table, or held in specially designed jigs or fixtures. The cutting speed is approximately 400 ft. per min. although where only a very light cut is necessary speed may be greatly increased. The use of carbide tipped cutters permits increasing this speed to about 1000 ft. per min. Slow feeds are beneficial for producing smooth finishes. Milling cutters must be kept extremely sharp at all times; honing the teeth to a very smooth cutting edge pays big dividends in smooth cuts and time saved in finishing.

Abrasive cut-off wheels are most widely used and they involve a high speed spindle to which is fastened the abrasive disk, mounted on a swinging arm on the other end of which is the motor. The weight of the motor acts as counterbalance and permits the operator to feed the wheel down into the material. A flood of water on the material prevents scorching and produces a smooth easily polished cut with a minimum of waste.

Sawing

Sawing is done at 1200 to 1300 ft. per min. or above and best finished results are obtained on a band saw with 14 or 18 teeth per inch. On a jig saw the generally accepted blade is a No. 3 jewelers blade with 22 teeth to the inch for intricate work, and a No. 4 or No. 5 blade for production or for stacked work.

Thin methyl methacrylate sections can be individually sawed without a lubricant and it is also unnecessary to lubricate thick pieces if they are fed slowly. However, a lubricant will reduce or eliminate chipping, produce cleaner cuts and overcome the tendency of the saw to bind or stick. In heavy cuts including stacks of thin sections, a lubricant will reduce smoke, but moderate smoking can be expected when the stock is cut without a coolant if the thickness is 3/16 in. or more. Water is the best lubricant, but oil can be used when rust is a factor. Oiled paper may be placed between the sheets to supply lubricant when sawing several pieces at one time and bar soap may also be employed as a lubricant.

Finishing Operations

Grease burnishing is a finishing process in which the barrel should be loaded with three parts pegs and two parts articles together with one pint of grease sawdust and one cup of precipitated chalk. This combination will diminish the grease film and shorten the operation. One hour before taking the parts out of the barrel, add another cup of precipitated chalk. This process requires from 3 to 12 hours at 30 r.p.m., depending upon the kind of articles placed in the barrel.

Dry tumbling is a finishing process using three parts pegs together with two parts articles, one cup of FFF pumice and 1½ cups of flushing or paraffin oil.

Wax finishing is produced by adding (while hot) 4 oz. of wax mixture to every 25 lb. of new pegs and about 2 oz. of mixture each time the pegs are treated thereafter. Pegs need to be treated only about once a day with continuous use and can be allowed to run until they have a slippery and glossy appearance. Wax should not be added while articles are in the barrel.

For polishing methyl methacrylates by the wax method, carnauba wax and beeswax dissolved in turpentine are poured over wooden pegs in the tumbling barrel.

A dull finish on laminated plastics can be obtained with sanding or grinding using a 220 grit and then buffing with standard cotton buffing wheels and tripoli or similar polishing compound. Grinding and sanding operations are both practical by means of belt or disk sanding and by centerless or plain grinding. In grinding it is advisable to use plenty of cutting compound, kerosene or water soluble

(*Concluded on page* 137)

◆ ◆ ◆ Isothermal Quench Baths

By HAROLD J. BABCOCK
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ONE factor that will always have to be considered in applying TTT curves is the maximum thickness of the piece to be treated. Fig. 8, reproduced from "Principles of Heat Treatment," by Dr. M. A. Grossman, will illustrate this point. These curves show the drop in hardness in water and brine quenched bars of SAE 3140 steel with increased diameter. If the center of the piece is not cooled fast enough, softer, high temperature structures are produced, as can be predicted from the isothermal transformation curve. Again, the importance of the *quench* must be emphasized. As in the quench and temper method, so also in the isothermal transformation method, success depends upon adequate quenching equipment. It is the rate of cooling that, fundamentally, determines the final structure.

With the conventional media, such as brine, water or oil, a bath possesses cooling rates as illustrated in the curves of Fig. 9. As previously stated, the rate of cooling in these fluids may be increased by lowering the temperature of the quench bath (refrigeration, as the extreme condition), agitation or circulation of the liquid or by spraying in jets against the surface of the piece.

It should be noted that in using oil as a quenching medium, the rate of cooling is increased by raising the temperature of the bath. This condition may be attributed to decrease in viscosity with rise in temperature thus increasing the fluidity of the oil. But the quenching temperatures used in isothermal procedure are, for the most part, above the boiling point of these liquids so that molten salt, lead, etc. must be used.

Molten Salt Baths Better

In commercial applications, molten salts have certain advantages over molten metals. They are just a little heavier than water so metals sink in the bath, whereas in lead, it is necessary to submerge the piece forcibly. It is possible to agitate a lead bath or to pump lead through a jet quench, but with molten salt for the bath the mechanical problem is much less. Lead adheres to the surface of the piece or remains in small apertures and is very difficult to remove. Salt adheres only as a uniform film that protects the steel from chemical action with the air during transfer of the piece and washes off completely in the final wash water. Lead becomes solid at 620 deg. F. whereas a nitrate-nitrite salt bath may be used at temperatures ranging from 350 deg. to 1100 deg. F.

One property of molten salt not widely recognized, is its cooling power at temperatures above 400 deg. F.

A study of the cooling rates of mineral oil and of molten salt has been made by Lueg and Pomp, (*Stahl und Eisen*, Vol. 61, pp. 266-272, 1941.) In Fig. 10 is shown the cooling power of several quenching oils at 68 deg. F. on a 0.47-in. steel ball. Fig. 11 shows the cooling power of molten salt at 482, 662, 842 and 1022 deg. F. respectively on a 0.47-in. steel ball. From this it can be seen that salt at 482 deg. F. has as great cooling power as the best quenching oil bath does at 68 deg. F. In mineral oils Nos. 1, 2 and 3 even at 68 deg. F., the cooling rate is retarded because the oil first vaporizes at the hot metal surface and then boils, thus preventing the surface of the piece from coming into intimate contact with the quenching bath liquid. Obviously, at a bath temperature of 482 deg. F., using oil is not practical. The molten salt does not vaporize or boil even at much higher temperatures and a smooth cooling curve is the result. In the higher temperature ranges, molten salt is a coolant capable, at a quench bath temperature of 660 deg. F., for example, of cooling a 0.47-in. diameter steel sphere at rates in excess of 230 deg. F. per sec. in a still salt bath.

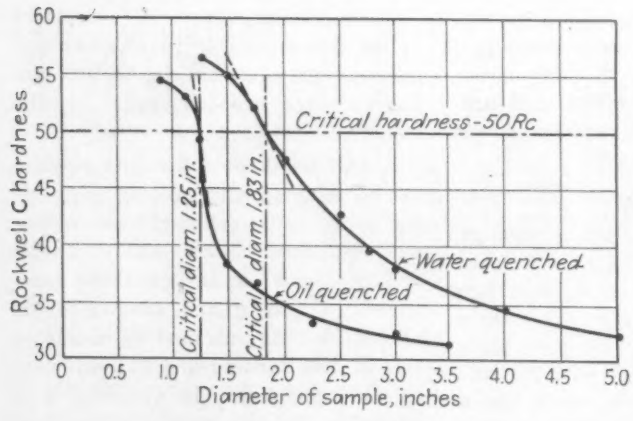


FIG. 8—Effect of increased thickness on hardenability of water and brine quenched SAE 3140 steel bars (Grossman)

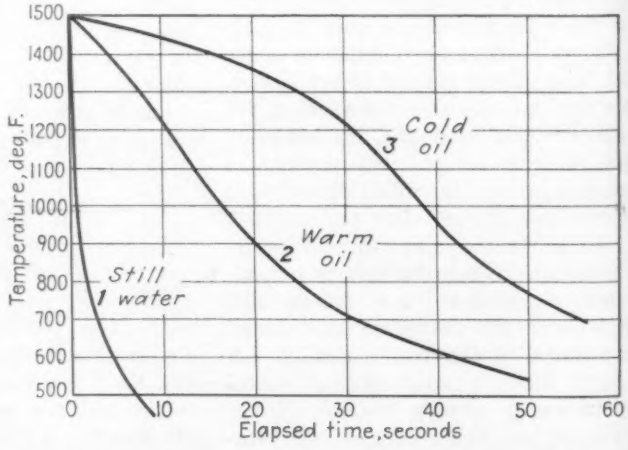


FIG. 9—Cooling rates of water and oil used to quench steel.

Applied to Commercial Practice

. . . Last week's discussion of isothermal transformation is concluded with a description of equipment and treatment used in industrial applications. The importance of the molten salt quench bath is stressed and comparisons with other quenching media presented.

Salt baths used for quenching steel are usually composed of chlorides of alkaline or alkaline-earth metals at temperatures ranging from 1000 to 1300 deg. F., or of nitrates and nitrites of alkali metals at temperatures ranging from 350 to 1100 deg. F. Such molten salts, at these temperatures, are fluids that flow almost as freely as water and are capable of being agitated by mechanical stirring devices or of being pumped through nozzles or apertures in fixtures to produce forced-jet quenching action.

Constant Quench Temperature Essential

In the commercial application of molten salt baths to the isothermal quench, success depends upon two well recognized functions of quenching equipment, particularly if used to treat any considerable weight of metal:

(1) The quenching medium must extract heat from the hot steel throughout the maximum cross-section at a rate equal to or greater than the critical quenching rate if complete through-hardening is to be obtained.

(2) If any considerable weight of metal is quenched, a great deal of heat is taken up by the quench bath. The temperature of this bath must be kept constant by extracting this heat from the quenching liquid by suitable cooling methods.

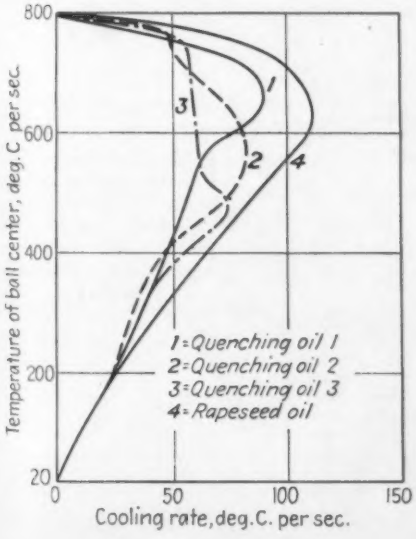
When molten salt is used as the quench liquid the cooling rate may be accelerated by means similar to those used with brine, water or oil. Moving the steel through the molten salt, violently agitating the molten salt or forcing it by suitable pumps through apertures to give a forced-jet quench, increases the rate of cooling just as in the low temperature liquid baths.

The cooling of molten salt to extract the heat liberated from the metal being quenched lends itself to much the same methods as applied to cooling other liquids such as brine and water, modified by the fact that molten salt freezes to a solid at temperatures close to 300 deg. F. It is not desirable to use water to cool molten salt since a leak or fracture in the cooling pipe or wall might bring it into direct contact with the hot salt thus causing an explosion.

A conventional salt bath commonly used in the range of temperature between 350 and 1300 deg. F. is usually designed for drawing steel. It is constructed with suitable heat insulating material and an insulated cover to retain heat in the bath so that it may be operated with minimum consumption of fuel or electric energy. But such a bath design used for isothermal quenching of steel would be wholly unsuitable, especially if any quantity of metal is to be treated, since it is built to retain heat.

The commercial application of the isothermal procedure requires for its success a quench bath capable of absorbing and dissipating a large quantity of heat without an increase in the temperature of the molten salt.

A view of such a bath having the capacity to quench 300 lb. of steel per hr. is illustrated in Fig. 12. It will cool the steel from 1550 deg. F. to 650 deg. F. while maintaining the quench bath temperature within 5 deg. F. of 650 deg. F. Using the Ajax-Hultgren design[11], this bath heats the molten salt directly by current flowing through it. Two pairs of electrodes, each pair closely spaced, confines all current flow within the narrow space between the two electrodes. No heat is applied externally. An automatic temperature control instrument regulates the



LEFT

FIG. 10—Cooling power of three mineral oils and rapeseed oil at 68 deg. F. on a 0.47 in. steel ball. Initial temperature was 1472 deg. F. (Lueg and Pomp).

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RIGHT

FIG. 11—Cooling power of molten salts at 482, 662, 842, and 1022 deg. F. on a 0.47 in. steel ball. Initial temperatures were 1472 and 1742 deg. F. (Lueg and Pomp).

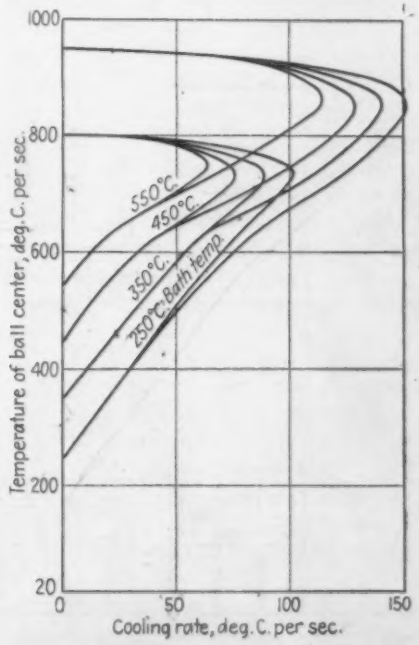

FIG. 12 — Isothermal high temperature salt bath quench with mechanical agitator and air cooled pot. To work successfully, a quench bath must be capable of absorbing and dissipating a large quantity of heat with no increase in temperature of the molten salt.

power imput to maintain the temperature of the salt up to the point set on the controls.

Surrounding the exterior of the bath is an air chamber in which a controllable volume of air is caused to flow. Whenever the temperature of the molten salt rises more than 1 deg. F. above the control setting, the cooling system is turned on and the bath temperature thus lowered. Such dual control for heating and cooling maintains bath temperatures within 5 deg. F. of any desired quenching point within the range of temperature for which the apparatus is designed to operate. In order to obtain maximum quenching speed, a motor-driven device maintains the molten salt in violent circulation or, in certain instances, a pump is used to force high pressure multi-jets of salt against the work held in fixtures.

Such design for an isothermal transformation quench bath, using molten salt, embodies the fundamental features that were emphasized previously. In Fig. 13 is shown an outline drawing of a group of electric, internally heated, salt bath furnaces in which such a bath is used, arranged for batch type treatment of small steel pieces. Twelve such installations are already in successful commercial operation.

The furnace arrangement illustrated by this drawing is for the heat treatment of SAE 4140 alloy steel. The pieces treated are parts of a shell fuse machined from annealed rod stock. These fuse parts, shown in Fig. 14, are threaded inside and out. Thus finished-machined, it is required that they be heat treated without distortion or quench cracks under such conditions that a hardness about 34 to 38 Rockwell C should be obtained together with the following minimum physical properties:

Yield point	130,000 lb. per. sq. in.
Tensile strength	145,000 lb. per. sq. in.
Elongation	13 per cent
Reduction in area	45 per cent

These pieces vary in section from a maximum of 0.5 in. in the large piece to a minimum of 0.004 in. in the small piece.

The conventional quench and temper method when applied to the large piece, particularly, presented a handling problem. Uniform results required practically an individual quench for each piece. The quench, even in oil, produced changes in dimensions, distortion and often quench cracks. If the pieces were dropped into the quench, mechanical damage to the threaded surface often resulted. In the quench and temper method, the pieces would have to be unloaded, quenching oil cleaned off and then reloaded into large capacity

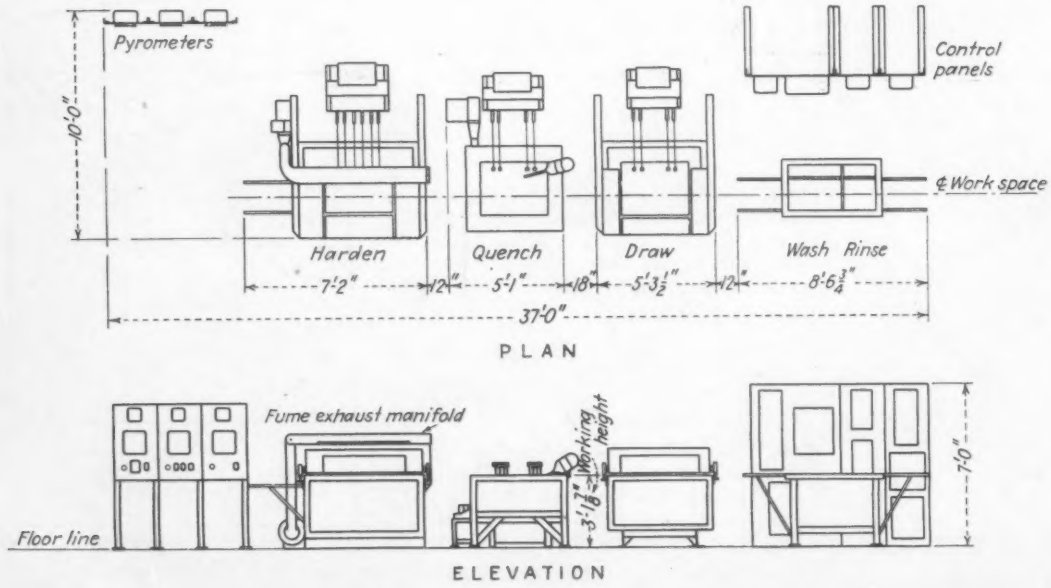

FIG. 13 — Layout of isothermal batch type hardening equipment for treatment of small steel pieces. Salt bath furnaces are internally heated.

racks for the draw or temper treatment, owing to the greatly increased time cycle required for drawing a martensitic steel.

Quench Cracks Eliminated

The salt bath would provide a high temperature furnace capable of heating at a rate more than four times as fast as a radiant type furnace. It assures uniform heating with total exclusion of atmosphere or effects of temperatures any higher than that of the liquid bath, that might affect the steel surface detrimentally. The use of a salt bath quench is known to eliminate quench cracks and minimize changes in dimension. (See Davenport and Bain[7].) Referring to Fig. 6 showing the time-temperature reaction (TTT) curve for SAE 4140 steel, it will be noted that between 625 and 725 deg. F. this steel will complete the transformation of its austenite to troostite in a period of about 100 sec. The structure will have a hardness of about 46 to 48 Rockwell C. The transformation of this steel is completed at the end of 1.66 min., but has too high hardness and too low elongation and reduction in area to meet specifications required for the fuse part. If it could be quenched at or above its critical rate in a bath held at 825 deg. F., a structure having the desired hardness and physical properties could theoretically be produced. But the maximum thickness is ½ in. The high temperature quench even if carried out in a pressure-jet quenching fixture could not cool the piece fast enough to be free from soft, high temperature products, with lower physical properties than required in the specifications.

However, as the writer interprets the work done by Greninger and Troiano[10] and Payson and Klein[13], the transformation reactions are completed in the isothermal quench bath. The product is always identified with the time and temperature used in this treatment. Then it follows that the physical properties of this transformation product may be modified as in any piece of hardened steel by transferring it to a bath at a higher temperature, appropriate for tempering this product.

In other words, if the steel is quenched in a salt bath at a temperature of 625 to 725 deg. F., kept in this bath not less than 1.66 min. and then transferred immediately to another salt bath held at a temperature of 950 to 1050 deg. F., a product having the desired properties should be obtained.

FIG. 14—These fuse parts were machined from annealed SAE 4140 rod stock and are threaded inside and out. Being finish-machined, their heat treatment should produce a hardness of 34 to 38 Rockwell C and a tensile strength of 145,000 lb. per sq. in. with no distortion or quench cracks. These results were obtained in the equipment shown in Fig. 13.

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It was found that in a salt bath, operated at 1550 deg. F., the heavy piece of the fuse (½ in. section) could be austenitized in about 10 to 12 min. This heating time established the cycle of operation.

In Table 1, data are presented from a series of tests using 0.505-in. tensile test bars made from SAE 4140 annealed rod stock from which the fuse parts are made. The time in each step of the isothermal transformation treatment given the bars is held uniformly to 10 min. The data in these first four tests are included to show that at high quench bath temperatures, 10 min. did not allow time to complete transformation, and a mixture of low and high temperature structures was obtained. As a result, low hardness and low physical properties are obtained. Such product of transformation could be expected from the information shown in the TTT curve.

In tests Nos. 5 and 6, the same conditions were maintained except that the pieces were immediately transferred after 10 min. in the isothermal quench furnace to a draw bath at the higher temperatures shown in the table. In spite of the lower quench temperatures, the cooling rate of the quench bath was not high enough to cool the ½ in. section completely as required according to the TTT curve, less than 6 sec. to cool from 1385 to below 900 deg. F. Specimens were cut from No. 6 test pieces for microscopic examination (1) after the isothermal quench and (2) after the 10 minute draw. Photomicrographs in Figs. 15 and 16 (1000 diameters, nital etch) show the structures obtained. It is evident that the cooling curve passed through the "nose" of the "S" curve since lamellar products can be seen which accounts for the low physical properties obtained.

The cooling rate of the quench bath was increased by using the agitator, producing a violent, turbulent flow of the salt against the pieces being quenched. In tests 7, 8 and 9, the isothermal quench temperature was successfully lowered and the draw temperature set to obtain Rockwell C hardness values in the range 34 to 38 with a time of 10 min. in each bath.

Thus it was shown that by using the isothermal transformation method it was practical to reduce the whole series of operations to a cycle of 10 to 12 min. in each bath. Once the isothermal quench and draw temperatures are established for this type of steel, the operating conditions remain fixed except for slight adjustments required to meet variables due to chemistry, grain size, etc., as found in different lots received from the steel mills.

As this method is applied to the heat treatment of the fuse parts un-

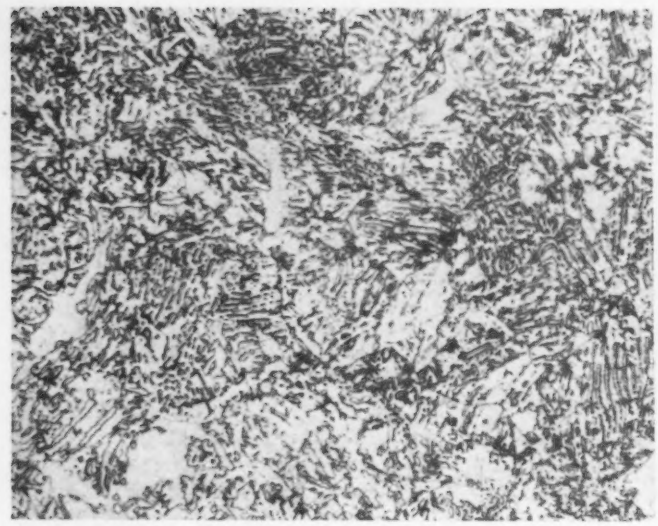

FIG. 15—Microstructure of ½-in. SAE 4140 steel, quenched 10 min. and then cooled. At 1000 diameters, nital etch.

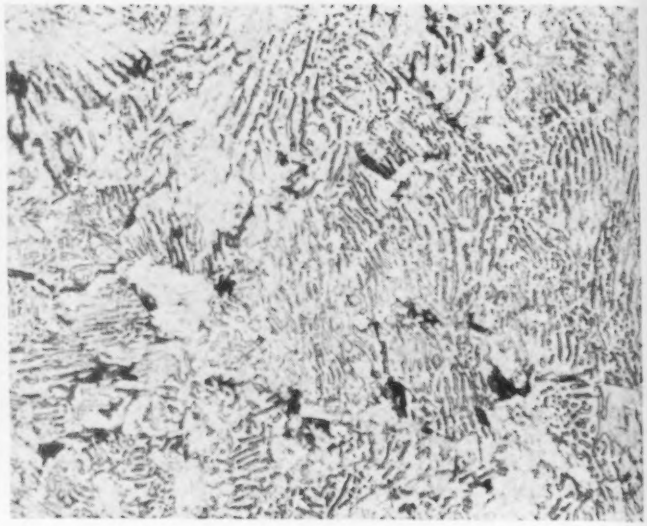

FIG. 16—Microstructure of ½-in. thick SAE 4140 steel, quenched and drawn 10 min. At 1000 diameters, nital etch. Low physical properties are due to the lamellar products seen in this photomicrograph and the one in Fig. 15.

der commercial conditions, the pieces held in suitable basket type racks are carried progressively through the hardening or austenitizing, the isothermal quench and the draw baths, hence onto the cooling racks and then into the wash and rinse tanks which remove the last traces of salt. (See Fig. 13.) They are carried through on the same fixture without any rehandling during the heat treatment.

It should be noted that by using salt baths in each of the three steps, the total time of treatment was reduced to between 40 and 48 min. per batch compared to 1.5 to 3 hr. by the conventional quench and temper methods. Quench cracks of even microscopic order were eliminated. Distortion was reduced to limits under 0.001 in.

In Fig. 17 is shown a typical commercial installation now in operation producing these fuse parts. With 12 such production lines in operation, it is interesting to note the results obtained under average production conditions. A typical chemical analysis of the SAE 4140 steel in one plant is as follows: 0.41 C, 0.90 Mn, 0.016 P, 0.031 S, 0.35 Si, 1.05 Cr, and 0.19 Mo.

The plant has heat treated over 20 different heats of steel (approximately 400 tons) and maintained the product within rigid specification limits without rejection of a single lot. Three lots selected at random show the following physical properties:

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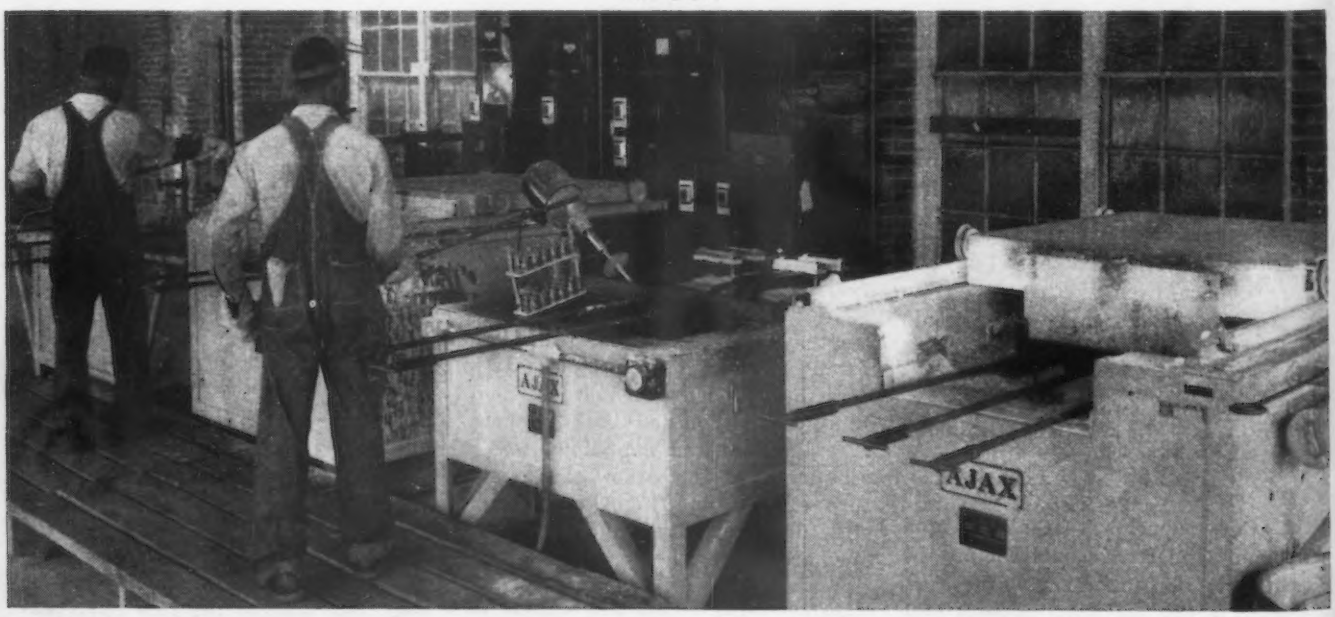
FIG. 17—Typical batch type isothermal production unit for the three-step salt bath process—neutral hardening, high temperature quench and draw.

Lot No.	Yield, Lb. Per Sq. In.	Tensile, Lb. Per Sq. In.	Reduction in Area, Per Cent	Elongation, Per Cent	R_c
143	168,500	180,000	57.5	17.0	35
144	172,000	183,000	57.7	16.5	35
145	176,000	189,000	57.5	16.5	35

Fig. 18 shows the structure (1000 diameters) obtained in lot 145. The reduction in area, the elongation and hardness combined with the high yield and tensile strength indicate clearly the tough, ductile properties imparted to the steel by this isothermal transformation method.

The commercial application just described in detail is typical of the way the TTT is used curve to predict the result that can be obtained in hardening steel. This application of the salt bath furnace used the



isothermal transformation method to obtain hardness of about 35 Rockwell C, in a structure of higher tensile strength (about 20,000 lb. per sq. in. higher) combined with higher ductility than can be obtained by the conventional method at the same hardness.

The TTT curve is equally valuable to determine how to avoid hardening. In Fig. 19 a yoke of SAE 52100 coiled rod stock is shown entering a salt bath at 1450 deg. F. for the austenizing treatment. If the yoke is "quenched" in a salt bath maintained at 1340 deg. F., the annealing cycle to produce a structure having hardness about 14 Rockwell C will be about 4 hr.[4] At the end of this time the yoke may be removed and cooled at any desired rate. Considerable time is saved in completing the operation compared to the typical annealing cycle in which the charge cools to low temperatures within the furnace.

Martensite Formation

Previously, it was pointed out that the quench and temper method, with its severe quench produced distortion and even cracks in the steel. This condition is due, in part at least, to the rate of formation of martensite. When martensite is formed in quenched steel, an increase in volume occurs, due to the lower specific gravity of this constituent, with the result that stresses are set up that often produce cracks in the piece. In the isothermal transformation method where hardness under 50 Rockwell C is desired, it has been seen how the formation of martensite is avoided entirely.

But the work done on the isothermal transformation of steel shows that the formation of martensite for austenite is not an isothermal reaction (Greninger and Troiano[10]), but a reaction depending for its completion on a decrease in temperature. Martensite forms immediately when the austenite cools to a certain temperature (below 590 deg. F.), and the reaction continues only as long as the austenite continues to cool. Then the TTT curves should show a way to lessen or even eliminate the stresses set up when full hardness is to be produced, as in Fig. 4 for example. Curve 3 for the 1.13 carbon shows that if this steel is cooled at or above its critical cooling rate to a temperature of 400 deg. F., the austenite does not begin to transform for a period of 50 min. Then, if the steel is quenched and held in a salt bath at 400 deg. F., it would be possible to bring the whole piece uniformally to this temperature. If this temperature equalization can be accomplished within less than 50 min., the structures of the steel would be austenitic. If the temperature of the piece is now lowered martensite will form. But as the transformation takes place at a slow cooling rate uniformly through the cross section, the soft austenite cushions the stresses set up when martensite if formed and minimum residual strains result in the product. It is understood, of course, that application of this procedure is limited by the thickness of the piece treated.

In Fig. 20 is shown a salt bath in which this method finds commercial application. Uniform hardening, combined with toughness in a spline shaft is thus obtained. The steel is shallow hardening. Since the maximum section is about 1½ in. thick, a radical quench is required to lower the temperature of the surface at a rate equal to or greater than its critical cooling rate. But it is essential to arrest the cooling of this surface at a temperature higher than that where the austenite transforms to martensite. In this type of steel this temperature is about 450 deg. F.

Under commercial conditions, an Ajax-Hultgren[11] electric salt bath, screw conveyor type is used for austenitizing in which the spline shaft is differentially heated by immersion up to the "collar" of the shaft. The pieces are transferred from this bath to a specially designed, automatically timed, collar-like water jet quench fixture. The time in this quench is held to between 10 and 12 sec. to obtain surface cooling at or above the critical rate. The spline shaft is then transferred immediately to a salt bath maintained at 450 deg. F.

This salt bath maintained at uniform temperature extracts the heat from the piece until the entire section is uniformly at bath temperature. When the piece is removed and cooled, the hardened area is uniformly at 49 to 51 Rockwell C up to the top of the shaft grading from there to 34 to 36 on the "collar." The piece is free from quench strains. Tests run on shafts so treated show that the tough structure so produced stands up against fatigue failure in accelerated life tests far better than those treated by the conventional quench and temper method.

FIG. 18 — Microstructure of ½-in. thick SAE 4140 steel produced by the isothermal method (12 min. cycle). Nital etch, at 1000 diameters.

Hardening A.P. Shot

Another commercial application is found in hardening armor piercing projectiles. Heat treated by the conventional quench and temper methods, they will shatter against the target more readily than the same projectile treated by the isothermal method. The shot is heated to about 1600 deg. F. for 30 min. and then immediately quenched into a molten salt bath held at 450 deg. F. The quench bath is designed with mechanical agitator which directs a stream of molten salt at the point of the projectile to assure maximum cooling rate at this vital part. At the end of 9 min. in the bath at 450 deg. F., it is removed and allowed to cool in the air. As it cools, the austenite transforms to martensite developing a structure with hardness about 59 to 61 Rockwell C on the nose of the shot.

Another commercial application is found in the treatment of carburized steel parts where a wear resistant

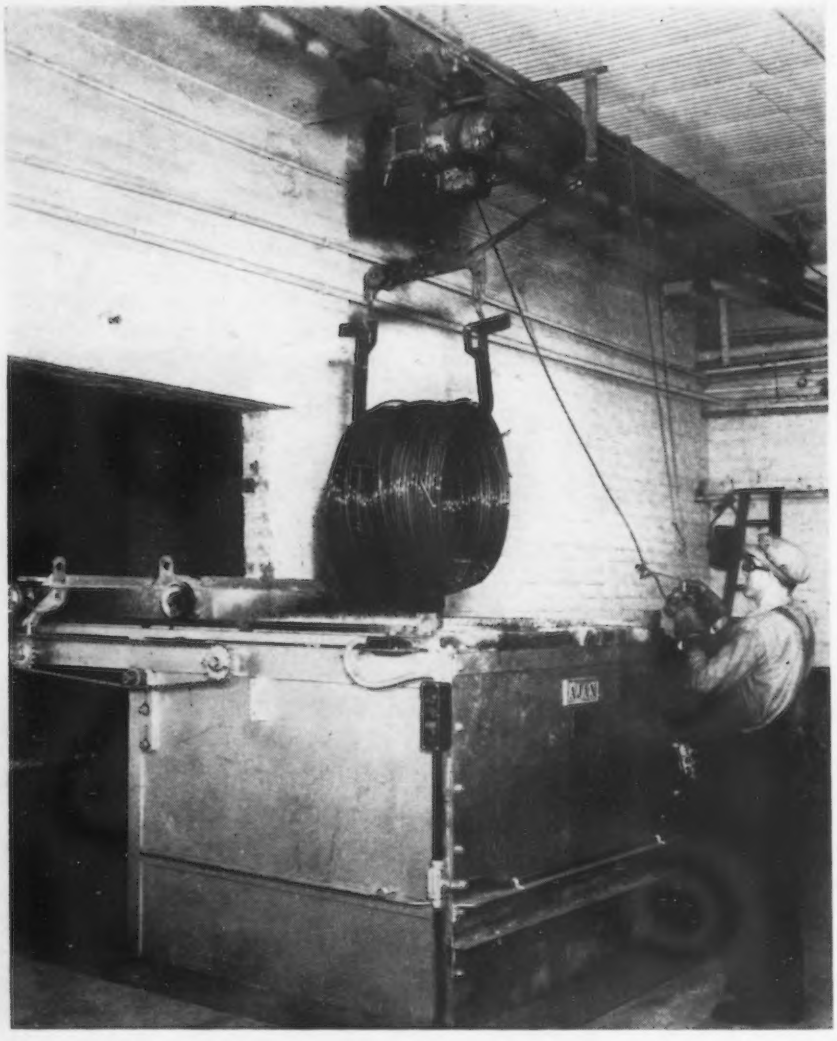


FIG. 19—Yoke of SAE 52100 coiled rod stock entering a salt bath at 1450 deg. F. for austenizing treatment.

surface subjected to high impact shock is required. These bolts of heavy caliber machine or "Tommy" guns are frequently distorted by the conventional quench and temper methods of treatment. If an electric salt bath is used with an activated carburizing salt, a uniform case and penetration are obtained. But it is not practical to quench into a bath of nitrate salts from a carburizing salt bath since an explosion would result. However, if the pieces from the carburizing bath are transferred to a bath of neutral salts, it will wash off the cyanide. The pieces may then be quenched from this wash bath into a nitrate bath without disturbance. When the machine gun bolts were thus treated, almost complete elimination of distortion was obtained and the case had a structure which was hard, tough and resistant to impact.

In this application the pieces, carried on racks, are immersed in a liquid carburizing bath at 1630 deg. F. for about 1¼ hr. to produce a 0.012 in. case, transferred to a neutral salt bath maintained at 1535 deg. F. and, from there directly to a molten salt quench bath at 475 deg. F. At the end of 1 hr. in this bath the racks are quenched in water wash tanks which removes this salt. The salt is completely removed even from the three small longitudinal holes and the one lateral hole by a wash in two tanks (for 1 min. in each tank). The hardness produced on the piece falls between 60 and 64 on the Rockwell D scale, (49 to 52 Rockwell C).

The quench and temper method previously used required a total time of 4.5 hr. compared to the isothermal method which requires 2.25 hr. The rehandling required was reduced from over 50 per cent of the pieces to under 2 per cent. Distortion over 0.001 in. was found in over 25 per cent of the pieces by the conventional method, requiring remachining the bore of the longitudinal holes. The isothermal method reduced this remachining to less than 1 per cent.

It is not intended to imply that the isothermal transformation method will replace or supersede the conventional quench and temperature procedure for all conditions. It is a procedure that enables the operator to predict the results he may expect to obtain where certain properties are desired which are not obtainable by conventional methods. It provides a method to produce a tougher, more ductile product than can be produced otherwise in steel at the same hardness. Like the older method, the analysis of the steel, its prior treatment and the maximum thickness of the piece influence the result that can be obtained. The highly valuable information now available in the TTT curves for various steels assists the heat treater to know where it is practical to apply the isothermal method. These curves, often called "S" curves, are not a curiosity that belongs in the metallurgical laboratory.

The commercial application of the isothermal transformation method places particular emphasis upon the rate of cooling provided in a quench bath using molten salt. The use of molten salt baths in this method of treatment provides the following desirable features:

(1) Uniform temperature throughout the entire bath area to assure uniform austenitizing or transformation desired.

(2) Minimum temperature gradient between the source of heat and the temperature at the center of the piece being heated to assure uniform grain size, and transformation product desired.

(3) Minimum oxidation or scaling of surface of the steel during heating or by contact with the atmosphere during the transfer required in the successive steps of the process to assure effective contact of the quenching medium with the metal surface.

(4) A quenching medium capable of cooling the steel at a high rate in a bath maintained at temperatures above 400 deg. F.

(5) A quenching medium that may readily be agitated or pumped through apertures in a fixture to assure a constant flow of the high temperature quenching fluid against all parts of the piece to obtain maximum rate of abstraction of heat.

(6) A quenching fluid which can be cooled by air blast and agitation to remove the heat brought in from the austenitizing bath by the pieces being quenched and prevent rise in temperature of this bath.

The isothermal procedures referred to in this article illustrate the wide field in which this method is finding applications. The development of the

Table I

Physical Properties Produced in 0.505 Tensile Bars of SAE 4140 Steel by Isothermal Transformation Procedure

Test No.	TEMPERATURES, Deg. F			Hardness R_c	Yield Point, Lb. Per Sq. In.	Tensile Strength, Lb. Per Sq. In.	Elongation, Per Cent	Reduction in Area, Per Cent
	Austenitize	Quench	Draw					
1	1550	1150	none	23	80,500	112,000	24.0	61.0
2	1550	1050	none	26.5	108,000	142,000	18.5	26.5
3	1550	950	none	27	109,000	162,000	14.0	23.0
4	1550	875	none	26.8	100,500	145,000	15.0	30.0
5	1550	750	1075	24	90,500	120,000	21.0	58.0
6	1550	700	1050	27	105,500	127,000	19.0	59.5
7	1550	700	950*	36	140,000	160,000	14.0	50.5
8	1550	650	1000*	34	154,000	170,000	17.0	53.0
9	1550	625	900*	38	189,000	201,500	14.0	46.9

* Bath violently agitated.

molten salt bath quench furnace described which is capable of dissipating the large quantity of heat brought into it from the high temperature austenitizing bath without variation in temperature, marks the transfer of the isothermal transformation method from a procedure of the metallurgical laboratory to that of the heat treat room. There are many units already in successful commercial operation, showing that the metallurgist and heat treater are quick to adapt to their needs new methods that offer to improve the properties of the steel they treat.

[1] A. E. Focke, "Hardenability of Steel," THE IRON AGE, Aug. 20, 1942, pp. 37-40.

[2] B. F. Shepherd, "Martempering," THE IRON AGE, Jan. 28, pp. 50-52 and Feb. 4, 1943, pp. 45-48.

[3] R. L. Rickett, "Planning Heat Treatment by S Curves," Metal Progress, January, 1943, pp. 79-82.

[4] Peter Payson, "The Annealing of Steel," THE IRON AGE, June 24, 1943, pp. 44-47 and 130; July 1, pp. 48-54; July 8, pp. 74-77; July 15, pp. 70-77, and July 22, pp. 60-67.

[5] W. Lueg and A. Pomp, "Salt Bath for Patenting of Steel Wire," Stahl und Eisen, Vol. 61, pp. 266-272, 1941.

[6] E. S. Davenport, "Isothermal Transformation in Steels," Trans. A.S.M., Vol. 27, 1939, pp. 837-886.

[7] E. S. Davenport, E. L. Roff and E. C. Bain, "Microscopic Cracks in Hardened Steel," Trans. A.S.M., Vol. 22, 1934, pp. 289-310.

[8] Thomas G. Digger, "Influence of Austenitic Grain Size on the Critical Cooling Rate of High Purity Iron-Carbon Alloys," Trans. A.S.M., Vol. 29, June, 1941, pp. 285-316.

[9] A. B. Greninger, "The Martensite Thermal Affect in Iron-Carbon Alloys and Plain Carbon Steels," Trans. A.S.M., Vol. 30, Dic. 42, pp. 1-26.

[10] A. B. Greinger and A. R. Troiano, "Kinetics of the Austenite to Martensite Transformation in Steel," Trans. A.S.M., Vol. 28, 1940, pp. 537-574.

[11] Ajax Electric Co., Inc., Frankford and Delaware Avenues, Philadelphia, Bulletin No. 107-A.

[12] R. M. Parke and A. J. Herzig, "Hardenability of Molybdenum S.A.E. Steels," Metals and Alloys, January, 1940, pp. 6-13.

[13] P. Payson and J. L. Klein, "The Hardening of Tool Steels," Trans. A.S.M., Vol. 31, 1943, pp. 218-256.

[14] R. F. Thomson and C. A. Siebert, "The Effect of Carbon Content and Cooling Rate on the Decomposition of Austenite During the Continuous Cooling of Plain Carbon Steels," Trans. A.S.M., Vol. 30, 1942, pp. 27-46.

[15] The Metallurgy and Heat Treatment of Iron and Steel, by Sauveur.

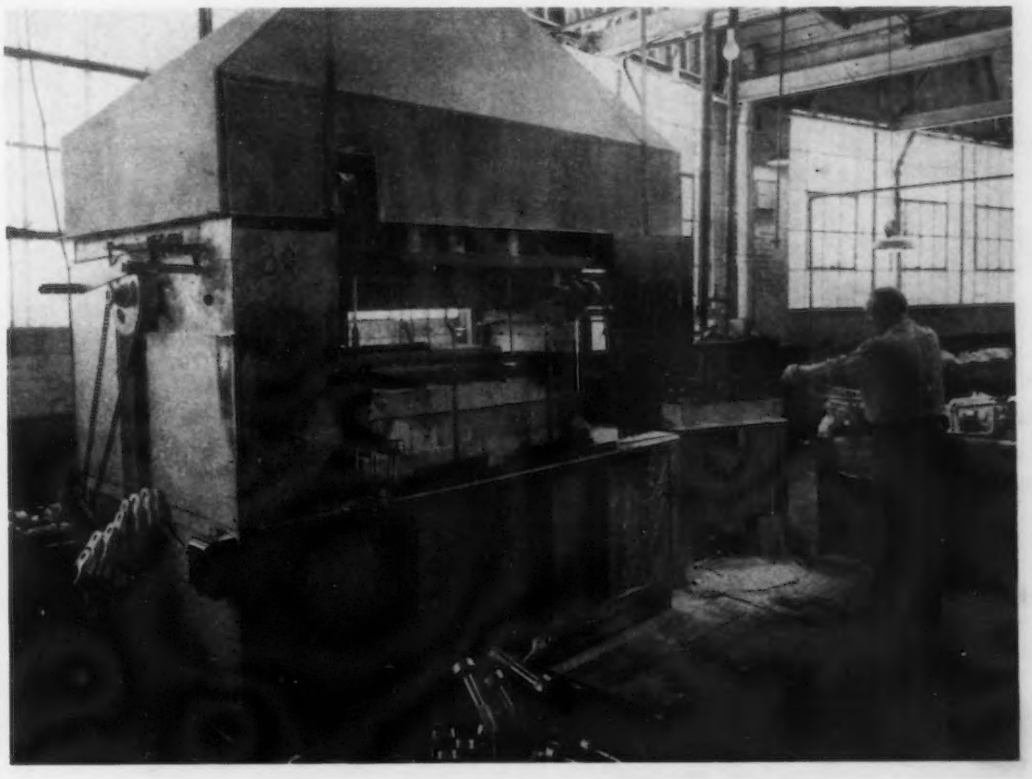


FIG. 20 — Ajax-Hultgren electric salt bath used for hardening spline shafts. This salt bath maintained at uniform temperature extracts the heat from the spline shaft until the entire section is at bath temperature.

Forging 75-mm. Shell on C

MANY articles have been written about shell forging plants that either specialized in hot forging work previously or were able to purchase new forging equipment designed for shell work. This article concerns a plant which before Pearl Harbor was a wire product plant, making chiefly coat hangers, coiled springs for auto seats, furniture, etc. This company had no experience in hot die forging and was unable to buy new equipment, except a heating furnace. The hydraulic presses, pumps, breaking press and other pieces of equipment acquired for shell work are fugitives from a scrap pile, for all these pieces of equipment were purchased from scrap dealers all over the eastern United States.

In spite of the fact that this firm had had no previous forging experience and that most of its equipment

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was improvised, the L. A. Young Spring and Wire Corp., Trenton, N. J., due to its excellent record of production, was awarded the Army-Navy "E" last July.

Billet Preparation

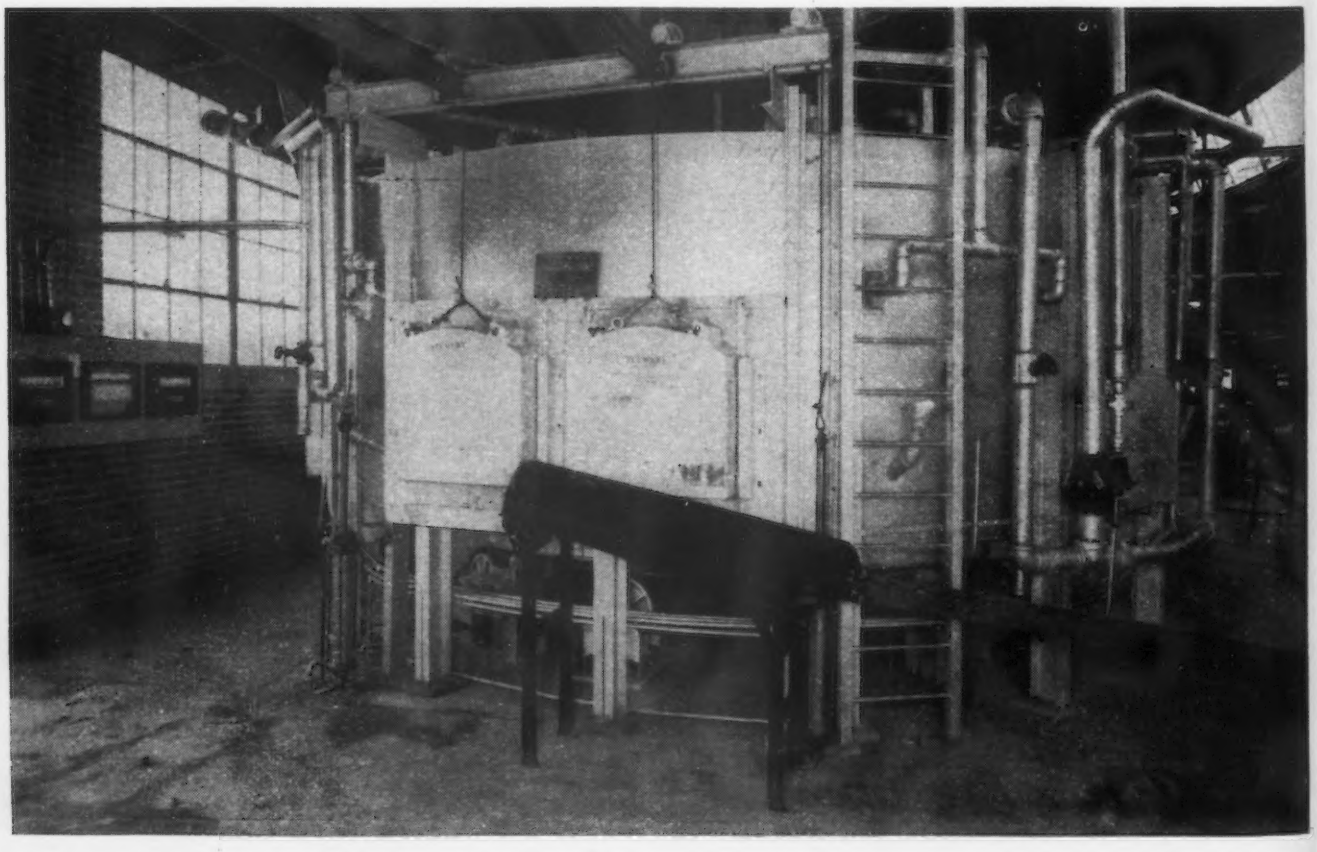
The 3⅛-in. round bar stock for forging shell is bought in lengths of 18 ft. 6 in., which make 27 slugs. From the outside storage yard they are rolled one at a time onto a gravity conveyor and transported inside the building. Inside, this conveyor acts as the nicking table, having a gage along one side with rests attached wherein the flame torch rests for nicking. A single flame oxy-acetylene hand torch is used to nick the bars about ⅜ in. deep for breaking.

After nicking a bar, it is rolled over onto an approach conveyor and pushed longitudinally into the breaker. The machine used for a slug breaker is a Toledo No. 57 mechanical shear which has been remodeled to act as a breaker. This shear is rated at 150 tons capacity and is amply strong enough to do the job.

The approach conveyor is anchored down at the farthest end from the breaker and is supported by two large compression coil springs 6 in. o.d. x 1 in. stock x 18 in. long; one is at the center and the other at the end near the breaker, Fig. 1. These springs cushion the jar from the bar while it is being broken.

As shown in the illustration, the

STEWART rotary heating furnace. The slugs are charged into the door at the left and discharged from the door at the right. Control of the three heating zones is by the recording potentiometers on wall at left.



Converted Rubber Presses

. . . High explosive shells are being produced by the pierce and draw method on rebuilt presses that were originally designed for much slower speed work in the rubber industry. With the exception of a rotary hearth furnace, all the equipment used by this wire products plant was rescued from the scrap heap.

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bar stock is pushed into the breaker, and a pall drops into the nick, locating the nick directly over the breaking anvil. An inverted U holds the bar down and makes it possible to make the last break. After breaking, the slugs are then stored near the furnace, where they are handy for charging into the furnace.

The breaks are very even, thus providing uniformity of material in each shell forging slug. The slugs are 3⅛ in. diameter by 8.22 in. long and weigh 17 lb. 14 oz. There is on an average of 8 oz. lost by scale, thus making a finished forging weight of 17 lb. 6 oz.

It is necessary to operate the breaking shear only 16 hr. a day to keep the two forging lines operating 24 hr.

Heating Billets

The slugs are heated in a Stewart gas-fired rotary-hearth furnace, Fig. 2. This furnace has a hearth of 16 ft. diameter and holds 300 slugs at one time. The heating time is 1 hr. 15 min. per cycle.

The hot slugs are charged into and are drawn from the furnace by air-operated tongs which are supported by a cable attached to a manually operated monorail. They are placed upright on the hearth and are spaced 1 to 2 in. apart to provide even heating. Uneven heating will produce an eccentric forging. There is a firewall between the charging and discharge doors to help control the heat, which is controlled automatically in three separate zones. A recording potentiometer records the heat in the soaking zone where the temperature is kept at 2300 deg. F. The temperature of the slug leaving the furnace is about 2200 to 2230 deg. This heating furnace is capable of supplying hot slugs to both forging lines without interruptions or waiting for heated slugs.

The hot slug is carried from the furnace on a gravity conveyor and is deposited on a simple mechanical descaler composed of two grooved, motor-driven rolls, driven by a 1-hp. motor. After the scale is removed from the cylindrical part of the slug, it is grasped by a pair of tongs so that the end to be pierced is held against one of the rotating rolls, thus cleaning the scale from this end. It is essential that all scale be cleaned from the end that is to be pierced, otherwise the scale will be carried down into the cavity during the piercing operation and be imbedded in the wall of the shell, leaving a pitted cavity. Moreover, scale acts as an abrasive and will score punch tips and shorten the tool life. (Note slug being descaled in Fig. 3.) After descaling, the slug is ready to be pierced and is placed in the piercing die.

Piercing

The presses used for piercing (one press is used in each line) were used originally in the rubber industry at Akron, Ohio. These presses had been scrapped, and were found in a junk yard, covered with rust. The presses were purchased at scrap prices and were sent to Trenton for overhauling. Rubber presses are very slow acting presses, while the speed needed in shell piercing is about 7 in. per sec. (However, the writer has observed one-shot* presses in Canada that pierced shell at 36 in. per sec.

* *See also "One-Shot Method of Forging Shell,"* THE IRON AGE, *Feb. 26, 1942.*

These piercing presses, seen in Fig. 3, were built by Hydraulic Press Mfg. Co. and had a piston diameter of 22 in. and a 24 in. stroke. The hydraulic pressure is furnished by a weighted accumulator at 1250 lb. per sq. in., thus rating the piercing presses at 238 tons capacity. Three pumps are used to supply water to the hydraulic system. Two are in operation at all times and one is standing by to be put in operation in case of a breakdown. These pumps were bought from three different used machinery dealers. One is a Diane pump, driven by a 150-hp. motor, rated at 125 gal. per min.; one is a Blake pump, driven by a 250-hp. motor, furnishing 250 gal. per min., and the third is a Worthington pump, driven by a 150-hp. motor, delivering 200 gal. per min.

Originally the hydraulic pressure was 1600 lb. per sq. in., but due to the heavy water knock which broke the lines, experiments in piercing were made which proved 1250 lb. to be sufficient.

After it is pierced, the hot slug is ejected by a cross bar, which is attached to idler tie rods affixed to

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ARRANGEMENT for supporting bars on approach conveyor to nicking press. The pawl permits positive location of nick directly over anvil and results in an even break and uniformity of stock in shell billets.

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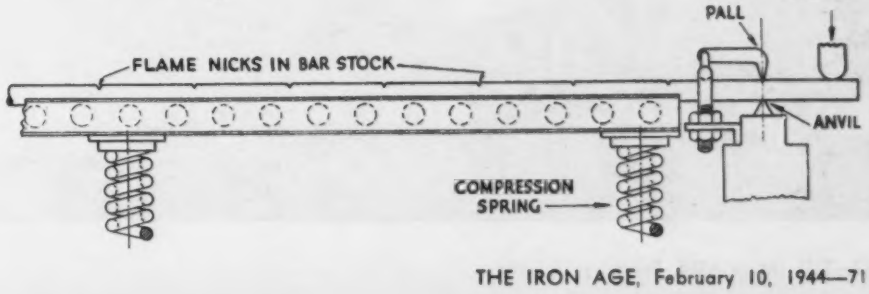

both right and left sides of the moving crosshead of the press. On the return stroke of the press, the forging is ejected from the die. The piercing punch is lubricated with Houghton's Hot Work No. 181 compound and is internally cooled by forcing water down the center of the punch in a tube and letting it flow up past this tube along the inner wall of the punch, flowing out at the top.

Piercing punches are made of Kloster DC-33 steel and last about 500 forgings before they need to be redressed. The punches are redressed about six or seven times, so that each punch can be used for piercing from 3500 to 4000 shells. The piercing die bushings were made of Hard Tem and last on an average of 5000 forgings (total life).

After ejecting the pierced slug from the die, it is grasped by a pair of hand tongs and turned, cavity down, over a rotating spader so that any scale which may have lodged in the cavity is spaded out before the drawing operation.

Drawing

The draw presses (one in each line) were built by Charles F. Elmes Engineering Works and, like the piercing presses, were used formerly as rubber presses. These presses were purchased as scrap, overhauled and speeded up for use in shell drawing. Each press has a piston diameter of 16 in., stroke of 35 in. and at 1250 lb. per sq. in. has a capacity of 125 tons.

The pierced blank is placed in a bottoming pot which forms the boattail on the forging and sets the thickness of the base. The forging is then grasped by tongs and pushed on the draw mandrel. While the ram returns, the bottoming pot and stops are removed. The press is then reversed and the forging is forced down through two draw rings. This operation reduces the forging in diameter and elongates it to size.

The forging is stripped from the draw mandrel by spring-operated strippers below the draw rings and drops out a chute in the bottom of the press, from where it is grasped with a pair of hand tongs by a helper. The heat and turn number are stamped on the forging, after which it is placed, cavity down, over a wicket on a monorail conveyor. To normalize it while cooling and thus aid in machinability, a muff is placed over the forging. The forging travels on this conveyor for 2 hr. before it is removed at the rough turning lathes.

The forgings are checked and inspected while hot. The company keeps eccentricity to a minimum by correcting it in the piercing operation, where it first appears. If eccentricity is corrected here, it will not occur in the draw-press operations.

During the writer's visit to this plant, production records were observed showing a scrap loss in forging of only 0.7 per cent over a period of three months. This is more proof that good shell forgings can be made on revamped equipment. More than anything else, however, it is that Yankee ingenuity and determination that the men of this plant possess that pieced together these various pieces of scrap machinery and made records of productions which won the Army-Navy "E" award and which will finally win victory for the Allied Nations.

The author gratefully acknowledges thanks to Wm. J. Grace, works manager and to Wm. A. Rosser, plant engineer, L. A. Young Spring & Wire Corp., Trenton, for their invaluable assistance and cooperation in the preparation of this article.

DESCALING slugs prior to piercing. Two of the converted hydraulic rubber presses may be seen in the background. Note the clear atmosphere due to the exhaust hoods at each press.

Broken Drills Removed With Dynamite

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DYNAMITER ignites fuse after tamping dynamite into oil hole and inserting cap. Less than a thimbleful of explosive is used. Drill has broken off well down in hole.

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A SALVAGE procedure for quickly removing broken drills from the oil holes of hundreds of precision made crankshafts is saving annually many thousands of dollars for the Ohio Crankshaft Co. The method, which employs dynamite, can also be used to remove broken reamers or plug gages. It is especially suited for clearing deep drilled holes.

Needed are only a clearing in which the salvage work can be carried out, common dynamite, fuse, caps, wire probe, putty and a brace and bit. The monthly breakage of drills at Tocco varies and the value of the crankshafts saved does likewise. Savings are computed on the style of crankshaft more than on the quantity from which drills have been removed. Recently, 93 shafts were blown free in one month. Their value was more than $42,000. In another month some 133 shafts valued at only $29,000 were treated. In comparison to the value of total production the number of crankshafts salvaged is not large but the savings resulting from this homespun procedure are.

The dynamiting technique is simplicity itself. The shaft in question is removed to a clearing outside the plant and placed on a platform, steel skid or the ground. With a wire rod, the hole is probed to determine position of the drill below the bearing surface.

Dynamite is taken from a standard stick of blasting powder and pushed from a small trough into the hole by means of a round stick. No more than a thimbleful is ever used. Generally, the amount is considerably less depending upon the size of the hole and the set of the drill. Practice has shown the proper quantity of powder to use for certain conditions and it is always best to put in less powder than too much.

A 6-in. fuse is next inserted into a small diameter, shoulder-free cap and dropped into the oil hole atop the charge. When ignited a heavy plank or metal shield should be placed over the bearing surface to check the flight of the drill member as it is blown free. Frequently, timbers are split or the drill penetrates metal guard sheets. It is wise to keep at a safe distance during dynamiting.

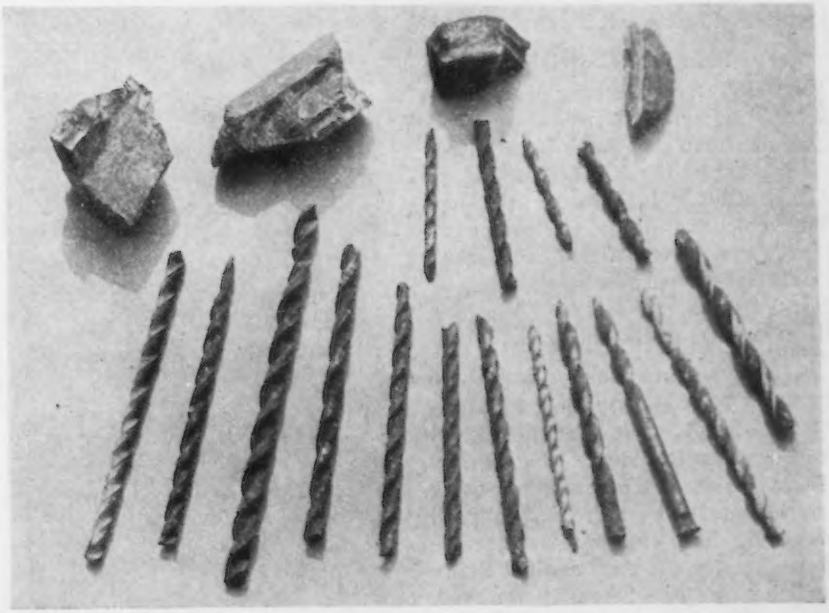
Drills are freed by the pressure of the blast which follows the drill flutes to the bottom of the hole and there reverses itself to drive the piece back out. As it leaves the shaft, the drill makes a ringing noise of metal striking metal.

Wonder has been expressed relative to the effect of the explosion upon the metal. There is no evidence of harm for thousands of crankshafts subjected to this operation have turned in long service records.

Drills removed vary in size from small 3/16 in. bits up to 1¼ in. core drills used in making lightening holes in camshafts. These big drills must be removed piece by piece requiring more than one shot. The dynamite is tamped into the oil hole of the drill itself.

Occasionally a drill breaks off flush with the bearing surface. To blow this necessitates building a putty dam of 1½ in. height above the hole. Into the dam is inserted a fuse and dynamite cap which on detonating either blows out the drill or enough of it so that the next charge can be inserted directly into the oil hole thus finishing the job.

COLLECTION of broken drills picked up from the ground around the blasting area. The large lumps are sections of a big core drill blown out by means of several shots. Note oil holes in core drill.



New Equipment . . .

. . . . Plant Service

. . . Recent new developments in protective clothing and dermatitis preventatives are described and illustrated in the following pages, as well as various other items relating to plant service.

ORIGINALLY designed for use in lumber mills, the safety "Kick-Back" apron No. 11394 has been put on the market by the *Industrial Gloves Co.*, Danville, Ill., for protection when using automatic hammers, drills, etc. The apron features the used of a bowed piece of fiber underneath a heavy canvas. The back of the apron next to the operator's body is quilted for comfortable fit.

Protective Hat

THE *Davis Emergency Equipment Co.*, Halleck Street, Newark, 4 has perfected a hard hat, called Hedgard, to give three-way protection to its wearer. The top of the crown is reinforced for direct blows. The side is built to stand glancing blows and the brim is made flexible yet strong so that it will not crack when dropped. A patented molding and compounding process makes the hat shatterproof.

Non-rubber Headband

A RESILIENT non-rubber elastic-action headband, Holdtite, is being made by *Carter-Lockard Co.*, 225 West 11th Street, Los Angeles. As the headband has the stretch of elastic, it is efficient for workers who wear goggles or respirators. It is adjustable and once set, it cannot loosen.

Industrial Clothing

INDUSTRIAL clothing coated with rubber, synthetic rubber or other synthetic materials have been put on the market by the *B. F. Goodrich Co.*, Akron, Ohio. Included in the new line, which will bear the company's brand, are firemen's and policemen's coats, general purpose work coats, industrial coats and worker's leggings, work jackets, pants and hats.

Faceshield

THE Type H faceshield has been developed by the *Mine Safety Appliances Co.*, Braddock, Thomas and Meade Streets, Pittsburgh, for quick attachment to the type K Skullgard protective hat. It provides durable protection for the face against flying particles and can be easily removed.

Clear, transparent plastic visors, 14 in. wide x 6 in. long, are employed. The fiber visor retaining strap is mounted on a pivotal joint, allowing upward or downward movement of the shield.

Sweat Bands

TO provide workers with greater comfort for hot weather work or where plant heat conditions cause discomfort, the *Aldine Paper Co.*, 373 4th Avenue, New York, has developed the Aldex sweat band. The outside covering assures silky-cool, non-irritating forehead contact. The cellulose fiber filler within the band absorbs perspiration on contact. The bands fit any size head, are so constructed that shape is maintained even when completely saturated and they are rugged enough for rinsing, drying and re-use.

Plastic Work Apron

A LIGHT weight plastic work apron for protecting war workers against dermatitis and other industrial hazards has been developed by the *Otto Aviation Corp.*, Bloomfield, N. J. Resistite is a compound of polyvinyl butyral resin impregnated into a fabric base. It will shed water, oil, gasoline, mild acids and alkalis, as well as iodine and similar compounds.

Eyemask and Hairguard

THE Standard Safety Equipment Co., 232 West Ontario Street, Chicago, has made extra ventilation available in a one-piece, all-plastic Sta-Safe eyemask by perforations above and below the vision area. The eye-protector has unusual impact resistance, is light weight and non-inflammable. It is available in clear or green antiglare model and in large or small sizes. The company also has designed the No. 18 Hairgard, which resembles the French Foreign Legion

head gear and covers all the hair. It is available in ivory or blue, with red, blue, green or white trim around visor. It is cleanable, adjustable, lightweight and cool.

Burn Treatment

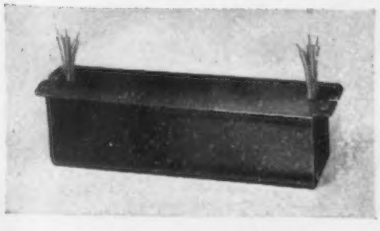
AS a means of reducing manhour loss from industrial burns, the *Gebauer Chemical Co.*, 9410 St. Catherine Street, Cleveland, is marketing a stable, tannic acid solution under the name of "Tannic Spray." The solution may be sprayed directly from the bottle over the affected burn area, materially reducing the probability of blister formation, infection and other complications.

Safety Glove

DUE to shortages of asbestos cloth used in the manufacture of asbestos gloves and mittens for industrial purposes, the jumbo size all-leather wool-lined one-fingered mitt has been designed by *Industrial Gloves Co.*, Danville, Ill. Made of heat resistant leathers, the mitt pattern assures adequate ventilation and coolness to the operator. The 4-in. gauntlet on the Steel Grip Safeguard No. 14730 gives extra protection at wrist; thumb is reinforced with leather strap.

Fluorescent Lamp Ballast

An air-cooled type of fluorescent lamp ballasts for exposed mounting on fluorescent lamp fixtures is being marketed by the *Acme Electric & Mfg. Co.*, Cuba, N. Y. The leads are brought out through outlets in the base plate. It is claimed that because of the exposed installation, the ballasts will operate at lower ambient temperatures than enclosed type ballasts.



Waterproof Creme

FOR plumbers, tinsmiths, heating men and others subject to contact with acids, alkalis and other materials, the *Cadet Creme Co.*, 151 Farrar Avenue, Worcester, Mass., has placed on the market "Skin-Kote," a waterproof creme which is said to be unaffected by carbon tetrachloride, toxic petroleum solvents, ether, thinners and other solvents which defat tissue, causing dryness, cracking and infections.

Breast Protectors

THE Saf-t-Bra designed by *Willson Products, Inc.*, Reading, Pa., is shaped to comfortably adapt itself to the contours of the female figure. Available in three sizes, small, medium and large, it is made of a durable plastic, which can be cleaned

easily and is attractively colored in fleshtone. It not only provides protection for the breasts, but is designed to extend well back under the arms to prevent possible painful injury of the delicate and sensitive lymphatic glands.

Skin Protector

A SKIN protector has been announced by the *Commercial Solvents Corp.*, 17 East 42nd Street, New York, which is called the CSC Protector. It is non-sticky, white and greaseless, and it is claimed it will not irritate sensitive skin and has no drying effect. It is said to be protective for four to five hours after application.

Hand Creme

DESCRIBED as the "visible glove," Neo-film, the protective coating brought out by *Jones Medical Laboratories, Inc.*, 800 Huron Road, Cleveland, is a liquid which guards the skin from cutting oils, greases, coolants, lards, oxide fumes, red lead, etc. It washes off easily with soap and water, carrying off all harmful residues.

Goggle Cleaning Station

TO encourage workers to wear their goggles and to keep them clean, the *Mine Safety Appliances Co.*, Braddock, Thomas and Mead Streets, Pittsburgh, has designed a goggle cleaning station for wall mounting throughout the plant. The compact case is equipped with Fogpruf, a lens cleaning and anti-fogging agent, and optical wiping tissues. A tap on the inverted vial sprays Fogpruf on the goggle lens. Cleaning tissues are pulled from the opening in the top of the station and discarded into a receptacle in the lower part of the case.

Protective Cream

THE Tarbonis Co., 1220 Huron Road, Cleveland, has developed a cream as a specific for various skin disorders. It is recommended where there is occupational dermatosis whether due to chemical irritation, chronic exposure to abrasives, work with cutting oils, reagents, acids, etc. The cream is greaseless, clinically non-allergic and non-irritating.

Fluorescent Lighting Fixture

DESIGNATED the Aristolite, a commercial fluorescent lighting fixture, in sizes for 2-40, 3-40 and 4-40 watt lamps has been announced by *Edwin F. Guth Co.*, 2615 Washington Avenue, St. Louis 3. A steel housing totally encloses all accessories and wiring. End-design permits flush-abutment of units when continuous installations are desired. The fixture can be suspended or can be mounted close to the ceiling. According to the manufacturer, the special lens design glass utilized breaks up the rays to

satisfactory brightness levels yet has high transmission qualities. The glass panels are easily removed for servicing and relamping. A Masonite reflector directs 85 per cent of the light downward.

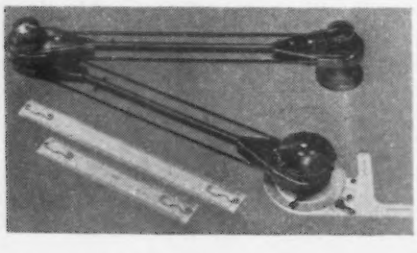
Injection Molded Nameplates

INJECTION-MOLDED nameplates of Tenite, used to mark steam and diesel engines, will not corrode and the outlines will remain distinct, according to *Tennessee Eastman Corp.*, Kingsport, Tenn. The nameplates, with one color an inherent

part of the plastic and another furnished by paint, contrast sharply with the metal of the engines. The plates are fastened to the engines by means of machine screws, and serial numbers and other data are stamped on with metal stamping dies.

Portable Drafting Machine

A SMALL drafting machine that can be mounted on a portable board and used in shop or field is being produced by the *V & E Mfg. Co.*, Pasadena, Cal. It is called the Vemco Jr. drafter and is made of shock-resisting plastics. It features accurate, parallel motion over the entire board, a full circle baseline setting, pre-lubricated and double-sealed bearings and enclosed pulleys. Disk brakes at anchor and elbow allow it to be used on steeply inclined boards. Aluminum



scales 8 and 10 in. long fit into slotted chucks in the positive scale holder. The protractor is graduated in degrees with figures by quadrants. A 10-in. vernier plate can be supplied.

Aircraft Hose Clamps

AIRCRAFT STANDARDS PARTS CO., 1711 Nineteenth Avenue, Rockford, Ill., has added model M-6 for ¼, ⅜ and ½-in. hose and model No. M-10 for ⅝ and ¾-in. hose to its line of aircraft hose clamps. By using the extra take-up in the band, the M-10 can be used on hose from ¼ to ¾ in. The band is spring steel strip perforated to correspond with the teeth of a worm gear and is drawn through the hosing by a worm thumb-screw. Lock wire is not required.

Oil Reconditioner

A COMPACT, portable oil treating unit has been developed by the *Sparkler Mfg. Co.*, 313 Lake Street, Mundelein, Ill., for reconditioning cutting, grinding and honing oils that should be heated before filtering. The unit consists of a 100-gal. mixing and heating tank that is equipped with electric immersion heaters, a mechanical agitator, a thermometer, a filter aid storage box of 50-lb. capacity, a main line fused knife switch, a magnetic push button controller, a Sparkler model 18-D-12 horizontal plate 600-gal. per hr. filter, a rotary pressure pump and a 1-hp. motor. The pump is so arranged that it can be used to transfer the oil from the pump into the heating and mixing tank and also to pump the oil through the filter. Tank will heat 100 gal. of oil from 80 to 180 deg. F. in 30 min.

Krimp-Sealer

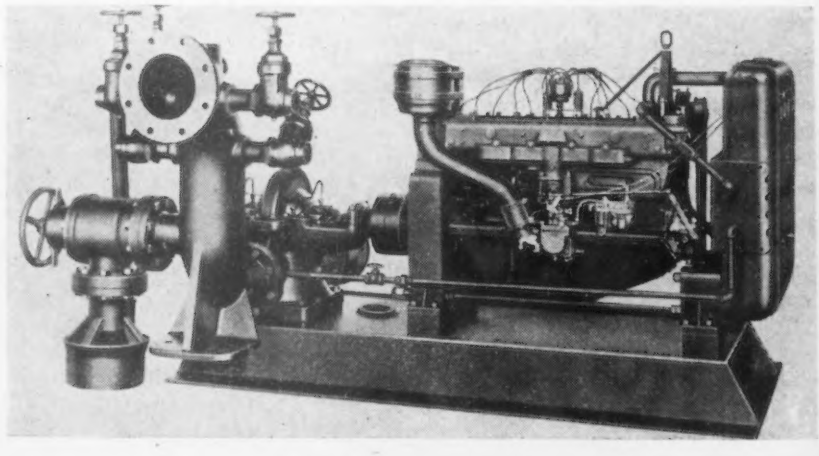
PACK-RITE MACHINES, 828 N. Broadway, Milwaukee, announces an improvement in the design of their E-Z sealer, used to krimp-seal heat-sealing bags for arsenals, aviation plants, metal parts manufacturers, etc. Designed for foot pedal operation, the krimper bars are mounted on insulater blocks to confine the heat. Special heating elements are used in order to take care of all types of heat sealing materials.

Mansaver Grab

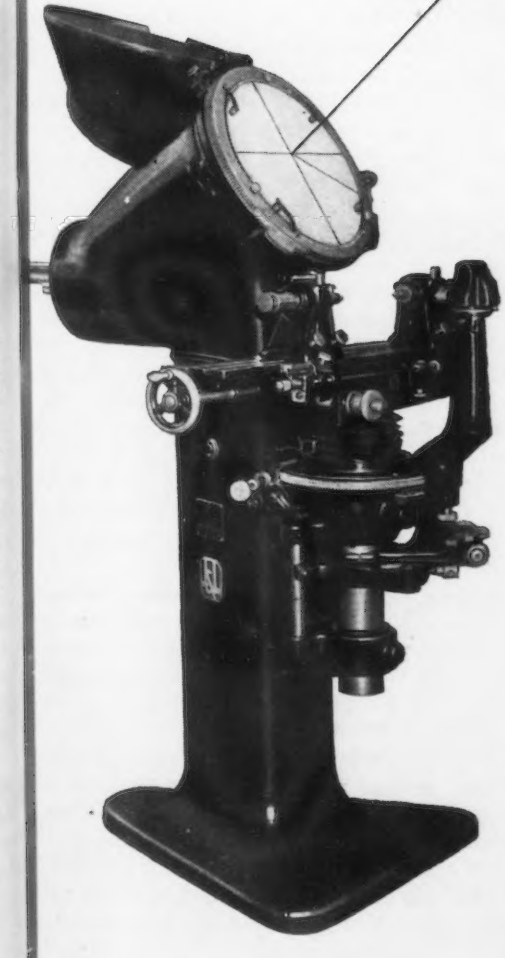
J. B. ENGINEERING SALES CO., 1732 Orange Street, New Haven, Conn., has developed a Mansaver grab which is capable of lifting 100,000 lb. at one time. It picks the load up by means of pans and can be adjusted to grab pans of varying widths. The equipment also can carry loads 20 ft. long, 7 ft. high and varying in width from 100 to 110 in. It is operated by one man from the floor by means of a chainwheel. It is offered also with a motor drive where frequent operation is desired.

Fire Pumps

FOR times when electric power or steam pressure is not available, *Fairbanks, Morse & Co.*, 600 South Michigan Avenue, Chicago 5, have developed a line of gasoline engine-driven fire pump units in capacities of 500, 750 and 1000 gal. per min. Quick and reliable starting is featured. They may be equipped for automatic operation starting from pressure switches or thermostats.



Beyond a shadow of a DOUBT!



In inspection operations there is no way of gaging the consequences of doubt . . . but there's one sure way of gaging *beyond a shadow of a doubt!*

That method is with the use of **Jones & Lamson Optical Comparators,** projection machines for measuring and comparing objects by means of a magnified shadow.

They measure angles in degrees and minutes; lead or spacing; height or depth . . . They photograph the enlarged shadow, without the need of a dark-room . . . They compare objects with a master outline . . . They permit rapid inspection and measurement of the many forms that are difficult or even impossible to inspect by direct gaging.

Any man or woman with a few minutes of instruction can operate this machine with speed and precision—a matter of particular importance in these days of manpower shortage.

There's an experienced Jones & Lamson Inspection Engineer near you. Call, write or wire for this service to Jones & Lamson Machine Company, Springfield, Vermont.

For rapid, economical inspection . . . BEYOND A SHADOW OF A DOUBT!

•

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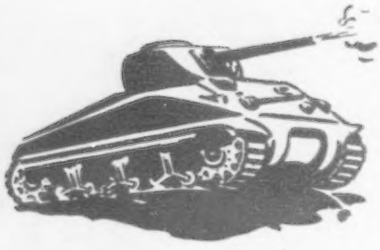
JONES & LAMSON
MACHINE COMPANY
OPTICAL COMPARATORS Springfield, Vermont, U.S.A.

PROFIT-PRODUCING MACHINE TOOLS

Assembly Line . . . .

STANLEY H. BRAMS

• Equal pay for equal work keynotes drive of Auto Union in brief filed in General Motors case . . . Chevrolet develops a more economical method of obtaining test coupons.



DETROIT—An attack on one of the broad philosophies motivating the War Labor Board was a feature of the negotiations of the United Automobile Workers Union with General Motors Corp. The union stand was that the board is collapsing because, among other reasons, it looks upon each labor problem as an individual case, rather than a segment of the broad labor panorama.

With this springboard, the union strongly urged its industry-wide platform of equal pay for equal work, an objective set forth at the Buffalo convention as primary, and one whose implementation commanded most of the attention of a recent meeting of the International board in Chicago.

In the GM negotiations, whose findings are now being studied by NWLB in Washington, the union declared that the company's tool and die work classifications are paid largely on an equality basis, with identical arrangements set up for GM plants through Michigan, Ohio, Illinois, New York, and New Jersey. The claim is made that if these skill classifications are to be compensated equally in these various plants, then similar provision should be made for production workmen.

Looking at today's broad auto industry picture, the union proposed to divide it into six general classifications insofar as wage scales are concerned. These are: Tank production and heavy armored mechanized units; engine production—aircraft, auto and diesel; wing and fuselage fabrication and assembly; guns, shells, and general ordnance; forges and foundries; and tool and die, pattern makers, maintenance and related skilled trades.

Obviously these breakdowns are for the war period, but they are readily translateable into peace-time equivalents. The tank production classifications proposed by the union, as follows, are roughly similar to jobs in an automobile or truck assembly plant: Welders, assembly hands, grinders, drill press operators, lathe operators, milling machine operators, flame cutters, spray painters, and tank testers.

Similarly the aircraft engine job classifications set forth by the union could apply in almost any type of motor production plant: Drill press operators, milling machine operators, lathe operators, rough and precision grinders, assembly hands, men inspectors, shapers, surface finish polishers, Bullard operators, filers and burrers, boring mill operators, sintering, gear cutting machine operators, and balancing on cranks. All these classifications, of course, would be further broken down in detail.

WAGE differentials have quite definitely been causes of disagreements in plants of the auto industry in the past. This writer recently heard a long complaint from a level-headed acquaintance working at a machine in one of the largest Detroit plants. This man is paid $1.15 per hour for his work, producing tank parts. In the same plant, he said, a few aisles away from his machine are other men working on identical machines to approximately the same tolerances, producing aircraft engine parts. The men working on these aircraft parts, however, are paid $1.35 per hour. Quite obviously here is a made-to-order cause for labor relations friction.

The examples in the union brief on the General Motors case cited smaller differentials in armor plate welding pay in various eastern Michigan plants. Fisher Body plants at five eastern Michigan points pay $1.29 an hour for this work, the brief stated, while Chevrolet-Flint has brackets of $1.24, $1.29 and $1.34; Ford, Detroit, pays $1.25; and Chrysler, Detroit, pays $1.25, it declared.

A variety of factors are at hand here beyond the simple issue of equal pay for equal work. However admirable may be the equality ideal from the workingman's standpoint, it should be applied within regional limitations (certainly the paying of Detroit level wages in an automotive plant in a southern agricultural district, for instance, would badly upset the equilibrium of that latter area).

Then, too, any installation of equal pay scales for equal work would be obviously intended by labor groups to be tacked onto the highest going wages for the particular job, rather than the median or the average. Questions of efficient operations therefore become inevitably tied to the problem implying that one company would survive at a uniform rate, while a second might perish.

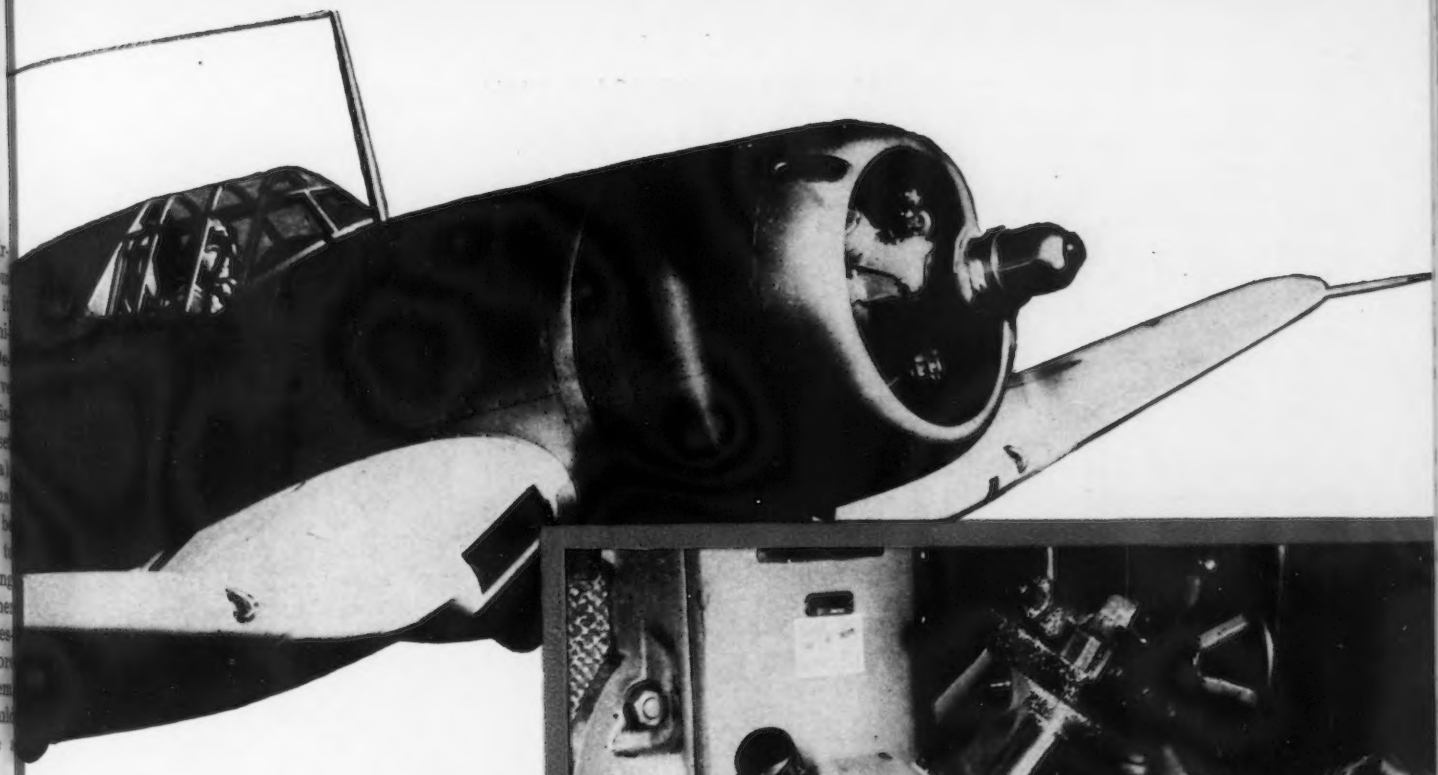
Too, there is a faint suspicion of internal union politics attached to this entire program. A centralized wage schedule would make future negotiating for pay raises much simpler. Concurrently, it would increase the power of the central administrative board, eliminating much of the functioning of the locals of the unions. This may not necessarily be part of the union thinking. Then, again, it may.

Finally, a fine question of free enterprise is involved. Standardization of wages could logically be followed by standardization of selling prices, standardization of profits, and standardization of everything else. The European name of this is *fascism*. The difference is that in Europe these "reforms" were sought by the "upper classes" to bulwark their positions. Here, now, they are sought by labor groups seeking to improve their positions. Someone must be wrong.

STREAMLINING of the procedure for testing heat treatment of forgings used in production of Pratt & Whitney aircraft engine parts made by Chevrolet has resulted in notable savings of steel.

Standard practice in the past has been to utilize test coupons forged as a part of each propeller shaft. A coupon was cut off an end of each shaft following rough machining and drilling of the center lengthwise hole, and was then wired to the parent shaft. Each coupon and its shaft remained tied together through the furnace quench and draw. The coupon was then detached, slit and turned to a regular tensile test bar.

Seeking to reduce the 16.84 lb. of



Basis For Confidence

American flyers aloft are trusting their lives to the precision workmanship of those who build their planes back home. And to the capacity of those builders to support this skill with the prodigious ***number*** of planes they need. Two axioms of war which underscore the fact that ***More Bullard Vertical Turret Lathes are in use by America's builders of airplane engines than in any other industry.***

• Bullard Vertical Turret Lathes

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

steel required for each coupon, Chevrolet engineers hit on the idea of utilizing stock which would not be subject to machining operations and which could be considerably smaller at the start than the original coupon. Tests were run, and the following procedure was decided upon:

As heats of steel come to the forge plant, estimate is made of the number of forgings that can be produced from them. Enough bar stock is withdrawn from the heat to provide a test coupon for each propeller shaft forging. This stock is furnished along with the forgings, to the manufacturing plant, which uses a band saw to slit the bar stock into pieces 1 in. square by 4¼ in. minimum length. This provides about 10 test coupons out of the same amount of steel previously required for one coupon.

One of the new type coupons then goes through heat treatment along with each individual forging, and subsequently undergoes customary tensile, yield, elongation, area reduction, and hardness tests. Of course the test coupon in the new procedure is not from the same forging with which it goes through heat treatment, but testing has established that as long as it is from the identical heat of steel, the differences in findings between it and the old-type coupon are negligible.

Steel savings for each propeller shaft, utilizing this system, run about 15.16 lb. Plans call for utilizing this program for crankshafts as well, with attendant saving of 19.26 lb. per unit.

Carrying out this conservation program, Chevrolet engineers have been granted permission to test one sample for each 10 master rods, providing additional savings. Another phase of the drive to save steel has resulted in the reduction of the amount of steel required for machining on the cylinder sleeve by 10 lb. per cylinder.

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Baruch May Clarify Termination Records

Washington

• • • **Bernard M. Baruch** may soon report what are minimum requirements contracting officers must meet in making a record of contract terminations.

Based on the fact that War Department recommendations were largely followed in devising a uniform termination clause, it is assumed that Mr. Baruch will incorporate the War Department's present practices on record maintenance when he makes recommendations on the demands of termination records.

The War Department now requires the following record in every negotiated contract termination settlement:

1—Manufacturer's settlement proposal supported by certificates signed by the manufacturer and his suppliers, including inventory.

2—Report of War Department accounting personnel.

3—Statement by the contracting officer setting forth the basis of the settlement, together with an explanation of unusual situations and special reports by property disposal officers.

In view of the known accounting demands of the General Accounting Office with respect to the adequacy of records for audit, it is expected that no objection will be raised by GAO should the Office of War Mobilization make the foregoing record requirements standard for all war agencies.

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Electrolytic Line Coats Zinc Sheets

Pittsburgh

• • • **Using the same** electrolytic lines that have revolutionized production of tin plate, Weirton Steel Co., a division of the National Steel Corp., is now turning out electrolytic zinc coated sheets at the rate of 160 ft. a minute in its **new precision** unit at Weirton, W. Va.

While most of the zinc coated sheets produced at Weirton are processed into ends for fiber shell canisters and ammunition containers, some of the company's recent output will be used to make automobile head gaskets and spark plug gaskets.

A list of suggested items for which electrolytic zinc coated sheets and strip may be utilized, according to the company, includes hot air conductor pipe and elbows, oil cans, spools and reels, Venetian blinds, furniture, moulding, expanded metal lath, corner bead, fiber box reinforcements, lamps, flexible hose and shafting, builders hardware and box strapping.

Three lines of electrically operated equipment, each 400 ft. long, can be used interchangeably to produce either tin plate or zinc coated sheets, which are fabricated into a wide variety of articles for war or civilian use.

The lines are designed to coat sheets up to 38 in. wide, from 0.0080 in. to 0.0370 in. gage (39 to 21 zinc gage) and coated from 0.1 oz. to 0.2 oz. a square foot on both sides. The product is marketed in coils or cut lengths down to ⅜-in. narrow strip.

The electro-plating unit, where the zinc coating is applied to the moving steel strip, is a three-deck section consisting of 24 identical cells, formed like troughs. These cells are 5½ ft. long, 4 ft. wide, and 8 in. deep.

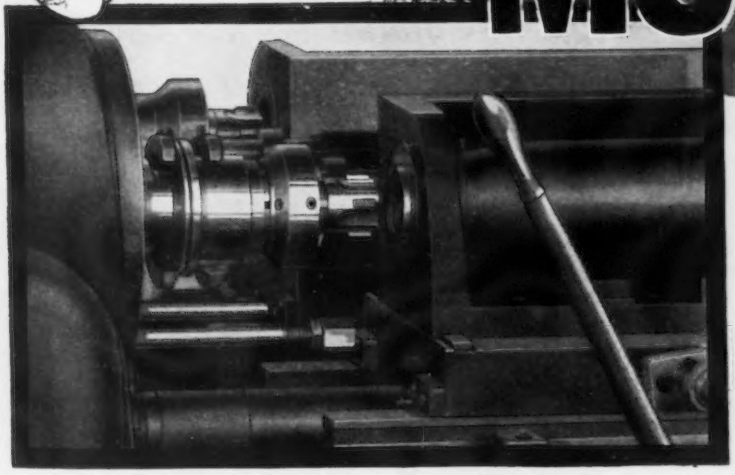
For zinc coating, the cells are filled with a zinc electrolyte made from zinc chloride, sodium chloride, and aluminum chloride. The solution is mainained at a pH of 3.0, with temperatures ranging from 115 degrees F. to 125 degrees F.

On the floor of each cell there are 16 pure zinc anodes, and the total weight of the anodes in all 24 cells exceeds 33,000 lb. Current enters the cells through bus bars connected to the anodes. The current carries zinc from the anodes and deposits it on the moving strip steel, which enters and leaves each cell on rollers.

The low voltage generators deliver 60,000 amperes of power to the plating unit at all times. At a line speed of 160 ft. a minute, a current density of 200 amperes per square foot is required.

COMING EVENTS

Feb. 21 to 24—American Institute of Mining & Metallurgical Engineers, New York.
March 14, 15—National Association of Waste Materials, Inc., New York.
March 27, 28—American Society of Tool Engineers, Philadelphia.
March 30, 31—American Gas Association War Conference, Rochester, N. Y.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.
Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.



No. 22 . . .
SHELL TAPPING MACHINE

● This particular machine has achieved an outstanding record in the production of shells and bombs. It is arranged with tap for tapping the nose ends of shells and bombs. May be arranged with die heads with which to thread component parts. Also equipped with lead screws to guarantee positive leads and with precision fixtures for perfect alignment. Capacity Machine Threads —½" to 2" U. S. S. Inclusive; ½" to 2½" S. A. E. Inclusive. Capacity Pipe Threads—½" to 2" Inclusive. Write for descriptive catalogue.

. . .

Also ask for catalogue on No. 32 and on No. 42 Thread Milling Machines.

MURCHEY MACHINE & TOOL COMPANY • DEPT. I, DETROIT 26, MICHIGAN

MURCHEY

Murchey also manufactures all types of Self Opening Die Heads and Collapsible Taps. Literature on request.

Washington . . . L. W. MOFFETT

• Military is force hindering reconversion . . . Public weary of complacency charges . . . Government softness on strikes and overstaffed agencies shows apathy and political expediency.

THE policy of the government to bar "general resumption of civilian production at the present time" as expressed by WPB chairman Donald M. Nelson, is partially based on a psychological factor. The policy represents military thinking. Whether it is right or wrong may be debatable, but the Army and the Navy believe that there is too much civilian complacency over the war situation. To permit anything like broad scale reconversion, it is feared, would increase this so-called complacency and give rise to a business-as-usual trend in the face of the fact that the country now faces the most serious crisis in history.

Definitely, some government agencies do not share this thinking of the military branches of the government, but have had to yield to it. That they have had to yield is understandable. The military services only have to point to the growing battle casualties, to the fact that the European invasion yet to come is expected to be costly in lives, and that any let-down on the home front might well add to the sacrifice of lives that lies ahead.

Nevertheless, government agencies not in agreement with military viewpoint cannot understand why civilian production cannot be started when manpower, materials, and capacity are available. They do not accept the idea that this reflects complacency in any sense. On the contrary, they consider that it shows an acute awareness to the need of maintaining production and employment and therefore the economic structure so far as is possible under war conditions without in any way interfering with military demand.

It is contended that a policy of unjustified restriction on civilian output will cause a tendency toward overproduction of war weapons. Some of them might well become obsolescent before needed and therefore cause a waste of materials, manpower, and capacity. This policy carried too far, it is maintained, would mean a rough rather than a smooth transition period. This view is based on the premise that the longer industry is kept from making firm plans for reconversion, the greater the economic repercussions from unemployment will be.

UNCERTAINTIES of war clearly must be kept uppermost in mind and every preparation made to guard against reverses. Nor, it is contended, should the civilian population be falsely encouraged in the thought that the war is nearing its end, either in Europe or in the Pacific. To allow the home front to go any "softer," it is maintained, would inevitably affect the morale of the front line troops. The pressure for a National Service Act is said to be prompted to a considerable extent by this kind of thinking by the armed services.

The armed services probably go to extremes in their concern over so-called civilian complacency, but, if they have to lean over one way or the other, the backward tilt is the slant they should take professionally. At least it is the safer side. At the same time, there is undoubtedly a growing resentment in the country over excessive admonitions against complacency that come from the military and other government sources. The tone of these warnings might indeed be altered. They would be more effective if they were less pontifical. The public has grown weary of being treated as if it was a kindergarten class and as if it didn't know that war is what Gen. William Tecumseh Sherman said it is.

Certainly most of the public must be acutely aware of the implications of war. With some 10,000,000 fathers, sons, and brothers in the military services, directly affecting about one-third of the families of the country, it simply is not true that there is widespread complacency. There still is undoubtedly too much complacency — any apathy is too much — but to assume that it is so widespread as appears to be assumed by some statements emanating from government sources is overdoing the job. The growing casualty lists and realization that they will become much greater has given the civilian population for the most part an intimate understanding of war and unquestionably has caused a lessening of complacency.

FOR that which remains it would be well for the government to analyze itself and see if it isn't responsible for a great deal of it. Its soft attitude toward strikes, its vastly overstaffed bureaucracy of almost 3,000,000 civilian employees, which could be reduced by 50 per cent at least and place the government on a better war-footing, surely reflects an apathy on the part of the government that smacks of political expediency. Thus the tax-paying public whose so-called lack of war consciousness might well turn the tables and warn the Administration against its own weaknesses.

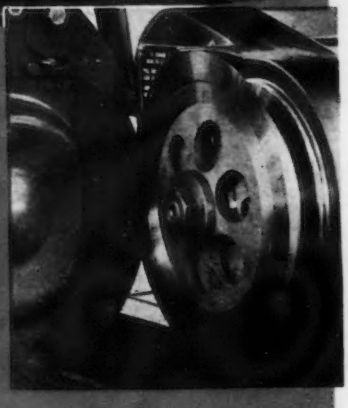
But notwithstanding differences of view regarding complacency or other factors, the big thing is to get along with the war and to bring it to a successful conclusion as soon as possible. To this end any reconversion to civilian production, with sound reason, will be delayed until after the invasion on the western front. Arguments that there now is idle capacity in the steel and other vital industries, and that components and labor are available for much greater civilian production will not prevail. For the present the stepping up of such output will continue to be only on relatively small scale.

ONCE the European war has been ended, however, it may be expected that there will be an early shift to much larger peace production. As anxious as management is to return to greater civilian production after the war situation justifies that conversion, labor, already urging increased peacetime output, will become much more insistent because quite properly it will not stand by idly and see a needless growth of unemployment.

There are varying estimates of the effect on war production after Germany is knocked out. One estimate, which many think is considerably too high, is that with the defeat of Germany war production can be cut 80 per cent. The remaining 20 per cent,

Below: An internal job. Here the Internal Grinding Attachment has been pulled down into position for grinding the bore in a short shaft to an accurate plug-gage fit. The attachment is standard equipment always in place and may be set up at a moment's notice.

Above: An External job. Grinding the taper—3½" per foot—on the shank end of an attachment driving gear. Notice the Internal Grinding Attachment on the front of the wheelhead. The attachment is up and out of the way but ready for instant use.



Right: A Face grinding job on the CINCINNATI Hydraulic Universal.

CINCINNATI 12" Hydraulic Universal Grinding Machine

Give Your New Product A BREAK in the Toolroom

The first few samples of your new product for tomorrow's market must be made on machine tools, in the *tool room*. There, they pass through their most critical period. There, the product can be started on its way to success or failure. With versatile and up-to-date tool room machines for manufacturing the parts, the chances are that the performance of the assembled unit will equal blue-print specifications.

CINCINNATI Hydraulic Universal Grinding Machines have all the qualifications for tool-room work of this type. They will size accurately, within .0001", and produce exceptionally smooth finishes with no extra effort. Changes from external to internal or face grinding may be accomplished in a few minutes. The table continually reverses within .004", enabling the operator to confidently grind close to shoulders.

These few statements give you an idea of the fine work which can be produced on CINCINNATI Hydraulic Universals. Complete information may be obtained by writing for catalog G-486-1 (12" size) or G-474-1 (14", 16" and 18" sizes).

CINCINNATI

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

CENTERTYPE GRINDING MACHINES CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES

it is claimed, will be enough to knock out Japan. Perhaps a more general estimate is that a 50 per cent cut is all that can be made, leaving the remaining 50 per cent on war production to finish the job of crushing Japan. But whatever the percentage of the cutback, it will be so large that a lot of capacity will be freed for civilian production and it will be needed to supply the peace economy of the nation.

While relatively this country has not suffered from shortages, nevertheless, it has been on a short diet and has an appetite for consuming many classes of products for repairing machinery and all sorts of utensils and gadgets, to say nothing of what it will want in the way of automobiles and heavy durable goods items when full peacetime production is restored. Moreover reconversion on a gradual rather than a sudden and complete basis certainly will relieve the impact of the numerous and serious problems that will be involved when the war comes to an end.

o o o

Sympathy Shown for Postwar Cartels

Washington

• • • **American industrial** and some governmental support is appearing in favor of cartelization of all industries. Departments containing powerful groups which are said to favor this solution to postwar foreign trade problems, including unemployment, are the Foreign Economic Administration, WPB and the State Department. Some sympathy is showing in Congress.

As the Federal Trade Commission, the State Department and the Justice Department have assigned groups to study cartels, the Kilgore (Senate) Committee on War Mobilization released last Friday an anti-cartel monograph prepared by Corwin D. Edwards, chairman of the Policy Board, Anti-Trust Division, Department of Justice.

While Senator Kilgore declared that the report represents in no way the opinion of the Committee members, he said:

"The study points up the necessity for developing a foreign economic program that will both preserve the integrity of our domestic economy and enable us to maintain friendly economic and political relations abroad. Such a program along new lines is requisite if we are to establish an enduring peace after the war."

The Corwin report says that the British are chief exponents of cartelizing all American industry.

"In a recent discussion with the president of the United States Chamber of Commerce, Lord McGowan, chairman of the board of Imperial Chemical Industries, declared that he saw no hope for postwar cooperation between British and American business unless the American Sherman Act were repealed," Mr. Corwin said.

According to the report, the most ambitious of the publicly announced programs is that of the World Trade Alliance which is promoted from England by Sir Edgar Jones, a former director of Courtaulds, Ltd., and an executive of the international tin plate cartel.

In discussion of his proposal, Sir Edgar asserts that it requires two basic conditions:

"1. For every class of products the organization must be universal.

"2. Raw materials must be organized as well as manufactures."

He also points out that control of exports must necessarily be associated with similar control of internal markets in each participating country.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Reprinted by request.

Creighton and Hazlett Are Advanced by J. & L.

Pittsburgh

• • • **William J. Creighton** has been made executive vice-president, Jones & Laughlin Steel Corp., Pittsburgh, by action of the board of directors on Feb. 7. Adam J. Hazlett was appointed general manager of sales.

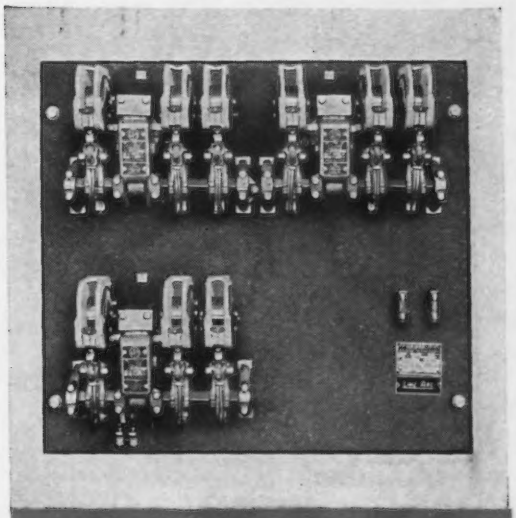
Mr. Creighton entered J. & L. as a clerk in 1900, became financial vice-president in 1928, when he was elected a director of the corporation and a member of its executive committee.

Mr. Hazlett, after graduation from college, was employed by the West Penn Steel Co., in the sales department. He later became sales manager, and subsequently president, of the Eastern Rolling Mill Co. In 1938 he came to J. & L. as manager of strip and sheet sales.

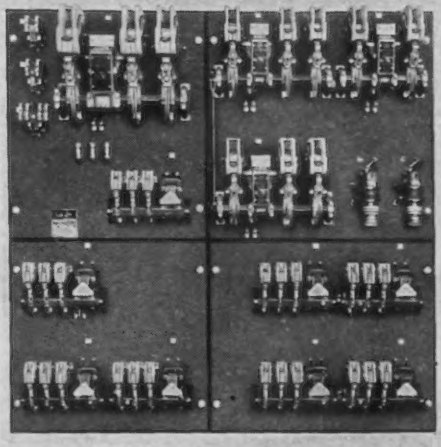
William J. Filbert Dies

• • • **William J. Filbert**, 78 years old, director of U. S. Steel Corp., a member and former chairman of the Corp.'s finance committee, died Feb. 4 at his home in New York after a brief illness. Mr. Filbert served as comptroller for 30 years. At the time of his death he was senior director of the company, having been a member of the board continuously for nearly 25 years.

Control by EC&M assures high efficiency of BILLETEER



EC&M *LINE-ARC* Contactor Control for the Billeteer tool head and elevator drive. This unit is mounted in the cabinet on the Billeteer.



EC&M Controller for separate mounting in cabinet which controls other motions of the Billeteer.

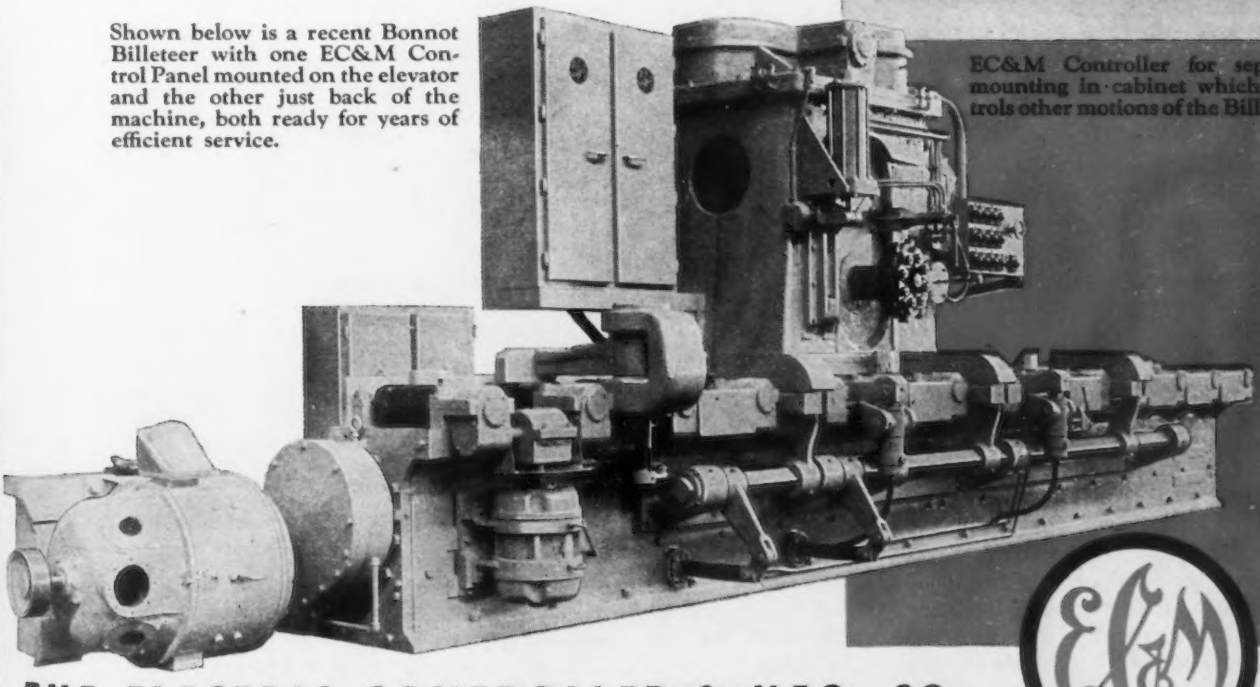
●Spotting the cutting head of the Billeteer over the seams and defects of billets is not only a continuous job but one which requires perfect dependable control of a machine that weighs 150,000 pounds.

The operator must have fingertip control of the cutting head in addition to operating the approach and runout tables and all manipulation of the billet itself.

The unit shown below was just completed for a steel company which has three other Billeteers EC&M equipped. They know the rugged, twenty-four hour a day punishment these controls must undergo.

Our nearest office will gladly supply complete details.

Shown below is a recent Bonnot Billeteer with one EC&M Control Panel mounted on the elevator and the other just back of the machine, both ready for years of efficient service.



THE ELECTRIC CONTROLLER & MFG. CO.

2700 East 79th Street **Cleveland 4, Ohio**

WEST COAST . . . OSGOOD MURDOCK

• "No Previous Experience Necessary" catchlines removed from shipyards' want-ads . . . Neither Maritime Commission nor Navy have yet listed or released any surplus material . . . 40% of 91% of Douglas workers would prefer no union.

SAN FRANCISCO—Bumpy, narrow gage, little cable cars still creep up and shinny down the steep hills of this sensitive city, much to the sentimental satisfaction of old inhabitants and the playful amusement of visitors. Each little carriage-painted conveyance must be operated by a strong-arm gripman on the front end and a tangle-footed conductor, now sometimes a slim conductorette, who can thread his or her way through the narrow aisle collecting fares, giving out tiny transfers, calling "Look out for the curve," and trying to get inside passengers off while retaining precarious hangers on the outside steps front and rear, right and left.

An old-time gripman with years of service has been missing the last year or so. The other day he appeared back at his old traditional post. "Where have you been?" asked habitual passengers as they recognized him back again.

"I've been over at the shipyards as a pipe-fitter's helper, making good money and earning some of it sitting down. But I've got a wife and two kids and I figured it was about time to settle down and get back to my regular job. This thing won't last forever."

Several thousand others, like Joe Gripman, have been doffing their gaudy painted tin helmets for the last time and going back to their old jobs and old haunts—sometimes way into the interior, some voluntarily, many by request. Some 3000 shipyard workers in this Bay area have been discharged recently, mostly for chronic absenteeism or incompetence, according to the Maritime Commission. As gray iron foundries, munition plants and facilities construction projects slack off, and as a pretty steady stream of good men are released from military service, some former civilian craftsmen and some trained by the Army or Navy, better men are fed in at the top and the poorest sift out the bottom. As the feverish pressure for speed is relaxed to steady routine production and as technical demands for repair work replace the mass manpower confusion of emergency cargo hull quantity production, shipbuilding on the West Coast in 1944 will be more of a trade and craft and less of a parade and circus. As in any conversion and evolution, growing pains again are suffered.

Contrary to thoughtless, popular impressions and despite temporary restlessness and misunderstanding by workers, the six-day week universally adopted for Pacific Coast shipyards since Jan. 1 was expected to and has actually speeded and made more efficient ship construction. Management discovered, and convinced the Maritime Commission, that staggered days off decreased morale because a crew never was complete. Sunday crews and personnel have always been minimum; as the months wore on and the novelty wore off, more and more workers preferred a Sunday holiday, especially women and housewives. It is further self-evident, after two to three years of operation, that more maintenance and overhaul is required, so that one day's rest for plant and facilities out of seven is increasingly useful to maintain mechanical and physical efficiency. It has been found particularly valuable to have all foremen and leadermen present every working day. The same number of total manhours are now distributed over six days that were formerly spread thinner and staggered over seven.

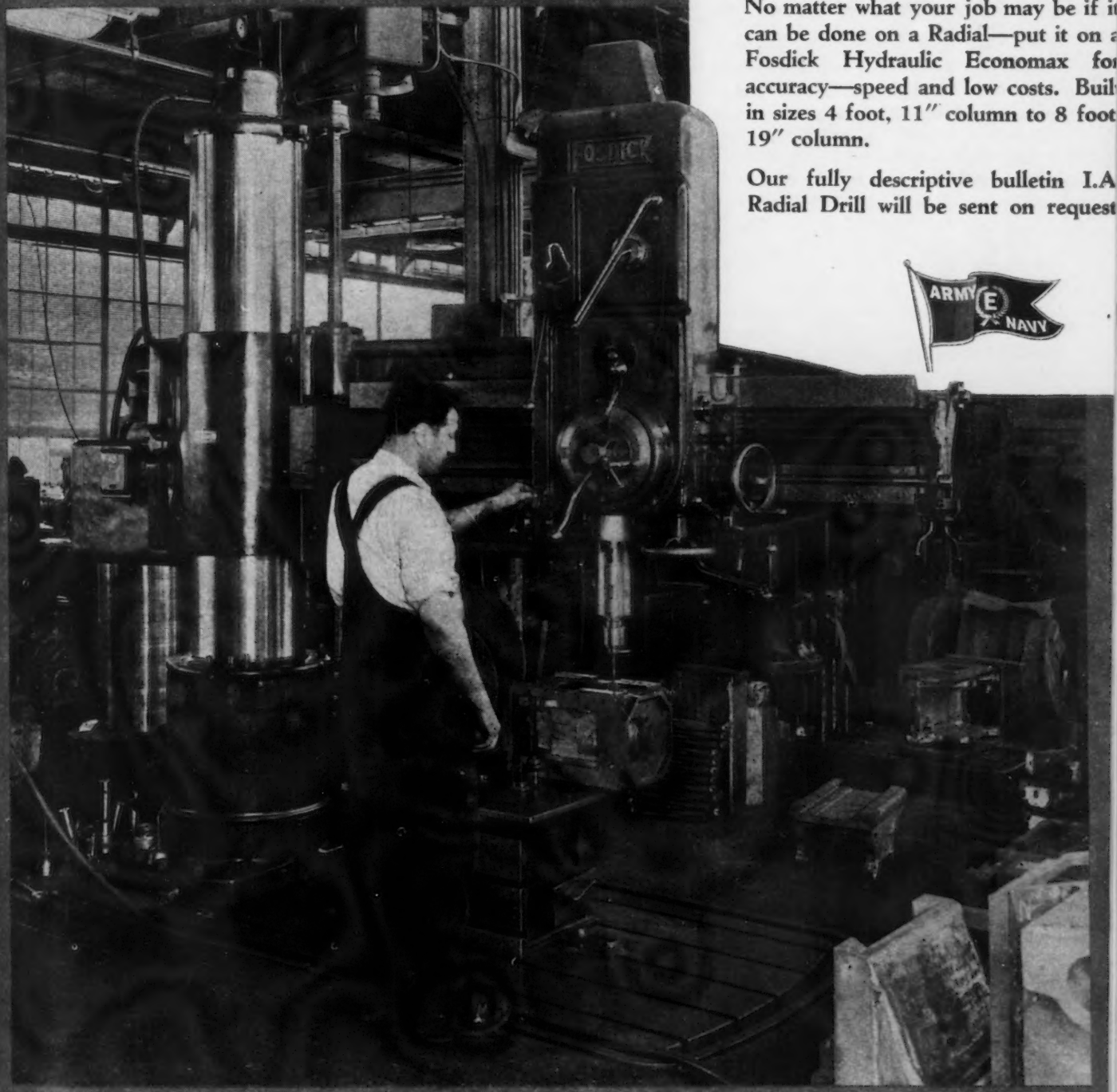
JOSHUA HENDY IRON WORKS at Sunnyvale, a principal manufacturer of propulsion machinery for Maritime vessels, is switching over to two shifts a day in most departments, because it is found that greater production results from two full shifts of skilled labor fully foremanned and superintended than from trying to keep wheels turning with a midnight-to-dawn skeleton crew. Kaiser's Richmond Shipyards are asking 12,000 of their 90,000 workers to shift to "other types of work," presumably more directly productive. Of the first 3000 interviewed, 1500 agreed to switch while the other 1500 quit. Machinists, electricians, sheet metal workers and pipe fitters are wanted, but checkers, laborers, helpers, clerks and assistants are not now needed in the old quantity. Although Liberty ships are still being made at Richmond, three or four of the Victories are in progress. At Portland, Oregon Shipbuilding Corp. has launched its 322nd ship in 32 months and the switch to Victories is just about complete. It's taking 100 days to complete the first one, instead of around 30 days for a Liberty, but they hope to get it down to 50 days when the switchover is complete. On Puget Sound, Seattle-Tacoma Shipbuilding Corp. has launched its 25th destroyer, completing the original $175,000,000 contract for 10 of 1750 tons and 15 of 2100 tons displacement. Additional contracts have been awarded for 21 more destroyers which will carry the yard through the middle of next year.

Marinship Corp. at Sausialito, Cal., said to be the Maritime Commission's "dream yard," is about to make its third major conversion, an estimable record. The last of the West Coast yards to be built and therefore getting the last crack at workers, it nevertheless had everyone's experience to go on. Under Bechtel management, it seems to have done the best job of worker training and morale building, and with a total labor force of under 20,000, there has been less turnover and apparently maximum production and performance. After constructing 12 Liberty ships on the six ways, the yard switched to tankers and has contracts for 64 which will require all of 1944 and part of 1945. The vessel now in production is 10,000 h.p., turbo-electric driven, and a long-run post-war craft.

The only present major Maritime repair yards on the West Coast are Moore's at Oakland on San Francisco Bay and Todd's Seattle-Tacoma affiliate on Puget Sound at Seattle. Repair work requires higher skill and greater

CAPACITY . . . SPEED . . .
and ACCURACY . . .

Fosdick Radials



● In hundreds of shops engaged exclusively in war production Fosdick Radials are speeding production — maintaining accuracy — and saving vital time.

These sturdy Radials have the stamina and power for drilling large holes accurately — the rigidity to maintain close tolerances on smaller diameter holes — a full selection of speeds and feeds quickly available in the head to assure the maximum of production.

No matter what your job may be if it can be done on a Radial—put it on a Fosdick Hydraulic Economax for accuracy—speed and low costs. Built in sizes 4 foot, 11″ column to 8 foot 19″ column.

Our fully descriptive bulletin I.A Radial Drill will be sent on request

ARMY E NAVY

FOSDICK MACHINE TOOL COMPANY
CINCINNATI · · · OHIO

resourcefulness by management and brings a considerably higher wage scale to the workers.

INVENTORIES of surplus material steel stocks listed by the WPB Redistribution Division for the 10th region, including California, Arizona, western Nevada and southern Idaho, approximate 22,000 tons. It is understood that for the Pacific Northwest states of Oregon and Washington, listed at the Seattle regional office, stocks so far listed approximate 15,000 tons. But no inventories nor lists are yet available from either the Maritime Commission or the Navy, by all odds the principal war steel buyers and owners. Traditionally the Navy is a hoarder of materials and may not get around to listing its surplus stocks for years, if ever. "We have no surplus now," declare Naval officers nominally in charge. Once liquidation begins in earnest, Maritime surpluses on the Pacific Coast are likely to make present Redistribution records seem puny, pilot figures. An orderly, businesslike beginning has been made in this disposal of surpluses, and WPB Redistribution officials as a clearing house agency are working closely with commercial distributors.

OF 21,000 workers at the Douglas Santa Monica plant, 91 per cent voted in the NLRB election Feb. 1, one of the highest percentages in a major labor election. Of those voting, 39.7 per cent were for no union, 34.3 per cent for the CIO United Automobile Workers of America and 26.1 per cent for the AFL International Association of Machinists. The electrical maintenance department held a separate election and 76.4 per cent voted for AFL Electrical Workers. A runoff will be held in a week or two between CIO and AFL.

At Seattle OPA has again taken to the courts with charges of interest to the steel trade. Western Steel Casting Co. Inc. is accused of sales above ceiling prices to the Navy during the past year. OPA attorneys claim that prices have been over double the ceiling. A judgment of $49,363 is asked, treble the $16,454 which it is claimed represents overcharges during the past year. It is understood that all Washington foundries have been checked and surveyed following what are stated to have been numerous claims for overcharge. Other suits are therefore expected.

"THE Fontana steel plant . . . is owned wholly by Kaiser Co. Inc. and its operations now and in peace time depend wholly upon the ability of each and every one of us to make it produce steel at prices which are competitive in the open market." Such is a statement Henry J. Kaiser addressed to his workers and associates at Fontana.

He goes on to say, "Our cost of production must be equal to or below that of our competitors if we are to continue to exist . . . We can expect within the very near future that keen competition for steel plate and other steel products will prevail on the Pacific Coast and that the price will decrease. . . . The plant is wholly owned by Kaiser Co. Inc., which company is in turn most heavily indebted to the Reconstruction Finance Corp. for funds. For this huge sum which we have borrowed we are paying interest at 4 per cent and have pledged collateral for its payment. Part of this collateral is in the nature of ship earning fees which the shipbuilding division of the Kaiser Co. Inc. is earning."

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Steel Employment Lower During 1943

• • • **Employment** in the steel industry declined to 605,000 during December, the lowest since February, 1941, according to the American Iron and Steel Institute. The figure was 611,000 in November. Over the whole of 1943, the industry employed an average of 626,000 as against average employment of 647,000 in 1942.

Payrolls in December were $140,203,000, bringing the year's total to the record figure of $1,649,227,000. In 1942, steel payrolls totaled $1,467,059,000.

Wage-earning employees in the industry earned an average of 116.1 cents per hour in December as against 116.4 for November. Over the whole year 1943, wage earners averaged 113.5 cents per hour against an average of 105.6 cents per hour in 1942.

Wage earners worked an average of 43.2 hours per week in December, against 44.8 hours per week in November. Through 1943, the workweek averaged 43.0 hours as against 38.9 hours in 1942.

Steel Warehouse Chapter Founded in Colorado

Cleveland

• • • **The directors** of the American Steel Warehouse Association, Inc., have approved the establishment of a Colorado Chapter, W. S. Doxsey, president, stated. The territory of the new chapter includes the state of Colorado and parts of New Mexico and Wyoming. Members of the chapter are: C. A. Crosta, Inc., Denver, M. L. Foss, Inc., Denver, Goldberg Brothers, Denver, Hendrie & Bolthoff Mfg. & Supply Co., Denver, The Mine & Smelter Supply Co., Denver, and Silver Engineering Works, Inc., 3309 Blake St., Denver.

H. V. Waterman, Hendrie & Bolthoff Mfg. & Supply Co., is president of the new chapter; J. H. Singleton, C. A. Crosta, Inc., vice-president; and A. M. Hays, Hendrie & Bolthoff Mfg. & Supply Co., secretary-treasurer. Mr. Waterman is also Chapter Director.

. . . Cited for Awards . . .

• • • **The following** companies have received the Army-Navy E award for excellence in war production:

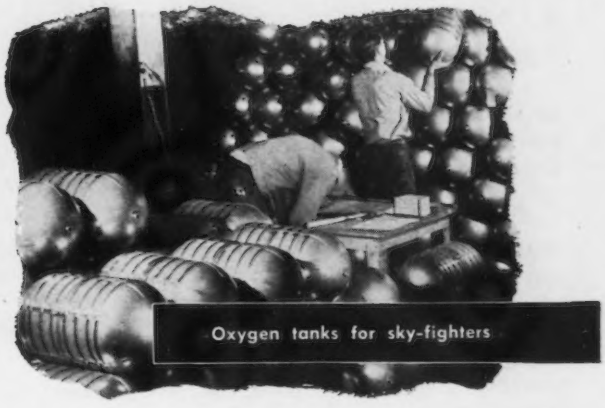
Balch Mfg. Co., Kalamazoo, Mich.
Butler Mfg. Co., Galesburg, Ill.
Carlton Lamp Corp., Newark, N. J.
E. I. du Pont de Nemours & Co., Inc., Electrochemicals Department, Wyandotte Plant, Wyandotte, Mich.
Freiberg Mahogany Co., Harahan, New Orleans.
International Pacific Pulp & Paper Co., Multnomah Lumber & Box Sales Co., Portland, Ore.
Manco Mfg. Co., Bradley, Ill.
Osborn Mfg. Co., Cleveland Plant, Cleveland.
Pittsburgh Piping & Equipment Co., Pittsburgh.
Roth Mfg. Co., Chicago.
E. J. Schoettle Paper Box Co., Precision Mfg. Co., Philadelphia.
Symington-Gould Corp., Gould Coupler Works, Depew, N. Y.
De Laval Steam Turbine Co., Trenton, N. J. (third star).
Babcock & Wilcox Co., Refractories Division, Augusta Works, Augusta, Ga. (second star).

Maritime M

Cooper-Bessemer Corp., Mount Vernon and Grove City, Pa., plants (second gold star).
Colonial Foundry Co., Louisville, Ohio.

YOU CAN GET MORE "STAINLESS" *Delivered Faster Now*

Pasteurizing tanks made of stainless



Oxygen tanks for sky-fighters

For a warplane's collector system

Stainless steel has been one of the "tightest" of all scarce metals. Now it is more readily available for W.P.B.-approved war and civilian uses, and delivery can be made faster.

Greater production of ARMCO Stainless Steels is made possible by more plentiful raw materials. Most of the alloying elements used in stainless—including chromium, nickel and molybdenum—are again fairly abundant.

For war uses it is not necessary to look for substitute materials. In fact, removal of restrictions is being considered for applications where it has been difficult to convert to other materials.

Resists Heat and Corrosion

ARMCO Stainless has many advantages, in war as well as in peace. Its hard, smooth surface withstands wear and tear; its high strength/weight ratio helps you design with lighter sections. Stainless defies heat and staunchly resists many forms of corrosion. It forms easily and can be readily welded.

If you make war equipment you'll find an ARMCO Stainless grade for every requirement. Just write to The American Rolling Mill Company, 821 Curtis Street, Middletown, Ohio.

STAINLESS ARMCO STEEL

The American Rolling Mill Company

PERSONALS

• **H. W. Catt** has been appointed manager of the chemicals and pigments department of the purchasing division of the B. F. Goodrich Co., Akron, Ohio. Mr. Catt joined B. F. Goodrich in 1929 and was engaged for 10 years in chemical research and rubber compounding. He succeeds **Dr. Victor E. Wellman**, who becomes director of purchases in the chemical division of the company.

• **Ralph J. Teetor**, president, Cadillac Malleable Iron Co., Cadillac, Mich., was nominated to succeed **L. C. Wilson**, general manager, Reading steel casting division, American Chain & Cable Co., Reading, Pa., as president of the American Foundrymen's Assn.

• **John C. Dilworth** has been named manager of sales for the railroad materials and commercial forgings division for both the Pittsburgh and Chicago districts of Carnegie-Illinois Steel Corp., and assisting him as district managers of sales will be **Orrin H. Baker** for Pittsburgh and **John J. Davis, Jr.**, for Chicago.

• **Walter L. Rice**, vice-president of Reynolds Metals Co., has been elected president of Reynolds Mining Co. He succeeds **R. S. Reynolds, Sr.**, founder of the company, who now becomes chairman of the board.

• **Martin J. Berlyn** has resigned as manager and chief engineer of the diesel engine division, Dominion Engineering Works, Ltd., Montreal, to become vice-president of the American Bosch Corp., Springfield, Mass., in charge of engineering.

JOHN O. CHESLEY, railway sales manager, Aluminum Co. of America.

• **Maj. Francis W. Hay**, formerly with Aluminum Co. of America at Bridgeport and Massena, has been named assistant resident representative of the Army Air Forces Materiel Command at the Buffalo plants of Curtiss-Wright Corp.

• **Gwilym A. Price**, vice-president of Westinghouse Electric & Mfg. Co., has been elected a member of the board of directors of the Pittsburgh Steel Co., Pittsburgh. **J. Herbert Carson** was elected comptroller of the company, and **J. N. White** was elected assistant comptroller.

• **William S. Wheeler** has been elected president of the Pennsylvania Engineering Works, New Castle, Pa., following the retirement of **W. H. Lewis**, who remains with the organization as chairman of the board of directors. Mr. Wheeler joined the company in 1905 as a draftsman and has served in all departments of the company. Previously he was vice-president and general manager. Also **Clark Rossiter** has been made vice-president and general manager, **P. M. Pattison**, vice-president and secretary, **A. L. Davis**, treasurer, and **H. L. McFeaters**, chief engineer.

• **R. W. Sutton** has been appointed purchasing agent of Truscon Steel Co., Youngstown, subsidiary of Republic Steel Corp. Associated for many years with industrial purchases, Mr. Sutton has been a buyer for Republic for the last 13 years.

• **John O. Chesley**, head of the sales development division, has been named railway sales manager for the railroad field of Aluminum Co. of America, Pittsburgh, and **Frank C. Barrows, Jr.**, of Detroit, has been appointed automotive sales manager for the automotive field.

• **Fred Ingraham**, who after more than 50 years' association with the American Steel & Wire Co., U. S. Steel subsidiary, is retiring as manager of operations of the Chicago district. **Harry H. Lumley** has been named Chicago district manager to succeed him.

• **Herbert J. Rosen**, for more than nine years operating manager of Griffin Wheel Co., Chicago, has been elected a vice-president. He recently was elected a director.

• **Harry Hanson**, secretary and assistant treasurer of Griffin since 1940, has been elected treasurer succeeding **Metzger D. Stinson**, retired.

• **Joseph A. Voelker** has been elected sales vice-president of Pittsburgh Steel Co., Pittsburgh. He was general manager of sales since May, 1942.

• **Paul W. Butz** has been appointed district manager of sales for Columbia Steel & Shafting Co., Detroit office.

• **Vincent K. Alexander** has been appointed sales manager of Manheim Mfg. & Belting Co., Manheim, Pa. For the past ten months, Mr. Alexander has served as acting sales manager.

• **Thomas Coyle**, chlorine products manager of the electrochemicals department of E. I. du Pont de Nemours & Co., was elected president of the Compressed Gas Manufacturers Assn., Inc.

• **William J. Heckmann** has been made general claims attorney for the Illinois Central Railroad, with headquarters in Chicago, to succeed the late Philip M. Gatch.

• **Frank J. Kane**, former superintendent of Republic Steel Corp.'s ore mine at Mineville, N. Y., has been appointed general superintendent of Republic's ore mines, Southern division.

FRANK C. BARROWS, JR., automotive sales manager, Aluminum Co. of America.

• **W. H. Jackson,** assistant superintendent, Norfolk and Western Railway, Roanoke, Va., scioto division, at Portsmouth, O., has been transferred to Bluefield, W. Va., as assistant superintendent of the Pocahontas division. **F. E. Taylor,** terminal trainmaster at Cincinnati succeeds Mr. Jackson and **A. E. Johnson** succeeds Mr. Taylor.

• **S. F. Briggs** has been reelected chairman of the board of Outboard, Marine & Mfg. Co., Milwaukee, and other officers chosen were: **Ralph Evinrude,** president; **J. Stern,** executive vice-president; **Hugo Biersach, W. C. Clausen, F. T. Irgens, E. H. Millet, J. G. Rayniak** and **P. A. Tanner,** vice-presidents; **H. M. Fisher,** secretary-treasurer, and **C. Rudie,** assistant secretary-treasurer.

• **E. J. Harrington,** former production and materials coordinator for the Lockheed Aircraft Corp., has been made a vice-president of Curtiss-Wright Corp., in charge of materials control.

• **N. B. Dinkel** of Alameda, Cal., is to represent the Crosley Corp. in the Pacific Coast area.

• **William I. Burt** has been appointed general manager of plants in the chemical division of B. F. Goodrich Co., Akron, Ohio; **Dr. Frank K. Schoenfeld** has been made director, technical and development, and **Harry E. Foster,** general auditor.

• **Edward W. Campion** has been elected chairman of the board of directors of Bonney-Floyd Co., Columbus, Ohio.

• **T. Rideout,** formerly development engineer of the gear division of Western Electric & Mfg. Co., Pittsburgh, has joined the staff of Watson-Flagg Machine Co., Paterson, N. J., as project engineer. For many years Mr. Rideout was chairman of the general standards committee of the American Gear Manufacturers Assn.

• **Robert Wier, Jr.,** has been appointed sales manager of the Winchester Repeating Arms Co., East Alton, Ill., division of Western Cartridge Co., as sales manager of the ammunition division of the parent Western organization. In his new position, Mr. Wier will direct and co-ordinate sales activities of both Western's ammunition division and the Winchester division.

GEORGE A. WHITEHURST, supervisor, administration planning, Carnegie - Illinois Steel Corp.

• **George A. Whitehurst,** formerly assistant to chief engineer, has been appointed supervisor, administration planning, for Carnegie-Illinois Steel Corp., Pittsburgh. He will coordinate policy and procedure throughout the company. Mr. Whitehurst has been associated with the corporation and its subsidiaries in various capacities in New York, Chicago and Pittsburgh, since 1931.

• **Howard G. Jones** of the Vulcan Iron Works of Wilkes-Barre, Pa., has been made New York representative. Mr. Jones, who has been connected with the home office in responsible capacities for nearly 20 years succeeds **Thomas MacLachlan** who recently resigned.

• **J. P. Lawrence,** formerly vice-president and general manager of the American MonoRail Co., Cleveland, was made president following the retirement of **H. M. Miller,** who is now chairman of the board. Other officers are: **F. C. Harris,** vice-president and chief engineer; **C. deV. Miller,** vice-president and sales manager; **J. L. Pischke,** secretary and treasurer.

• **Walter C. Ahlers** has been advanced to the position of Detroit district manager of the SKF Industries, Inc., Philadelphia, to succeed **Robert H. Hirsch,** resigned.

• **W. T. Darcy** has been appointed manager of service shop sales at General Electric Co. It is Mr. Darcy's responsibility to supervise and coordinate the repair and renewal parts business-building activities of G-E service shops all over the country.

• **Merle Thorpe** has been elected to the board of the Cities Service Co., New York, and has been appointed director of business development. Mr. Thorpe, who is retiring as editor and publisher of Nations' Business magazine, will assume his new duties immediately.

• **Adolph Frankel** has been appointed manager of the electronic tube sales department of the Westinghouse Lamp division with headquarters at Bloomfield, N. J.

OBITUARY...

• **Maj. W. E. Hoke,** 78, inventor of the "Hoke Blocks," precision gages which have remained unsurpassed for 27 years, died recently at his Baltimore home.

• **Edmund J. Walsh,** vice-president of Chattanooga Boiler & Tank Co., died Jan. 10.

• **James A. Nolan,** 54, New York State representative of the Carpenter Steel Co., Reading, Pa., died Jan. 17, at Rochester, N. Y. He was associated with the company for 33 years.

• **Frederick J. Macwilliams** of Chicago, Ill., died Jan. 23, following an extended illness. Mr. Macwilliams, 49 years old, was one of the founders and was general manager of Abart Gear & Machine Co.

• **John R. Pill,** land agent of the Woodward Iron Co., Woodward, Ala., for the last 17 years, died Jan. 28, at Birmingham. He was 77 years of age.

• **Howell G. Heddinger,** vice-president and district manager of Hedge & Mattheis Co. and formerly associated with the Wells Construction Co. and Aberthaw Construction Co. died recently. He was 57 years old.

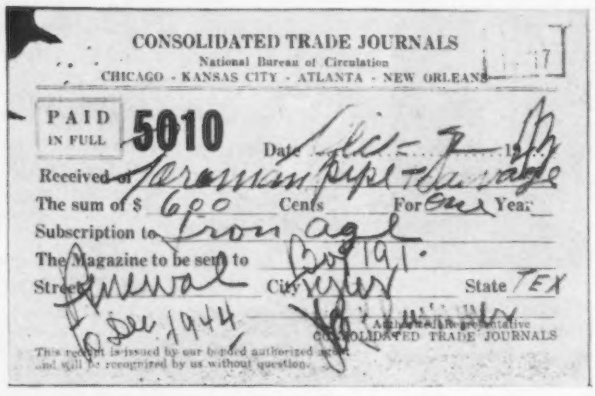
• **William M. Byrd, Jr.,** president of the Alabama Pipe Co., Anniston, Ala., died at Birmingham, Jan. 30. Mr. Byrd, who took part in founding the company, had served as president since June, 1942. He was 69 years of age.

Fatigue Cracks

BY A. H. DIX

Bargain

• • • If a sharp featured, reddish blonde, big-nosed smooth talker asks you to pay him for a subscription for your favorite family journal, better say no. The Forman Pipe & Salvage Co., Tyler, Tex., said yes and has nothing to show for it but this receipt:



CONSOLIDATED TRADE JOURNALS
National Bureau of Circulation
CHICAGO - KANSAS CITY - ATLANTA - NEW ORLEANS

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Date Dec 7 19

Received of Foreman Pipe & Salvage

The sum of $ 6.00 Cents For One Year

Subscription to Iron Age

The Magazine to be sent to

Street Renewal City Tyler State TEX

To Dec 1944

CONSOLIDATED TRADE JOURNALS

This receipt is issued by our bonded authorized agent and will be recognized by us without question.

The signature reads "J. E. Plummer," who, the receipt assures us, is the "bonded authorized agent" of the Consolidated Trade Journals. But the Consolidated Trade Journals has not passed along to us the $6 its bonded, authorized agent collected, and as it is not listed in the telephone books, Mr. Plummer may be its entire staff.

Besides, the price is $8 a year, and it is safer to send it to us than to trust big-nosed smooth talkers.

Letdown

• • • Speaking of telephone books, an advertising agency man told Tom Lippert, second chair in the brains department, that of the dozens of associations listed in the New York telephone book, one is brazen enough to call its simply "The Association." We looked it up and sure enough there it is, just "The Association —Regent 4-1500."

We wish we had stopped there for then we could have treasured this as an example of arrogance magnified to an awesome degree. But we gave in to the temptation to dial the number and a young lady told us it is simply an abbreviation of "Professional Service Credit Association," which will shortly be out of existence. The number will be dropped in the next directory.

C. I. Champion

• • • For using some such simile as "brittle as cast iron," a non-technical publication had its knuckles rapped by the Gray Iron Founders Society. As the statement is not only derogatory but untrue as well, the rebuke was deserved.

What we would like to know how far it is permissible to go without getting on the Society's black books. Is it, for example, all right to say "I like your cast iron nerve?" Here, it seems to us, the reference is definitely flattering, in that indestructibility is implied.

Does the Copper & Brass Association object to "He had an infinite amount of brass" where non-ferrous stocks are not involved? And is the Lead Association sensitive to the use of its product's name in a picturesque objurgation conveying contempt for inaction?

Aptronym

In Newark, N. J., there is a Dr. Ill, also a Dr. Lancit.

—L. W. Smith,
H. & O. Machinery & Engineering Co., Newark, N. J.

Sermon for Today

• • • We have been permitted a sneak preview of an entry in the Pabst postwar employment contest, and in it find this:

> The problem will demand constructive treatment to re-establish the mutual confidence of labor in management and management in collective labor representation.

This sounds pretty, but it implies a past period of harmony, and if we were a Pabst judge we would mark this paragraph "When was this?" There never was a golden age, and while it is pleasant to hope that some time there will be, we know there cannot be. For if buyer and seller always saw eye to eye the stimulus that makes the competitive system click would be missing. The trick is to keep the friction within reasonable limits, but the only place it is completely absent is in the graveyard. Sustained harmony is much like the first stage of stagnation.

And while we are up on our soapbox we would like to issue a general bill of complaint about those who think that the hard-muscled, fat-free frame of free enterprise can be maintained without the sweat and buffeting of competition. The roadwork and weight-lifting cut into the pinochle sessions but so far they are the only known preventive of flabbiness.

So. Calif. Has One

A. B. Farquhar Co., which just dropped its distinguished "Ltd." for a dime-a-dozen "Inc.," was not the last of the American "Ltd.'s." There is Morey & Jones, Ltd., Los Angeles.

—Wm. M. Siesel, Trenton, N. J.

No More, No Less

> You refer to your brains department's use of "unwater" instead of "drain." "Dewater" and "unwater" are good old engineering terms, and are as distinctive to the specialists who employ them as the difference between "pathogenic" and "parthenogenetic" in the obs. ward.
>
> Why has your page just 18 readers? Is there some mystic virtue in the "18"?
>
> *—H. F. Cotter*

It is something that was ordained, like eight rows on an ear of golden bantam.

Sales Asset

• • • The office of one of the Pittsburgh draft boards is on the corner of Forward and Shady Avenues. The address is wasted on a draft board but for another business we can think of it would be a sales asset.

Turkey in the Shop

Congratulations to J. R. Williams on his seasonal touch in "The Bull of the Woods" of Jan. 13.

I have outlined the turkey.

—Harold J. Roast, Montreal

"MACHINISTS W

Puzzles

Last week's gambler started out with $281.25.

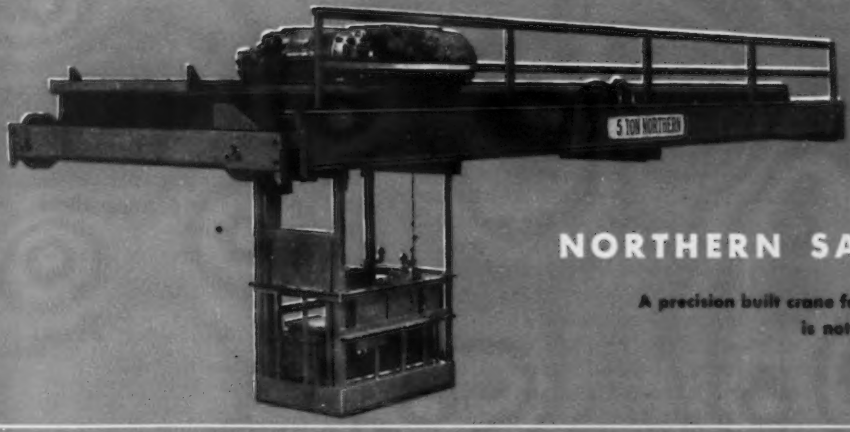
Lt. Com. A. R. Simpson aims this at the master minds. You can establish your own par:

At 12:00:00 o'clock the three hands of a chronometer equipped with sweep second-hand are in coincidence. At what other time will they exactly coincide again? If at no other time, at what time will the three hands be closest to exact coincidence, and what will be the angle of arc between the two outermost hands at this instant?

3 LINES OF *Northern* CRANES

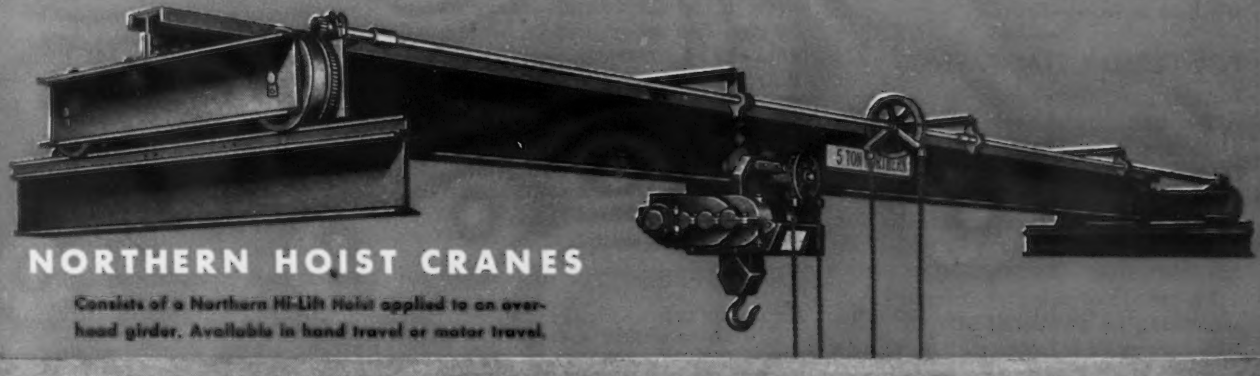
NORTHERN SUPER-CRANE

The fine machine tool of overhead cranes built for heavy duty, 24-hour-a-day jobs.



NORTHERN SA & LSA CRANE

A precision built crane for medium duty where service is not so severe.



NORTHERN HOIST CRANES

Consists of a Northern Hi-Lift Hoist applied to an overhead girder. Available in hand travel or motor travel.

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ENGINEERING WORKS

General Office: **2613 Atwater St., DETROIT, MICH.**

NORTHERN CRANE & HOIST WORKS, Limited • WINDSOR, CANADA

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913 South 38th St., BIRMINGHAM • • • 53 West Jackson Blvd., CHICAGO
2428 Spring Grove, CINCINNATI • • 5724 Navigation Blvd., HOUSTON
44 Whitehall St., NEW YORK • • • 555 Union Trust Bldg., PITTSBURGH
4135 Gratiot Ave., ST. LOUIS • • • • 1679 University Ave., ST. PAUL

All Northern Cranes are built to the most modern standards — are especially sturdy, durable, and have the most modern electrical equipment and control. Trolleys are one-piece welded construction. Gears are precision machine cut, and run in an oil bath. Ground shafts operate in oversize roller bearings. Construction is *right* throughout.

A Northern Crane, properly selected for the job, will give long, satisfactory service.

Write for booklet.

Dear Editor:

SEIZED PATENTS CHAMPION

Sir:

Evidently Mr. Tolley (Dear Editor page Jan. 6 issue) is disappointed because he hasn't arrived at that Big Rock Candy Mountain. He has looked up 30 enemy patents and has found nothing of value. Where will he ever find any list of patents that assays better than one per cent, to say nothing of three per cent as he demands?

In stating that most patents of value have probably already been culled, he overlooked the fact that the same privilege accrues to him, as the manufacturing rights are nonexclusive. I feel these lists have great potential value but the labor of separating the wheat from the chaff appears enormous. Why don't you and your able staff of brain trusters tackle that job some day in your spare time?

HENRY F. GASTON,
Industrial Engineer
4306 51st St.,
Hyattsville, Md.

● We have already culled out the seized patents covering metal products and processes, but do not feel competent to do a further job of separation as one man's wheat is another man's chaff.

Not all seized patents listed are available for licensing. The Alien Property Custodian informs us that licenses are not available for those patents on which pre-war licenses were granted, for these arrangements still hold in force.—Ed.

POWDERED METAL PATENTS

Sir:

We have purchased three albums from the Alien Property Custodian, listing thousands of patents. They are so poorly listed, as to field the patents cover, that it is practically impossible to find a patent in which we are interested.

Do you have a better compiled list, something on powdered alloys?

SPECIAL MACHINERY BUILDER
Indiana

● Powdered metals patents are included under the APC "Metallurgy" classification. This class has not yet been covered in The Iron Age series on seized patents, but will be soon. Our series, while describing the patents in greater detail than the APC albums, follows the same broad classifications. Therefore, the nuggets, if there at all, are not found without some spadework.—Ed.

TOOL STEEL DIRECTORY

Sir:

I had the opportunity of glancing through your Tool Steel Directory. Will you please forward six copies with bill.

CHARLES G. GRAZIOSO,
Chief Engineer,
Artillery Engineering Dept.
Frankford Arsenal,
Philadelphia 37

● Prices are: Single copies, $1; five or more, 50c each.—Ed.

FIBERGLAS

Sir:

A local firm telephoned us in an effort to locate a rather elaborate table having to do with synthetic fibers, plastics, etc., which the firm recalled as having been in a June or July issue. We can't find it. Did we publish it?

CLEVELAND OFFICE

● See "Physical Properties of Fiberglas Laminated Plastics," July 22, 1943 issue.—Ed.

INFRA-RED RAYS FROM GAS

Sir:

An inquirer about the use of infra-red rays for the drying of molds in a steel foundry was referred, in the Dear Editor page of Jan. 20, to a maker of electric infra-red lamps.

Infra-red radiation is emitted by any hot source regardless of how the heat is derived. Even the wave length of the emitting body behaves on the basis of the temperature of the body and not on the basis of the manner by which that temperature is reached. A test recently made by Rolls-Royce in England, to determine the relative mold drying efficiency of a gas-heated medium temperature infra-red radiant energy source, compared with a standard infra-red radiant unit, produced results that were quite startling in the decided advantage offered by gas. The report will be made available at the American Gas Association War Conference on Industrial and Commercial Gas to be held in Rochester March 30 and 31, 1944.

C. GEORGE SEGELER,
Engineer of Utilization
American Gas Association,
420 Lexington Ave.,
New York 17

ZAY JEFFRIES

Sir:

I wish to obtain a copy of a paper by Jeffries published in IRON AGE during November, 1934. Can you identify the author?

K. SPROULE
Box 547,
Copper Cliff, Ont.,
Canada

● The article, "Nonferrous Metals—Past and Future," began on page 20 of the Nov. 8, 1934 issue. Its author, Zay Jeffries, well-known Aluminum Co. of America metallurgist, may be addressed at 2210 Harvard Ave., Cleveland.—Ed.

SCRAP IDENTIFICATION

Sir:

It is requested that permission be granted to reproduce certain sections of the article, "How to Identify Alloy Steel Scrap," appearing in your April 16, 1942, issue. If permission is granted, the material will be used in a paper to be written for the Ordnance Sergeant, a magazine published by the Ordnance School, Aberdeen Proving Grounds, and disseminated to Ordnance technicians engaged in field maintenance.

W. T. MAINWARING, 1st Lt.,
Ordnance Department
96th Ordnance Maintenance Co.,
Ry. Arty.,
14th Ordnance Maintenance Bn.,
Fort Monroe, Va.

● Granted.—Ed.

HIGH SPEED MILLING

Sir:

Will you kindly send us reprints of your article, "High Speed Milling in Aircraft Production," and also "Report on the ASME Special Meeting on High Speed Milling."

KARL H. WHITE,
Chief Draftsman
United States Navy Yard,
Naval Aircraft Factory,
Philadelphia

AIR-OPERATED PRESSES

Sir:

We are interested in buying some small bench type presses to be operated by air, and which should be suitable for cutting paper, celluloid, or thin plastic, and real light metal, from special dies.

Could you provide us with the names of manufacturers of this type equipment?

CARLYLE E. ANDERSON,
President
Monogram Glass Co., Inc.,
1131 Chicago Ave.,
Evanston, Ill.

● A few of the firms making small bench type presses operated by air are Hanna Engineering Works, 1765 Elston Ave., Chicago, Ill.; Hannifin Mfg. Co., 621 Kolmar Ave., Chicago, Ill., and F. J. Stokes Machine Co., Olney P. O. Philadelphia, Pa.—Ed.

PLASTICS AND PLASTICITY

Sir:

If available, will you kindly send us two reprints of E. V. Crane's series on "Plastics and Plasticity," which appeared in your issues of July 29, Aug. 5, 12, 19 and 26.

G. N. DONOVAN,
Librarian
Western Electric Co.,
100 Central Ave.,
Kearny, N. J.

● A reprint of the series may be obtained by writing to the author E. V. Crane, Chief, Development Engineering Department, E. W. Bliss Co., 53rd & 2nd Ave., Brooklyn, N. Y.—Ed.

PRIORITIES GUIDE

Sir:

We have the 7th edition, October, 1942, of your War Priorities Guide but would like to have the latest edition.

MARGARET M. MILLER,
Librarian
Standard Oil Company of California,
Standard Oil Building,
San Francisco 20

● The latest edition is the 8th, which was published as a supplement to our issue of April 29, 1943.—Ed.

THEY'RE COMING AT *You!*

First on the agenda of postwar planners is the problem of "full employment" for present workers and returned military men. These people are looking to you for jobs at today's standards of wages and living.

But you can't turn out a sufficient volume of peacetime goods at salable prices, unless you can find means to offset higher manpower rates. Prewar methods and equipment won't do it.

Much of the answer lies in better selection and utilization of machinery. You must get more production per hour than you did before the war. In this, machine tools, the cost-cutting tools of industry, will play a more important part.

During the War, machine tool builders have learned many ways to effect substantial time savings. Monarch engineers have helped many a war plant use lathes to better advantage, to get material quicker to the fighting front.

These same practical Monarch men are at your service for peacetime production. They can show you timesaving short cuts that can also be depended upon to cut costs. Full utilization of the important timesaving features of Monarch Lathes will enable you to produce more goods for more people at lower cost—and thus help you keep your plant busy and your workers satisfactorily employed.

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES *Save Time*

This Industrial Week . . .

- **Steel Ingot Output Ups; January Tonnage 7,595,202**
- **Order Volume Remains High; Plate Shipments Set Record**
- **Essential Civilian Tonnages Set; More Contract Cutbacks Occur**

STEEL production continued rising this week, with a one-half point gain to 99.5 per cent from last week's revised figure. While the recognition of new capacity as of Jan. 1 will result in downward corrections by a few points for this and the five preceding weeks, the increasing trend has exceeded expectations. January total tonnage output at 7,595,202 tons was the highest since last October.

Steel order volume in general continues exceptionally high with respect to shipments. Plate deliveries which set a record last year established a new mark last month at 1,173,164 tons. High pressure output will continue for weeks to come and will result in continued tightness of steel sheets which now are extended on mill order books into the latter part of this year and in a few cases into 1945. When and if plate demand eases, backlogs on sheets may be shortened considerably.

Recent steel allocations emphasize the fact that essential civilian needs (contrasted with regular civilian manufacture) haven't been completely forgotten in the hectic rush to provide invasion equipment for the armed forces. A program which will require about 1,200,000 tons of carbon steel for farm machinery in the year starting next July 1 has been anounced. Commitments on new domestic freight cars aggregating about 28,000 cars have been made covering the first three quarters of this year. (Freight car makers, incidentally, are reported to be worried about rising costs of material and labor.) There are indications that tin mill production may be expanded substantially as the permission to make steel beer cans for off-shore and foreign consumption will require a large tonnage. The open weather has caused high demand for wire products by farmers. Oil well drilling early this year will require much steel pipe. While details regarding requirements for construction of the projected 1250-mile trans-Arabian oil pipeline which the U. S. will build have not been announced, it is reported that the main line will be built or 24 or 26-in. seamless tubing and will involve approximately 120,000 tons.

ADDITIONAL cutbacks in contracts for the production of war goods have come to light during the past week. White Motor Co.'s contract for half-tracks was cut off completely, although the service parts program will continue. Several subcontracting plants in New England stopped work. A Cleveland shell maker laid off men after its contracts had been cancelled. Steel barrel orders have been reshuffled. There were numerous other evidences of contraction over the Nation. But at the same time, several new projects were in the wind, one, for example, being a new type of shell which if it proves successful may be of interest to stamping firms.

Revisions in the Army supply program are believed likely to pressage further contract cancellations, with government-owned plants bearing the brunt of the blow ahead of private industry. Queried by THE IRON AGE as to certain phases of industrial demobilization plans, Army officials indicated that there is mounting opinion in favor of compiling a "Blue Book" of machine tool prices to be paid by private purchasers of surplus government equipment; that the military services feel they should have control of stockpiles as a protective measure against future wars; that copper, lead, and zinc stockpiles should be increased; that there is no need for stockpiling scrap; that weapons of proved obsolescence will not be stocked.

Probable postwar consumption of steel in the far west is a lively topic now, particularly in relation to the capacity of steel mills in those states. A number of market analysts have been exploring the subject in detail with varied results. The McCarran committee on decentralization may develop much discussion.

ESTIMATES of postwar consumption range from a gain of 400,000 tons over the pre-war era in eleven western states to a 1,000,000-ton increase. The Kaiser interests are reported to have been particularly active

50,000 Tons of Aluminum for Mats

WASHINGTON

• • • Assistant Director of the Aluminum and Magnesium Division Thomas E. Covel said on Wednesday of last week that the division has allotted 100,000,000 lb. of aluminum to the Army for making landing mats.

Mr. Covel told THE IRON AGE that several different types of sheets are being experimented with, and that the huge order could be placed by the Armed services over whatever period of time deemed most desirable. It is understood that preliminary tests of aluminum for landing mats have run into forming difficulties, but that the Army has not reached any conclusion regarding the suitability of aluminum alloy mats.

The division has placed the total supply of aluminum at more than 2,000,000,000 lb.

Aluminum supplies include 250,000,000 lb. of primary metal and 75,000,000 lb. of secondary metal held by Metal Reserve Co. and additional 750,000,000 lb. of privately-owned ingot.

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Steel Market Briefs

• PRODUCTION—Steady at high levels. Present rate assured as long as flat rolled demand holds up. Completion of European phase of war expected to cause temporary decline. Repairs may cause some slight leveling off.

• DISTRIBUTION—Product mix still unbalanced, due to flat rolled demand. Headaches ahead for WPB, as long as steel supplies for war exceed demand.

• PRICES—Steady on major products. Mills with higher than ceiling prices approved by OPA losing out, where items are obtainable elsewhere at ceiling prices. OPA in last stages of analyzing cost data from all steel companies on carbon steel products.

•FLAT ROLLED STEEL—Tight, and getting tighter. Plate deliveries going into third and fourth quarter. Sheet deliveries into third quarter, with some promises being made for early 1945. Shipbuilding program mainly responsible. Relief on plate demand may occur by July. Landing craft program will run until September. Sheets needed for expanded landing mat program. Barrel program cut, but some orders may be reinstated on sheet mills.

• BARS—Some sizes in good demand. Mix not very good. Hot rolled bar trend slowly downward, until WPB opens up on civilian steel. Cold finished bars very active in the last two weeks, due to resumption of certain shell and bomb programs.

• PIPE—Tight all along the line. Under CMP, oil companies getting break for drilling material. Plenty of oil country pipe available, but drill pipe quite tight.

• TIN PLATE—Second quarter tin mill production will be more than 100,000 tons above first quarter. Third quarter even better.

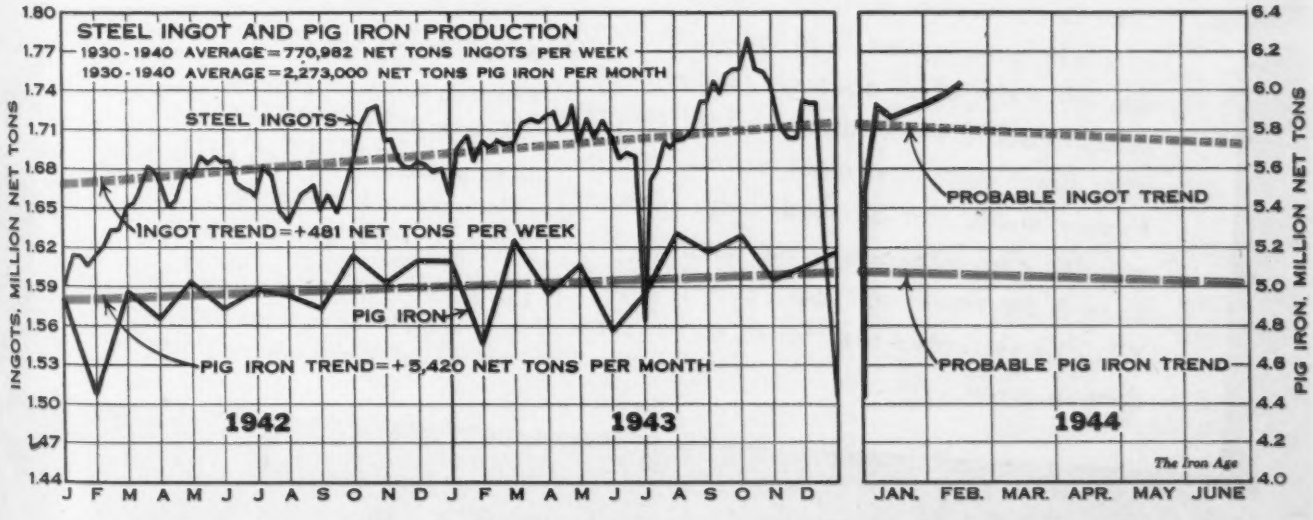
• MISCELLANEOUS—Wire and wire products in good demand. Farm repairing continues at accelerated rate. ALLOY steel demand off sharply. Electric furnaces being curtailed. PIG IRON—Easy, with DPC blast furnaces being shut down, indefinitely. This situation mitigates possibility of grave scrap outlook. SCRAP quite easy. Major items still selling at OPA ceilings. Future price trends on some items, such as turnings, may be downward.

in making surveys, which are said to show larger potential postwar consumption than previously thought likely.

Kaiser, recently urging his steel workers on to lower cast production because "we can expect keen competition within the very near future and that prices will decrease," explained that his plant is wholly owned by Kaiser Co., Inc., which company is in turn indebted to the Reconstruction Finance Corp. for funds borrowed. "We are paying interest at 4 per cent," he said, "and have pledged collateral for its payment. Part of this collateral is in the nature of ship earning fees which the shipbuilding division of the Kaiser Co., Inc., is earning."

To prepare steel consumers for possible price revisions, OPA administrator Chester Bowles stated last Friday that there might be price increases in some products and decreases on others. No across-the-board action, blanketing all steel products, is contemplated. In some quarters, the Bowles statement was interpreted as a tipoff that the steel industry will not get as wide scale an increase as it might have expected, but producers generally remained confident that cost data which has been submitted amply support the need for higher prices in certain items, notably rails and semi-finished. OPA is making the most complete survey ever attempted of steel industry costs.

MARITIME Commission plans for disposing of its surplus materials are being followed with interest because of the large quantities that may be involved. Recently Maritime scrap has been moving to the middle west from the Pacific Coast in large quantities, said to total around 100,000 tons. Other high spots in excess and idle steel circles include a reported gain in exports of this material and a report that warehouses are not buying heavily because of the dissatisfaction with M-21-b-1 governing purchases and sales. Most of the excess steel problems are mild, however, compared to the excess tool steel dilemna where a wide variance of sizes and compositions makes disposal difficult.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 3	101.0	103.5	96.0	91.0	99.5*	92.5	98.0	99.0	96.0*	95.0	95.0	101.5	97.0	99.0*
February 10	101.5	103.0	96.0	91.5	99.0	102.0	98.0	99.0	100.5	95.0	96.0	97.5	89.0	99.5

* Revised

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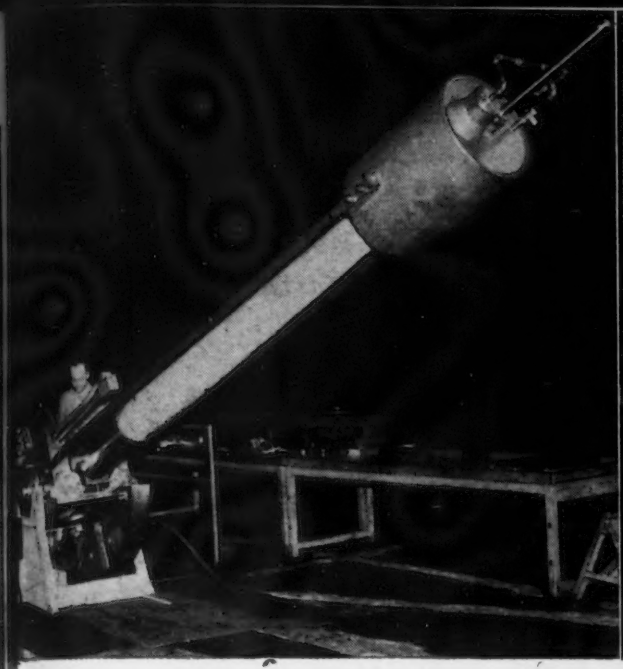

General Rise in Steel Prices Not Warranted, Bowles Asserts

Washington

• • • **In an unexpected** statement issued last Friday, OPA Administrator Chester Bowles asserted information now in the hands of OPA indicates that no general steel price increase is justified. Further, he indicated that there might be some increases on particular products and actual decreases on others. He hastened to point out, however, that no decision will be made until OPA has concluded its survey of the steel price structure.

That the Price Administrator discussed the comprehensive study now under way in advance of action on it created considerable comment and was interpreted in some quarters to be a tipoff, guarded as it was, that the steel industry will not get as wide scale an increase in prices as had generally thought to be probable. There also was speculation that the statement was partially directed against wage-increase demands of the CIO-USW, at least against the sharp increase labor is asking, 17c. an hour.

In pointing out that OPA is making the most complete survey ever made of steel industry costs in cooperation with its Steel Mill Products Advisory Committee, Mr. Bowles said that it covers 90 per cent of the industry tonnagewise and all major carbon steel products. A parallel study, he said, of alloy steel products is about to be undertaken by OPA and its Alloy Steel Advisory Committee. At the earliest, he added, the survey and analysis will not be completed before March. This latter committee will meet with OPA late this week.

The present study covers financial data from 1936 to date in addition to steel mill cost analyses for November, 1943. OPA has comparable mill cost data for the early part of 1942 as a result of an earlier but less intensive survey, it was stated.

"It appears from the limited information currently available to us that the steel industry does not at present need a general upward price adjustment," Mr. Bowles said. "No decision will be made before the studies are completed.

"Whether or not particular steel mill products will be shown to need price increases or price decreases, and the extent of such price increases or price decreases simply cannot be ascertained in the present stage of study. At the earliest, the survey and analysis will not be completed before March.

"Furthermore, should the results of the survey indicate that some costs have increased above realization while costs of some other products have gone down, it may be possible to balance some individual ceiling increases against other decreases."

Expressing a view that is in contrast with that widely held by economists both within and outside of the government, Mr. Bowles does not accept the steel industry as the bellwether of the economic structure. On the contrary he treats each basic industry separately in that a price increase in one does not lead under wartime control to a price increase in another. Such price increases are referred to as only "speculative influences."

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Figures Will Support Adjustment

Pittsburgh

• • • **Close reading of** Price Administrator Chester Bowles' statement regarding the possibility of a steel price rise indicates that, despite popular press interpretations, there is a good chance that adjustments in the price level of the majority of carbon steel items can be made. Certainly the feeling in this large steel center is that there can be no final decision until the data sheets, now in the hands of OPA, can be adequately studied.

It is known that data on many carbon steel items is such that costs figures will support some sort of upward adjustments. Nor is it improbable that some of the revisions might not be substantial—especially on those

AT TWO WAR GOODS PLANTS: *Photo at left shows testing of 5-in. Naval gun without firing it, at Fisher Body Pontiac Division. At right: transfer of propeller blades from furnace into hydraulic press at Curtiss-Wright Corp.*

products which for months have shown an actual loss. The reference to a "general price adjustment" is of course not consistant either with the facts or with the special conditions with which the industry has been confronted in the past year or so.

The fact that in an unprecedented move the steel companies have furnished cost data which previously has been largely confidential, indicates that there is support to the realistic belief that some form of price adjustments will be made on many steel items. Furthermore the OPA made its own studies months ago which pointed to the need for a complete overhauling of the steel price structure.

It is a matter of record as to the increased costs which have confronted the steel industry. Raw material costs, freight rates and labor increases have all accumulated to such an extent that the volume of orders, better freight returns, allowable extras, and a good product mix in the early stages of the war are not now offsetting high cost handicaps. It is for this reason that the industry threw overboard its age old reticence to government scrutiny of its most private costs data.

Probably one of the first items which may be advanced under OPA approval will be steel rails. For years the industry has more or less made this product at either a break even point or at a loss. Not so many years ago rails were picked as a political focal point to indicate a reduction in steel prices. Nonetheless at least one steel company has been able to prove to OPA that it should get $5.00 a ton premium on standard rails.

Other items which will certainly stand a chance of an increase in price will be ingots and semifinished steel. Ingots in many cases have been made and shipped at a price that was only a few cents above actual cost without some overhead being considered. Semifinished steel such as sheet bars and slabs have been made and shipped at little or no profit.

Finished steel products will probably take a longer time to process and will lend themselves to a lesser degree of adjustment than products such as ingots, semifinished and rails.

WPB Vice Chairman Named

Washington

• • • **Wade T. Childress** has been appointed as WPB Deputy Vice Chairman for Operations. Mr. Childress has served with WPB and predecessor agencies since May, 1941.

Postwar Steel Consumption in West Subject of Much Speculation

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By DON R. JAMES
News and Markets Editor

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• • • **Probable** postwar consumption of steel in the Far West is a lively topic now, particularly in relation to the capacity of steel mills in those states. A number of market analysts have been exploring the subject in detail with varied results. The McCarren Committee on centralization may develop additional discussion.

Purely for background interest, the tables on the next page (page 101) are presented, showing capacities and also an estimate of consumption in western states in 1937. Data along the lines of the latter rarely are available.

The principal increases in finished steel capacity in these states have been for the production of shapes, plates, bars and hot rolled sheets. Capacity built and building in the states under discussion now exceeds 1937 consumption in all these products except the latter product.

As to the postwar era, estimates range from a gain of 400,000 tons over the pre-war era in these states to a 1,000,000-ton increase. The Kaiser interests are reported to have been particularly active in making surveys, which are said to show larger potential postwar consumption than previously thought likely. The Kaiser firm is said to have hired a government agency, as permitted under Public Law 74, to develop some figures.

Much discussion has centered upon population changes and more will be heard in this respect. The Pacific States have shown a significant increase in population and employment since early 1940. According to a recent study by K. C. Stokes for the Bureau of Foreign and Domestic Commerce, the percentage change of civilian population between April 1, 1940, and March 1, 1943, is plus 7.3 in the Pacific States. This far exceeds any other geographic area. The only other gain is 1 per cent in the South Atlantic States. The Mountain States show a decline in population of 3 per cent in the same period, according to Stokes. The Pacific States as of March 1, 1943, had 8.10 per cent of the total U. S. civilian population and the Mountain States had 3.13 per cent.

Undoubtedly the postwar Pacific States will retain part of the wartime increase in population. Just how great the consequent increase in steel consumption will be is a matter of conjecture. According to Marion Worthing, author of the consumption figures for 1937 in the accompanying table, the Mountain and Pacific States then had 10.3 per cent of the U. S. population and took 7.1 per cent of the total finished steel.

In connection with West Coast capacity, as with other steel capacity figures, it must be remembered that capacity figures at best are rough guideposts. In a given company diversion of raw material from one type of finishing mill to another can enable a unit to produce beyond given capacity.

The two newest plants in the west are the DPC works in Utah and the Kaiser plant at Fontana, Calif. The Geneva plant is located about 45 miles south of Salt Lake City and about 5 miles from Provo. Its coal comes 130 miles, its iron 225 miles, its limestone and dolomite 25 miles. The Kaiser plant is 50 miles east of Los Angeles and its coal comes 830 miles, its iron 179 miles, its limestone only a few miles.

Geneva's two major products were to be plates and structurals, but the structural mill was ordered halted when 90 per cent complete. Construction of the Kaiser structural mill is going ahead and it is expected to be in operation next summer.

Production of steel started Feb. 3 at the DPC's $180,000,000 steel plant near Provo, Utah, with the charging of the first open hearth furnace. This is the first open hearth steel produced in Utah. This plant, the largest in the West, is operated for the United States government by Geneva Steel Co., U. S. Steel subsidiary. It will have a yearly capacity of 1,280,000 tons. This newest addition to the nation's open hearth steel capacity is one of nine 225-ton basic open hearth furnaces. Two more will be brought into production at approximately weekly intervals.

Columbia Steel Co., west coast U. S. Steel subsidiary, began construction of this, the first fully integrated steel plant west of the Rocky Mountains, in April, 1942, for the DPC.

Estimated Annual Iron and Steel Capacities in Western States, Built and Building, 1944—Net Tons

STATE	Blast Furnace	Steel Ingots	Shapes	Rails	Splice Bars, etc.	Plates	H. R. Sheets	H. R. Strips	Black Plate	H. R. Bars	Concrete Bars	Wire Rods	Forging Billets	Misc.	Plain Wire	Nails	Barbed Wire	Fencing	Galv. Wire	Tubing
California	432,000	1,810,000	210,000	.....	20,000	300,000	120,000	3,100	39,400	284,000	175,000	100,000	9,500	.....	70,000	25,000	1,500	7,200	11,500	51,800
Colorado	629,800	1,127,850	100,000	300,000	112,000	9,000	.....	5,600	.....	79,500	56,000	100,000	13,500	20,000	125,000	40,000	25,000	20,200	33,600	.....
Oregon	.....	30,000	.....	.....	.....	.....	.....	.....	.....	42,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,400
Utah	1,653,300	1,308,000	*	.....	.....	700,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.....	280,000	30,000	.....	13,500	16,250	.....	.....	.....	38,000	47,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Construction of Geneva structural mill with 200,000 tons capacity recently ordered halted.
Full capacity of Geneva for pig iron, ingots and plates included in above table.

Estimated Annual Iron and Steel Capacity in Western States in 1938 (Net Tons)

STATE	Blast Furnace	Steel Ingots	Shapes	Rails	Splice Bars, etc.	Plates	H. R. Sheets	H. R. Strip	Black Plate	H. R. Bars	Concrete Bars	Wire Rods	Forging Billets	Misc.	Plain Wire	Nails	Barbed Wire	Fencing	Galv. Wire	Tubing
California	.....	850,000	108,500	.....	24,300	.....	92,000	3,100	39,400	202,000	113,000	47,000	9,500	.....	50,600	20,000	1,500	7,200	11,500	27,500
Colorado	629,800	995,000	50,500	300,000	112,000	9,000	.....	5,600	.....	79,500	56,000	70,000	13,500	.....	70,000	37,000	15,700	20,200	33,600	.....
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,400
Utah	193,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	.....	174,000	30,000	.....	13,500	16,250	.....	.....	.....	38,000	47,000	.....	.....	.....	.....	.....	.....	.....	.....	.....

Finished Steel Shipments Received in Eleven Western States, 1937—Net Tons

STATE	Sheet Piling	Rails	Plates	Heavy Shapes	Wire Rods H. R. Bars Conc. Bars	H. R. Sheets	H. R. Strip	Galvanized Sheets	C. R. Sheets	C. R. Strip	Pipe and Tubing	Tin Plate	Drawn Wire
Montana	500	400	4,100	2,200	8,600	1,500	100	1,900	.....	.....	16,100	*	*
Idaho	.....	*	1,200	1,100	4,900	600	100	1,800	.....	.....	3,800	*	500
Wyoming	*	100	500	1,300	4,100	100	*	700	.....	.....	10,200	100	1,300
Colorado	*	123,900	9,800	14,500	24,300	6,900	900	9,500	100	100	15,600	900	300
New Mexico	.....	27,100	800	1,400	10,900	400	200	600	*	*	54,000	*	*
Arizona	*	1,500	2,900	4,500	11,800	1,100	100	4,400	100	.....	14,000	.....	100
Utah	.....	53,100	5,800	5,300	11,200	3,200	300	5,500	*	*	9,300	20,000	*
Nevada	.....	2,200	500	500	900	300	*	500	*	.....	1,900	.....	200
Washington	*	2,600	32,100	21,100	41,500	7,700	2,800	11,400	800	500	19,900	70,500	10,000
Oregon	.....	6,700	15,500	8,200	18,200	7,500	2,600	12,400	700	300	11,200	44,300	6,600
California	3,000	48,000	142,100	104,200	246,600	155,000	25,600	105,900	14,100	11,600	326,100	329,800	66,700
Total above	3,500	265,600	215,300	164,300	383,000	184,300	32,700	154,600	15,800	12,500	482,100	465,600	85,700
Total U. S. A.	111,000	1,335,800	2,968,700	2,656,500	5,620,600	3,957,300	2,292,600	1,240,000	2,142,500	806,900	3,535,500	2,324,000	1,284,900

*Less than 100 tons.

Marion Worthing is the author of the above statistics on finished steel shipments, prepared for the National Resources Planning Board. Certain statistical projections were made. In the case of an occasional item, apparently the state was credited with consuming the steel if title to the tonnage was taken in that state. The grand total for the 11 states is higher by around 500,000 tons than another similar pre-war study covering the same areas.

Maritime Sets Procedure for Disposal of Its Surplus Materials

Washington

• • • **Unified procedure** for disposal of surplus property, giving first preference in obtaining material to contractors in the shipbuilding industry, then to other government departments, war contractors, industries, reconverting to civilian production, and last to competitive bidders, has been established by the Maritime Commission.

Each shipyard is responsible for reporting to regional directors of construction on the East, West, and Gulf Coasts, and the Great Lakes area on all property in excess of the need of the particular vessel construction contract for which it was purchased.

Supplies are to be segregated at the shipyard until use or sale of unrequired property is made. When local storage facilities are overburdened, material may be shipped to Maritime Commission warehouses, after consideration of handling and transportation costs. If material can be used on other shipyard contracts, it will be allocated, obviating purchase of new material. Before any requisitioned material is purchased for contracts, unrequired property inventories will be consulted.

In cases where unrequired material may be available which does not meet exact specifications of current or anticipated construction requirements, the Technical Division of the Commission will advise whether plans and specifications can be altered to utilize the material.

When the WPB requests that available material be sold to persons or firms engaged in essential war activities, or in re-conversion to civilian production, a negotiated sale, without competition, may be authorized. Otherwise, property will be advertised for sale with invitations issued for bidding and the bids opened in public. All such sales will be conducted by the district officers.

The Surplus Property Section in Washington will issue general statements of classes, quantities, and types of materials which are available. Persons wishing to be on the mailing list for statements must list the types of commodities desired.

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Warehouses Scorn Handling Excess Steel

Cleveland

• • • **Warehouse reactions** here to the presumed stimulus of the relaxation of order M-21-b-1 permitting the purchase of idle and excess steel has not been at all satisfactory from the volume standpoint. Despite the granted permission for warehouses to buy excess steel outside their tonnage and product class quotas little such activity has been noted in this market. The warehouses' reluctances appear to hinge on two deficiencies of the relaxed order.

The first and most aggravating, it is reported, is the fact that steel once placed in a warehouse stock from an idle inventory loses its identity as idle or excess thus requiring the ultimate buyer to furnish an allotment to buy. This contrasts with the fact that no allotment is required if the purchaser obtains the steel direct from the idle steel holder. This in effect eliminates the advantage to the buyer.

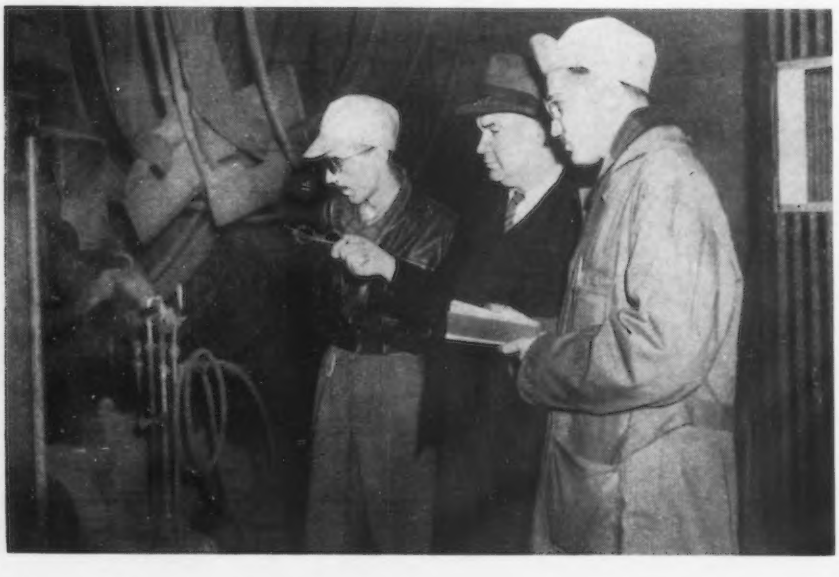
The second is that small and often new dealers, who have established themselves in business solely through a purchase of excess steel as their first inventory, are permitted by the order to replenish inventories from warehouses or distributors without allotment. This is not true of warehouses, and frequently acts as a penalty against them.

WPB, it is claimed, is reluctant to accept proposals of the warehouse industry that idle steel remain "ex-allotment" steel even though purchased by a warehouse for resale because of difficulties forseen in keeping inventories separated in warehouses. The industry claims that if steel held by warehouses as excess were to be resold against an invoice of original purchase from excess stocks, no trouble would be experienced; the identity of the steel could be maintained; and the added sales feature of ex-allotment steel from warehouses would not only work to the benefit of the warehouses but would also increase sales.

Idle and excess steel movement by the Cleveland regional redistribution facilities of the WPB have about reached the point of new listings, averaging about 15,000 tons per month. Overall inventory of idle steel for the region stands at about 35,000 tons, but records are not complete. J. J. Tice, regional manager of the WPB facilities division in Cleveland claims that warehouses are buying cautiously but in large blocks.

Plates and sheets are in heaviest demand, following the current market trend. Tool steel is in excess and moving slowly as are alloy steels. A moderate amount of exporting is moving a variety of carbon steel grades and sizes to South America and Mexico.

BRAZILIAN STUDENTS: *Under the auspices of the offie of Inter-American Training, these two Brazilian students, Joao Franca, left, and Mauricio Grainberg, right, talk with Ben Brown, melt shop superintendent at Jessop Steel Co. Both are attending Carnegie Institute of Technology, Pittsburgh, for metallurgical training.*



Rising Costs Create Concern Among Builders of Freight Cars

By TOM CAMPBELL
Pittsburgh Regional Editor

Pittsburgh

• • • **The railroad** freight car building program for the third and fourth quarters of this year may run into a snag, unless car builders are granted some form of price relief from OPA, according to reliable sources here.

Commitments on new domestic freight cars, during the first three quarters of this year, aggregating about 28,800 cars, have been made; but the substantial increase in raw material and labor costs, which have plagued the car building industry in the past few years, may act as a "brake" on the acceptance of additional orders.

Car builders, as a whole, had their selling prices frozen as of October, 1941. It is understood that substantial cost data already has been furnished to OPA by car builders, and some sort of a decision on the possibility of adjustments in freight car prices is looked for soon. Meanwhile, in addition to absorbing increased costs, to the limit of its ability, the car building industry also faces the prospect of higher steel prices this year.

If steel price adjustments, upward, are made on those products going into car building, and if such increases are made retroactive by OPA, the car builders face, it is said here, a condition which certainly will require help from the OPA. The car building industry, like other industries, whose prices have been frozen, has had increased raw material costs as well as increases in basic labor rates. Added to this have been higher costs, induced by labor strikes. In some instances, car builders have also had to pay more than the usual freight on their raw materials, due to the necessity of taking material from those suppliers directed to ship it by WPB.

For the first quarter this year, orders for about 10,000 domestic freight cars have been placed, and a like number have been accepted for the second quarter. Out of an estimated 10,000 domestic freight cars to be ordered for the third quarter, commitments have been made for about 8800.

The War Department's railroad car orders of last fall, which amounted to about 40,000 cars, have been revised to the extent that about 5500 have been cancelled. It is understood, however, that 2000 may be reordered. There are rumors to the effect that the War Department may make substantial additional purchases late this year, although such an action is entirely dependent upon the course of the war.

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Farm Machinery Quotas for 1944

Washington

• • • **Two schedules** governing farm machinery production for the year beginning July 1, 1944, were issued by the WPB this week. Production volume authorized is about the same as for the current year, but schedules may be altered between now and July 1.

The schedules permit manufacturers to plan production and order materials under CMP provisions. Changes in the distribution pattern now set up or the addition of controls or exemptions are not expected to reduce the total volume of machinery to be produced. The program will require about 1,200,000 tons of carbon steel and more than 1,000,000 tons are earmarked for the American farmer.

The tentative breakdown of this steel is: 88 per cent for the domestic

Farm Equipment Production Down in 1943

• • • A decrease in both quantity and value of production of tractors, harvester-thresher combines, and grain threshers in 1943 as compared with 1942 was announced by the Bureau of the Census, Department of Commerce. Total production of tractors (agricultural, industrial, and military) in 1943 amounted to 137,591 valued at $196,247,958; combines, 30,377 valued at $17,294,010; and grain threshers, 694 valued at $469,699.

KIND	1943				1942			
	Manufactured		Manufacturer Sales		Manufactured		Manufacturer Sales	
	No. Units	Value, Dollars	No. Units	Value, Dollars	No. Units	Value, Dollars	No. Units	Value, Dollars
Tractors, all types	137,591	196,247,958	140,410	205,529,531	215,074	208,556,356	227,304	213,850,210
Wheel type	101,330	59,863,901	102,320	62,462,450	172,123	102,557,627	185,677	111,618,126
Steel tired	64,008	36,757,414	65,038	38,118,105	74,679	43,217,016	70,661	40,694,182
Rubber tired	37,322	23,106,487	37,282	24,344,345	97,444	59,340,611	115,016	70,924,044
Wheel type except "all purpose"	13,506	10,082,538	16,924	13,404,241	21,135	15,839,902	24,678	18,809,819
Belt horsepower:								
Under 30, steel tire	3,695	2,199,435	3,964	2,332,969	3,737	1,790,609	3,714	1,808,657
Under 30, rubber tire	2,860	1,489,615	3,362	1,982,437	4,416	2,649,192	5,562	3,322,962
30 to 35, steel tire	2,417	1,785,338	2,799	2,048,781	3,483	2,302,634	3,445	2,281,890
30 to 35, rubber tire	902	820,220	1,374	1,236,943	1,201	973,854	3,119	2,589,588
36 and over, steel tire	2,514	2,164,964	3,214	2,884,528	4,871	4,476,419	4,296	3,943,355
36 and over, rubber tire	1,118	1,622,966	2,211	2,918,583	3,427	3,647,104	4,542	4,863,367
Wheel type, "all-purpose"	87,824	49,781,363	85,396	49,058,209	150,988	86,717,725	160,999	92,808,307
Belt horsepower:								
Under 30, steel tire	48,378	26,431,065	49,416	27,402,300	55,992	30,491,196	53,337	29,047,350
Under 30, rubber tire	30,672	17,884,445	28,826	17,040,721	75,973	42,583,272	85,834	48,135,766
30 and over, steel tire	7,004	4,176,612	5,645	3,449,527	6,596	4,156,158	5,869	3,612,830
30 and over, rubber tire	1,770	1,289,241	1,509	1,165,661	12,427	9,487,099	15,959	12,012,361
Tracklaying type	29,453	135,384,195	30,447	141,975,843	29,578	104,123,139	28,644	100,369,913
Belt horsepower:								
Under 50	12,852	51,968,808	13,335	53,517,473	13,072	23,744,198	13,005	23,474,541
50 and over	16,601	83,415,387	17,112	88,458,370	16,506	80,378,941	15,639	76,995,372
Garden tractors, including motor-tillers	6,808	999,862	7,643	1,091,238	13,373	1,875,590	12,983	1,962,171
Combines (harvester-threshers)	30,377	17,294,010	30,080	17,020,870	41,722	24,530,130	45,968	26,385,035
Width of cut:								
6 ft. and under	26,245	12,941,635	25,735	12,520,782	36,701	18,685,590	40,731	20,204,161
Over 6 ft. to 10 ft.	1,910	1,462,394	2,038	1,551,754	1,505	1,226,686	1,452	1,206,639
Over 10 ft.	2,222	2,889,981	2,307	2,947,834	3,516	4,617,854	3,785	4,974,235
Grain threshers, including rice and alfalfa threshers	694	469,699	999	803,910	2,146	1,933,484	2,147	2,041,780
Width of cylinder:								
Under 28 in.	541	333,278	687	473,143	1,417	1,165,937	1,410	1,250,457
28 in. and over	153	136,421	312	330,767	729	767,547	737	791,323

* Preliminary figures subject to revision.

farmer; 5 per cent for military and industrial needs; and 7 per cent for export.

Quotas are determined, as in the basic order L-357, by taking a percentage of the net shipping weight of machinery in any given category produced in 1940 or 1941. A manufacturer may choose either year as his base period, and he may "bracket" his production in any given group or division of machines. Quota percentages for 400 kinds and types of machines are given in Schedule B or order L-257. This schedule B corresponds to schedule A in effect at present.

Production quotas for export, except to Canada, are based on net shipping weight of machinery, equipment, and spare parts shipped to the countries or groups of countries listed in seven different schedules. In all but one of these groups of countries, the quota is based on a percentage of one half of the total net shipping weight of shipments made in 1940 and 1941 to all of the countries in the group. In the seventh group, schedule X-17 of L-257-a, each country must be taken separately. The quota percentages in this group vary widely.

Exports to Canada are dealt with in a separate schedule, X-18. Quotas for complete units are not based on weight but on the number of units of items; those for attachments and repair parts on net shipping weights.

Schedule X-12 lists 57 countries and areas for which the quota is nil. This list includes France, Norway, Poland, the Netherlands, Denmark, Belgium, and Italy.

Revised Army Supply Setup Points to More Contract Cutbacks

By DONALD BROWNE
Washington Staff

• • • It is expected that substantial contract cancellations in addition to the $8,000,000,000 previously announced will be made as a result of recent revisions of the War Department's supply program.

According to the War Department, it is following a policy of terminating contracts in government-owned plants instead of in privately-owned plants primarily to keep American industry on a going basis as long as possible. At present the termination of war work in private plants would result in these plants becoming idle, since manpower and critical components are not available in sufficient quantities to permit the resumption of civilian production, the War Department says. When the materials and manpower suffice for this purpose, the War Department would then change its policy to keep government-owned plants in operation to the fullest extent possible so that private industry could resume its normal production.

An inquiry on War Department industrial demobilization plants recently made by THE IRON AGE brought the following answers with respect to:

Machine Tools—There is mounting opinion that the government should compile a "blue book" of machine tool prices to be paid by private purchasers of surplus machine tools owned by the government. The thought is that companies desiring tools for peacetime production should be permitted to purchase surplus used tools now at appropriate discounts off the first cost to the Government.

In this way, actual savings to the government would be effected, it is said, because manufacturers are reluctant to buy used tools under present regulations where the price is generally set by rather conservative depreciation rates. It is pointed out that companies will prefer to buy new tools if high prices are demanded for used ones.

Thus contracting officers would have a protective guide in the sale of tools and could not sell below the minimum when special permission was granted by higher authority.

In general, the War Department proposes to stock special purpose tools of military significance but for which there is no civilian or peacetime use and wants also to modernize completely the tooling of government arsenals. The remainder under this plan would eventually be declared surplus and sold.

Work in Process—A considerable portion of work in process may well be used to expedite the completion of civilian type end items during the period of transition from war to civilian production. Some will be used for the production of replacement parts which may be finished when the demand is sufficient. The balance would find its way to the scrap pile.

Replacement Parts—Practically the same formula as applied to machine tools may be followed with regard to replacement goods, except there is no "blue book" plan afoot. The War Department will reserve the number of parts needed to maintain airplanes, automotive and other equipment it owns for the life of this equipment. The remaining parts will be sold as surplus or disposed of as scrap.

Strategic Stock Piles—It would appear that the military services believe they should have the responsibility for the determination of stock piles of critical materials to be established as a protective measure against future wars. It is also understood

SECRET WEAPON: *This is the M-8 motorized weapon carrier, made by Cadillac Motor Car Div. of General Motors Corp. It mounts a 75 mm. howitzer and a 0.50-cal. anti-aircraft gun in its open turret, making it a weapon complement for the 37 mm. fire power of the M-5. The new vehicle is especially adapted for mountain fighting.*

that the services desire to start this stockpiling by being authorized to take over stock piles in existence at the end of the war. Manifestly, such authorization would allay the fears of industry that these stock piles would destroy the immediate market.

The War Department is not ready to concur in the reduction of the production of copper, lead and zinc until present stock piles have been materially increased, nor to change the detail of soldiers furloughed from the Army to work in the mining of critical non-ferrous metals, particularly in the instance of zinc.

Scrap is not going to be stockpiled under present considerations—not even three-way alloy scrap which under current price policies will find little demand in peacetime steel chemistries.

One year's requirements of such critical metals is the most frequently mentioned supply to be maintained by the services.

Obsolete equipment—The Army has no intention to stock indefinitely weapons of proved obsolescence. Falling into this class would be early tanks and anti-tank guns. Such materiel will, however, be kept as insurance against unforeseen military needs until the progress of the war indicates that it can be safely scrapped.

1943 Finished Steel Production Sets More New Records

Source: American Iron and Steel Institute

		Number of companies	Item	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export *	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export *	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	45	1	xxxxxxx	728,068	xxx		238,202	8,521,651	xxx		2,484,068
	Heavy structural shapes	10	2	5,412,580	360,681	78.6		xxxxxxx	3,871,909	71.5		xxxxxxx
	Steel piling	4	3	338,000	3,287	11.5		xxxxxxx	37,045	11.0		xxxxxxx
	Plates—Sheared and Universal	22	4	9,489,740	1,157,127	143.8		13,950	12,966,878	136.6		48,625
	Skelp	7	5	xxxxxxx	57,802	xxx		43,089	777,366	xxx		479,256
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	198,024	64.4		xxxxxxx	1,933,395	53.3		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	12,198	46.4		xxxxxxx	162,275	52.4		xxxxxxx
	All other (incl. girder, guard, etc.)	2	8	100,000	1,494	17.3		xxxxxxx	21,639	21.2		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	57,123	60.2		xxxxxxx	629,920	56.2		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	621,769	xxx		90,232	7,188,229	xxx		968,667
	Concrete reinforcing—New billet	15	11	xxxxxxx	37,662	xxx		xxxxxxx	422,452	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	6,079	xxx		xxxxxxx	79,561	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	146,839	xxx		xxxxxxx	1,772,662	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	172,759	xxx		24,331	2,927,252	xxx		408,984
	Cold finished	19	15	xxxxxxx	28,799	xxx		xxxxxxx	447,515	xxx		xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	3,735	xxx		xxxxxxx	84,140	xxx		xxxxxxx
	TOTAL BARS	63	17	14,719,285	1,017,642	81.6		114,563	12,917,811	87.8		1,377,651
	Tool steel bars (rolled and forged)	17	18	200,840	11,875	69.8		xxxxxxx	177,327	88.3		xxxxxxx
	Pipe and tube—B. W.	15	19	2,231,040	113,718	60.1		xxxxxxx	1,326,084	59.4		xxxxxxx
	L. W.	8	20	845,400	47,221	65.9		xxxxxxx	560,048	66.2		xxxxxxx
	Electric weld	8	21	1,149,250	65,000	66.7		xxxxxxx	1,014,492	88.3		xxxxxxx
	Seamless	15	22	3,082,400	164,334	62.9		xxxxxxx	2,165,044	70.2		xxxxxxx
	Conduit	7	23	190,000	3,218	20.0		xxxxxxx	54,492	28.7		xxxxxxx
	Mechanical Tubing	11	24	597,800	66,015	130.3		xxxxxxx	750,366	125.5		xxxxxxx
		22	25	xxxxxxx	94,790	xxx		16,915	1,200,548	xxx		222,956
	Wire—Drawn	41	26	2,356,550	165,898	83.0		3,511	1,999,773	84.9		50,635
	Nails and staples	19	27	1,116,640	61,125	64.6		xxxxxxx	800,897	71.7		xxxxxxx
	Barbed and twisted	15	28	482,280	20,361	49.8		xxxxxxx	243,103	50.4		xxxxxxx
	Woven wire fence	16	29	778,060	28,111	42.6		xxxxxxx	263,537	33.9		xxxxxxx
	Bale ties	12	30	128,420	6,232	38.2		xxxxxxx	104,961	81.7		xxxxxxx
	All other wire products	8	31	78,220	4,119	62.1		xxxxxxx	58,007	74.2		xxxxxxx
	Fence posts	11	32	112,065	5,979	62.9		xxxxxxx	50,451	49.0		xxxxxxx
	Black plate	11	33	339,700	36,250	125.9		50	354,959	104.5		135
	Tin plate—Hot rolled	4	34	483,620	-			xxxxxxx	10,597	2.2		xxxxxxx
	Cold reduced	10	35	3,841,340	127,670	39.2		xxxxxxx	2,094,121	54.5		xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	532,752	xxx		27,678	6,015,959	xxx		215,257
	Galvanized	14	37	xxxxxxx	76,728	xxx		xxxxxxx	823,753	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	151,239	xxx		xxxxxxx	1,549,636	xxx		xxxxxxx
	All other	15	39	xxxxxxx	28,549	xxx		xxxxxxx	354,902	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	789,268	69.0		27,678	8,744,250	64.8		215,257
	Strip—Hot rolled	22	41	3,201,690	131,312	48.4		16,078	1,550,296	48.4		189,377
	Cold rolled	39	42	2,059,740	84,650	48.5		xxxxxxx	1,155,252	56.1		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	20,386	56.6		xxxxxxx	227,749	53.6		xxxxxxx
	Axles	6	44	453,470	16,396	42.7		xxxxxxx	164,847	36.4		xxxxxxx
	Track spikes	11	45	308,350	9,964	38.1		xxxxxxx	136,463	44.2		xxxxxxx
	All other	5	46	xxxxxxx	17,259	xxx		xxxxxxx	200,468	xxx		xxxxxxx
	TOTAL STEEL PRODUCTS	460	47	xxxxxxx	5,654,691	xxx		474,036	67,278,221	xxx		5,067,960
	Pig iron, ferro manganese and spiegel	27	48	xxxxxxx	757,417	xxx		322,685	9,132,709	xxx		4,527,164
	Ingot moulds	5	49	xxxxxxx	81,425	xxx		xxxxxxx	1,005,416	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	8,640	59.9		563	99,004	58.2		4,287
	Pipe and tubes	2	51	106,000	8,016	89.2		xxxxxxx	87,052	82.1		xxxxxxx
	All other	1	52	56,000	923	19.4		-	13,960	24.9		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	17,579	xxx		563	200,016	xxx		4,287

Total number of companies included, 184.

During 1942, the companies included above represented 98.8% of the total output of finished rolled products.

* In accordance with Government policy, export figures cannot be published.

Canada's 1943 Ferrous Output Down

Toronto

• • • **Canadian production** of pig iron, steel ingots, and castings, showed declines for 1943, while output of ferro-alloys registered a minor gain, for a new all time record, according to the Dominion Bureau of Statistics. Production for December, was the lowest since January, 1943, when output was sharply reduced by strikes at Algoma Steel Corp., at Sault Ste. Marie, Ont., and Dominion Steel & Coal Corp., Sydney, N. S. Annual production data are shown in accompanying table.

December pig iron production was 137,256 tons, compared with 142,249 tons in November. December ferro-alloy production was 17,038 tons compared with 16,169 tons in November. December production of steel ingots and castings fell to 76.8 per cent of capacity, amounting to 227,822 tons compared with 259,444 tons in November.

It is understood that pig iron soon will be dropped from regulation by the Steel Controller. Other steel materials may soon receive like treatment. Recently the Steel Controller surrendered control jurisdiction over a number of the heavier steel materials, and with surplus stocks or capacity available in Canada most other items may be dropped from regulation control. At the present time sheets appear to be the only scarce commodity in the steel group and delivery against new orders extends four to six months into the future with no surplus capacity available for upwards of four months. On plate and alloy bars some Canadian producers have obtained substantial contracts from the United States and Mexico.

Administration of Canada's cargo ship construction program and the naval shipbuilding activities of the Department of Munitions and Supplies has been merged under the new capital shipbuilding branch with D. W. Ambridge, director-general, C. D. Howe, minister, announced.

Recession in the steel industry has cut some 10 per cent from Canada's capacity output of last year, as well as virtually eliminating import of steel from the United States, but the reduction will not go much farther unless a major and unexpected change occurs in the war situation, according to the Ottawa correspondent of *The Financial Post*. Biggest single cut has been in the shipbuilding program, reflected very sharply in steel requirements. Imports of American steel plate, shapes and bars for shipbuilding, which formerly ran to 500,000 tons a year, have been dropped entirely. In addition, Canadian output of these steel products is off about 14,000 tons a month.

Canadian contracts for steel plate dropped, by the end of 1943, by a total of 30,000 tons a quarter. The Steel Co. of Canada, originally scheduled to provide 30,000 tons of plate in the last three months of 1943, was called upon for only 11,000 tons in that period. Dominion Steel Corp.'s 18,000-ton order was cut in half. Dominion Foundries & Steel's quota was cut to 900 tons instead of the 3000 originally ordered.

Bars and shapes have a similar record. Algoma Steel had been asked for 4500 tons; actually only 10 per cent of the order was wanted.

CANADIAN FERROUS PRODUCTION

	Pig Iron, Net Tons	Ferro-Alloys Net Tons	Steel Ingots & Castings, Net Tons
1943	1,758,265*	218,687	2,996,978**
1942	1,975,015	213,636	3,121,361
1941	1,528,053	213,219	2,701,313

* Includes: 1,456,444 tons basic iron; 148,654 tons of foundry iron; 153,067 tons of malleable iron.
** Includes: 2,841,780 tons of ingots and 155,198 tons of castings.

CMP Developments

• **Dir. 16 to Reg. 1, as amended, makes rules governing replacement of stainless steel rejected by a customer for non-conformity with specifications or for other defects identical with those rules governing replacement of other types of steel. (Release No. WPB-4914.)**

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• **Reg. 1 has been amended to incorporate all since issued interpretations and to include in the regulation a more flexible provision on returned allotments.**

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• **Dir. 6 to Reg. 3 defines method of applying split ratings to different production programs. (WPB-4909.)**

Priority Changes

L-30-d—Dir. 1 grants authorization to six manufacturers to produce up to a total of 400,000 pressure canners before July 1, provided that there be no interference with munitions manufacture. (1-31-44)

L-88—Amended order relieves railroads of paper work in connection with obtaining used rails for replacement on the ties. (2-4-44)

L-197—Upon appeal, permits will be granted to the paint, varnish and lacquer industry to procure 5-gal. steel pails for civilian use under certain conditions. (2-5-44)

L-211—Sched. 15, as amended, makes several changes in specifications controlling hot-rolled carbon steel bars. (2-3-44)

L-215—Amended order lifts restrictions on some leather working machinery. (2-5-44)

L-216—Sched. V, as amended, modifies its limitations on the production of files. (2-3-44)

M-9—Amended order eases the controls over movement of copper. (2-1-44)

M-21-a—Dir. 1 has been revoked, but deliveries of rejected corrosion and heat resistant alloy steels, to which it applied, remain subject to all other applicable WPB regulations and orders. (2-1-44)

M-21-d—Revoked order removes restrictions on the utilization of steel mill production facilities for the fabrication of corrosion and heat-resistant chrome steel and on the use of ferro-alloys. (2-2-44)

M-65—Amended order corrects an error which appeared in the original print. It now provides that no person may use in any fashion any cadmium after Jan. 22, for the manufacture of a lead base alloy containing no more than 3 per cent by weight of cadmium for the coating of copper wire. (1-31-44)

M-78—Order revoked thereby removing all restrictions on mercury covered by the order. (2-2-44)

M-126—Amdt. 3 permits limited use of iron and steel in manufacture of specified civilian items. (1-31-44)

M-293—Amended Table 11 puts marine diesel engines under closer control by designating them as "Class Y" products. (1-21-44)

M-293—Dir. 1 to Table 14 makes restrictions on production of boilers for stock applicable to the types subject to the scheduling jurisdiction of the Plumbing and Heating Division. (2-1-44)

M-311—Amended order attempts to accelerate the movement of automotive scrap to the steel mills and at the same time to increase the quantity of used automotive parts required to maintain the nation's automotive transportation. (2-1-44)

Dir. 6 to Reg. 3 rules that when two or more preference ratings (split ratings) are assigned to the same production schedule, they must be split proportionately in applying them to each class of production material required. (2-2-44)

Fire Destroys Republic Pipe and Pickling Plant

Youngstown

• • • **Fire destroyed** the three-story pipe and pickling plant of Republic Steel Corp. in Youngstown last Sunday. The origin of the fire and financial loss were undetermined but its effect on steel production was minimized by company spokesmen. The plant has only been operating on a one shift basis.

Price Briefs

• **Amdt. 88 to RSR 14 provides a special price of $80 per ton f.o.b. producing point, in carload lots of 100 lb. drums for calcium carbide sold for export.**

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• **Amdt. 14 to MPR 134 makes two principal changes in the regulation establishing rental charges for dump trucks used in construction or road maintenance work. (Release No. OPA-T-1692.)**

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• **Order 149 to MPR 136 provides for pricing method on used construction machinery when making delivery to the U. S. Army Corps of Engineers, for overseas use.**

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• **Amdt. 107 to MPR 136 adds scaffolds and masonry saws to the list of articles covered by the regulation establishing maximum prices of machines, parts and machinery services. (Release No. OPA-T-1716.)**

WLB Won't Consider Steel Issues Not Affecting Stabilization Program

Washington

• • • At a hearing called by Phil Murray, the War Labor Board met on Monday, with some 300 steel industry representatives to give colorful fanfare to the last rites of the "Little Steel" formula.

Companies were formally notified by WLB chairman William H. Davis to come to Washington to arrive at "issues and procedures" in connection with CIO's 22 demands. The 300 industry men paid an estimated $100 each to attend, counting railroad fare, hotel bills, and incidentals, to tell WLB what it already knew. They found out that CIO has 600 companies on its preferred list, but that those not in the "basic" steel industry, whatever that is, would not be operated upon by "Dr." Davis at this time. "Basic steel" industry is really the board's lingo for the production and sale of steel.

No procedures were settled upon except that "Dr." Davis made it clear that while the new panel, which was then unpacked, would consider the 17c. an hour demand, collateral wage matters such as vacations and sick leave, but would refer back to "collective bargaining" those issues not affecting the "stabilization program." This was in keeping with Mr. Murray's thinking. Steel men had foolishly thought that these points could be held in abeyance pending the outcome of the wage demands, as a sort of dessert. But, no, the panel will take care of that and it was clear that the no-pay matters will become appetizers.

Mr. Murray, always sartorially resplendent, gave the audience of some 500 persons assembled in labor's borrowed palace in the Inter-State Commerce Building a treat of Scotch inflected bandinage with John Stephens, industrial relations adviser for the United States Steel Corp. Mr. Stephens' cultured voice rang in the gold-decked marble halls, giving back retort for retort.

Steel representatives were regaled with the reasons Mr. Murray gave against holding the panel hearings in Pittsburgh and the lovely names he applied to steel men. Murray let it be known that breaking the government stabilization program was a deed that the whole nation should witness from the vantage point of the capitol. He good humoredly described steel men as "representatives of those powerful interests," and wryly as "agents" of the companies.

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Ohio-Michigan Toolmaker's Strike

Cleveland

• • • **The National Administrative** Council of the Mechanics Educational Society of America, meeting at Cleveland on Feb. 7, called off "temporarily a four-day-old strike of 25,000 tool and die makers in some 44 plants mainly in Cleveland, Toledo and Detroit. The National War Labor Board had called a meeting for Feb. 8 and ordered union officials to be present. The union threatened to strike again if the WLB decision is unsatisfactory, but observers feel that the strike is over since the union has made its gesture.

The strike dates back some four months and involves the fact that the UWA-CIO at Willys-Overland plants in Toledo had 9000 members to M.E.S.A.'s 1000, and a pending plant-wide election would put the UAW in full power. The M.E.S.A. did not want the National Labor Relations Board to grant the election on a plant-wide basis. The strike call was made to force NLRB to abandon such plans.

Subpoenas were served by the War Labor Board on the union's top ranking officers, President George White and Secretary Matthew Smith, to appear before the WLB in Washington on Tuesday afternoon. A meeting was called for Monday, but Smith claimed he wouldn't appear. WLB threatened to seek Federal court orders to enforce the union officials to appear if the new subpoenas were disregarded.

U. S. Steel's Production Records

Gary, Ind.

• • • **The Gary works** of Carnegie-Illinois Steel Corp., world's largest steel mill, set a new world's record for steel production, and established five other records. The Gary plant's new mark included production of ingot tonnage exceeding an average of 16,400 net tons daily during January, representing an increase of 9000 tons over the best previous record, established in May, 1942. The new world's record for steel production was reached, officials said, despite an acute manpower shortage which compelled many men to work double time daily on occasions in various plant departments during January.

The other January records included new highs for coke plant and blast furnace production as well as in rolling and plate mills.

Joliet plant operations of the American Steel & Wire Co., established 77 new production records in 1943. The company in 1943 set 912 new production records making a total of 1854 new highs established by this U. S. Steel unit since Pearl Harbor.

The Waukegan plant set 22 new records last year, while Worcester, Mass., operations exceeded previous highs no less than 293 times. The Donora, Pa., plants established 165 new records while the facilities in Cleveland, broke 137 former records. Duluth, Minn., plants entered 81 new records on the books. The New Haven, Conn., plant established 60 records, while Trenton, N. J., exceeded old marks 51 times during the year. The Rankin, Pa., operations with 24 new highs, and the Allentown, Pa., works with two records smashed, complete the list of plants producing for victory.

1944 Ore Quota Set

• • • The WPB Iron and Steel Advisory Committee set a quota of 90,000,000 gross tons of iron ore from the Lake Superior region for 1944. The committee requested that the ODT relax or eliminate restrictions on Lake movement of coal so as to permit a free flow of this important commodity at the same time it announced the new ore goal. The scarcity of manpower, it was pointed out, might require drastic steps in order to put all iron ore and coal boats into service at the opening of the lake season. It is now hoped that shipping will start, at least in the lower lake regions, sometime during March. An early opening of upper lake regions would enhance the chances of moving the required amount of ore to Lake Erie and Chicago docks.

Senate Bill to Supersede Baruch Contract Termination Clause if Passed

Washington

• • • **The Murray** (Senate) Termination bill, sometimes referred to as the omnibus bill, was introduced this week and before the Senate gets through, it may incorporate the Hill (House) Property Management bill reported on Jan. 24. The property disposal provisions of the Murray bill were deleted before introduction.

Briefly, the Murray bill establishes an Office of Contract Termination Settlement with a director empowered to establish policies and regulations to govern the executive agencies in making contract termination settlements.

The legislation was drafted and introduced against the wishes of the White House and the War and Navy Departments. If passed by Congress and signed by the President, the law would supersede the Baruch Contract Termination clause.

The General Accounting Office is given authority to examine settlements but cannot raise debts in the accounts of disbursing or contracting officers who are exempted from personal liability in making settlements. GAO is reduced to making representations to the departments, or reporting to Congress.

Under the bill, procurement agencies, including RFC and SWC can make partial payments up to 90 per cent of a contractor's termination claim, and to make or guarantee loans. The Contract Termination Settlement Director is granted authority to make the regulations governing such payments. If any overpayment is made, it is treated as a loan, repayable to the government on demand with interest at 12 per cent.

The bill provides for direct settlement of suppliers wherever the CTS Director finds it necessary and enables the contracting agencies to purchase the claims of suppliers. The CTS Director is given absolute authority to vary the standards, terms and condition, including the evidence necessary to secure a claim paid by a prime contractor to a supplier.

Moreover the bill permits contracting agencies to award additional payments to suppliers who are deprived of "fair compensation for the termination of a subcontract" on account of the "insolvency, bankruptcy or default" of a prime contractor.

Appeals may be made to the Court of Claims, but terminating agreements are to be final, except (1) to the extent otherwise provided by the terms of the settlement, (2) upon a showing of fraud or malfeasance, or (3) upon renegotiation under the Renegotiation Act unless exempt.

Concerned over the lack of a real government-wide adequate property accounting, the Hill Property Management bill reposes in the Bureau of the Budget authority to collect information secured by the other departments so that appropriation bills can be written on a more factual basis.

Accordingly, the Senate Committee on Expenditures in its report on the bill says that the Bureau of the Budget is now engaged in reviewing agency inventory and property control systems with the view of improvement and establishment of uniform practices.

In general, agencies are given authority to dispose of personal property under present statutes. In the opinion of legislative experts, all the new bill would do is to authorize by a joint congressional committee, and an over-all policy board comprising "five top flight executives from the executive branch, and one representative each of labor, agriculture and industry."

January Ingot Output Totals 7,595,202 Tons

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Estimated production—all companies: Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January.....	6,776,733	97.3	439,424	85.4	379,045	83.6	7,595,202	95.7	1,714,493	4.43

1943

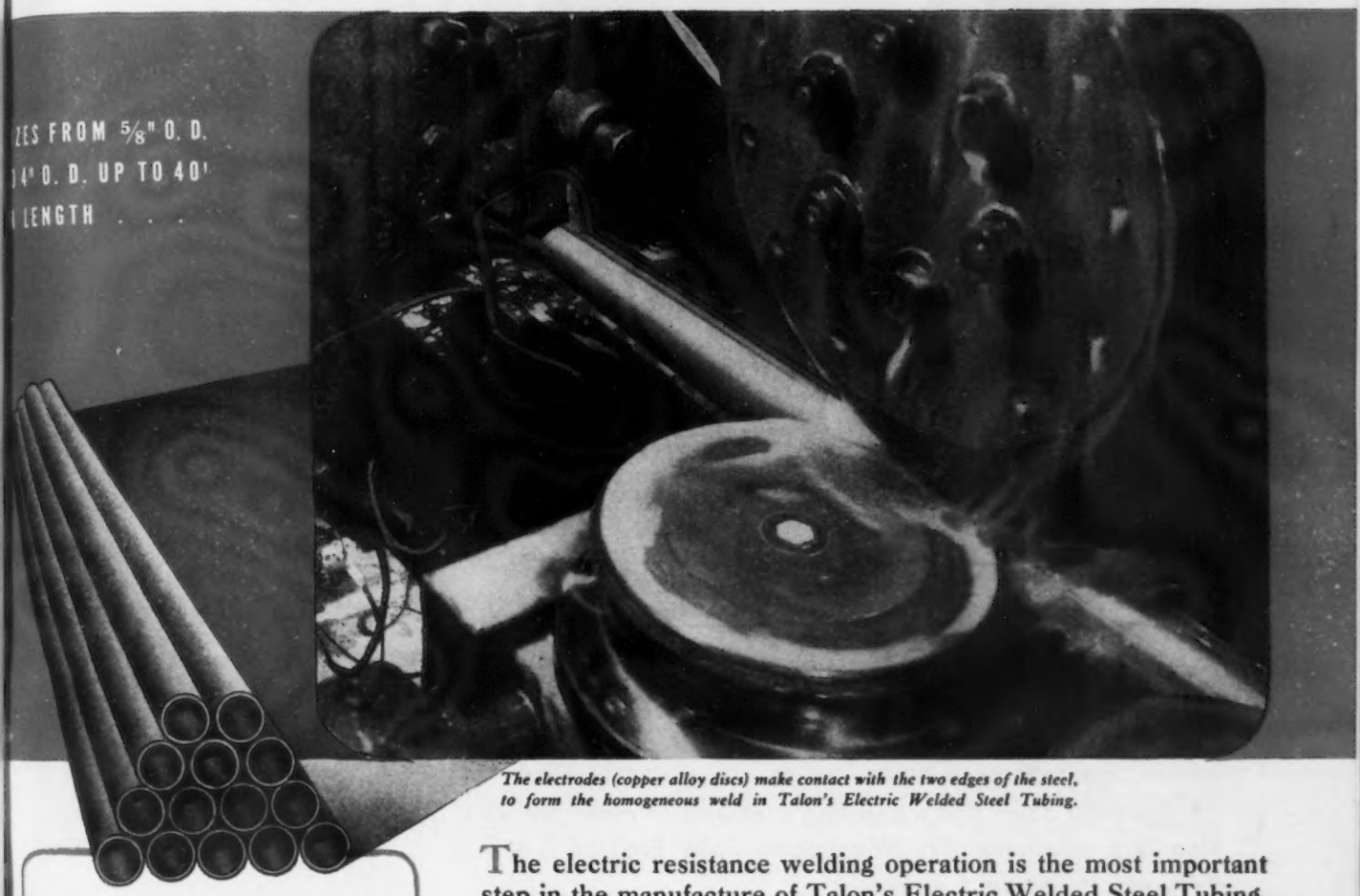
Period	Estimated production—all companies: Open Hearth* Net tons	Open Hearth* Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total* Net tons	Total* Percent of capacity	Calculated* weekly production all companies (Net tons)	Number of weeks in month
January.....	6,576,524	97.8	478,058	85.9	369,395	95.4	7,423,977	96.8	1,675,841	4.43
February.....	6,031,363	99.3	447,843	89.1	344,532	98.6	6,823,738	98.5	1,705,934	4.00
March.....	6,787,630	100.9	503,673	90 5	381,219	98.5	7,672,522	100.0	1,731,946	4.43
1st Quarter..	19,395,517	99.3	1,429,574	88.4	1,095,146	97.5	21,920,237	98.4	1,704,529	12.86
April.....	6,510,563	99.9	481,810	89.4	382,532	102.1	7,374,905	99.3	1,719,092	4.29
May.....	6,669,436	99.1	483,024	86.8	398,057	102.9	7,550,517	98.4	1,704,406	4.43
June.....	6,202,640	95.2	453,599	84.1	384,645	102.6	7,040,884	94.8	1,641,232	4.29
2nd Quarter.	19,382,639	98.1	1,418,433	86.7	1,165,234	102.5	21,966,306	97.5	1,688,417	13.01
1st 6 months.	38,778,156	98.7	2,848,007	87.6	2,260,380	100.0	43,886,543	98.0	1,696,426	25.87
July.....	6,556,531	96.8	466,288	90.6	393,342	94.0	7,416,161	96.3	1,677,864	4.42
August.....	6,699,850	98.7	484,957	94.0	407,224	97.1	7,592,031	98.3	1,713,777	4.43
September.....	6,646,702	101.4	480,635	96.4	391,241	96.6	7,518,578	100.8	1,756,677	4.28
3rd Quarter..	19,903,083	99.0	1,431,880	93.6	1,191,807	95.9	22,526,770	98.4	1,715,672	13.13
9 months....	58,681,239	98.8	4,279,887	89.5	3,452,187	98.5	66,413,313	98.1	1,702,905	39.00
October.....	6,891,753	101.6	513,521	99.5	413,787	98.7	7,819,061	101.3	1,765,025	4.43
November....	6,542,942	99.6	440,941	88.2	390,564	96.2	7,374,447	98.6	1,718,985	4.29
December.....	6,509,923	96.2	390,930	75.9	364,924	87.2	7,265,777	94.3	1,643,841	4.42
4th Quarter..	19,944,618	99.1	1,345,392	87.9	1,169,275	94.0	22,459,285	98.1	1,709,230	13.14
2nd 6 Months..	39,847,701	99.0	2,777,272	90.8	2,361,082	94.9	44,986,055	98.3	1,712,450	26.27
Total (year)	78,625,857	98.9	5,625,279	89.1	4,621,462	97.4	88,872,598	98.1	1,704,499	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

* Revised to include production of new facilities not previously reported.

And Now I Pronounce You

TALON'S ELECTRIC WELDED STEEL TUBING



The electrodes (copper alloy discs) make contact with the two edges of the steel, to form the homogeneous weld in Talon's Electric Welded Steel Tubing.

Interesting Facts About Joining Talon's Electric Welded Steel Tubing

Joining Talon's Tubing offers no drawback because almost any conventional method can be used, such as the following:

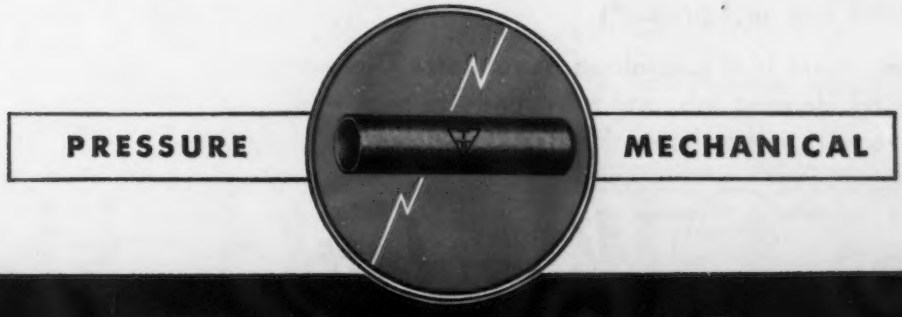
MECHANICAL METHODS—*threaded joints, riveted joints, drive screws, tapped plugs, and screws, slot and plate, friction clutch, telescoped joints, and patented rivets, screws and bolts.*

WELDING METHODS—*Oxy-acetylene welding, arc welding, atomic hydrogen arc welding, brazing, soldering, and electric resistance welding of various types.*

The electric resistance welding operation is the most important step in the manufacture of Talon's Electric Welded Steel Tubing.

As the tubing moves into position, the welding unit automatically adjusts itself up or down as necessary, and the proper amount of current is introduced. Side roll pressure brings the heated edges together at the instant the current takes hold to form a solid, welded joint. The planer, at the left in the photograph, removes the flash (excess metal) left by the welding operation.

No extra metal is added and the weld becomes a complete union, as strong as the edges and with the same strength and physical characteristics as the steel from which it is made. Subsequent heat treating gives a uniform, homogeneous structure in the weld.



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STEEL TUBE DIVISION — OIL CITY, PENNA.

UNDER CONTROL!

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• Wyandotte Field Engineers are experienced—capable of supplying time-saving and money-saving information on metal cleaning procedure and products. The Wyandotte line of metal cleaners is expertly formulated to wade into cleaning and degreasing tasks of any kind and caliber. Cleaning that is done the Wyandotte way is done speedily —with little emphasis on labor, and great emphasis on the quality of results.

• Champions in the metal cleaning field, in war or peace, are Wyandotte men and products.

• Remember, there is a specialized Wyandotte Cleaner for every metal cleaning job, and a Wyandotte man who will be glad to work with you in doing it most efficiently.

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SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION • J. B. FORD DIVISION, WYANDOTTE, MICHIGAN

WPB Explains Split Rating Ordering

Washington

• • • **The WPB** announced that when two or more preference ratings (split ratings) are assigned to the same production schedule, they must be split proportionately in applying them to each class of production material required. This application, according to direction 6 to priorities regulation 3, is on a class of item-basis, and must be followed in all instances where more than one preference rating is assigned to one production schedule.

WPB has fixed a base rating which it will assign for ordering production materials that go into each finished product group. The same base rating will be assigned, therefore, to each production schedule covering the same product group. However, higher ratings may be assigned to a portion of the production schedule by WPB.

To illustrate, if it is decided that $100,000 worth of nuts and bolts and $50,000 worth of wiring devices are to be put into production during a quarter and the preference ratings assigned to the schedule are 60 per cent AA-2 and 40 per cent AA-3, the AA-2 rating may be used to buy $60,000 worth of nuts and bolts and $30,000 worth of wiring devices and the AA-3 rating may be used to buy $40,000 worth of nuts and bolts and $20,000 worth of wiring devices.

Steel Bar Controls Changed

Washington

• • • **Several changes** in specifications controlling hot-rolled carbon steel bars were announced by WPB. These changes were made effective by amending schedule 15 of order L-211 and interpretation 1 of L-211.

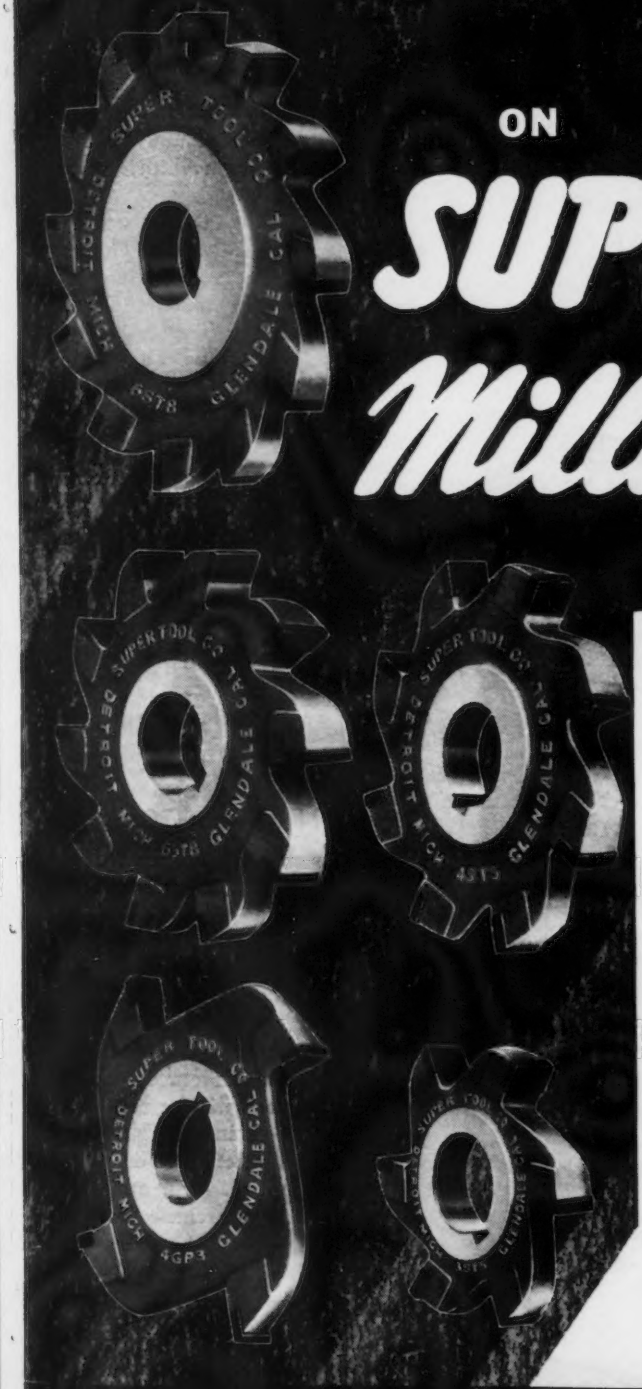
The amendment gives persons engaged in cold drawing carbon steel bars the opportunity to order products best adapted to their future processing operation. Several sizes of bars are eliminated from the table of permitted sizes and two new thicknesses are permitted in the largest size of equal tees.

Orders calling for narrower tolerances than the standard cannot be honored, the amended interpretation points out. The effect on these changes on manpower, materials, and production will be negligible, the WPB said, since they are all purely technical.

PRICES DOWN 25%

ON

SUPER CARBOLOY TIPPED Milling Cutters!



Here's money-saving news for production men! A 25% price reduction on Super Carboloy Tipped Standard Milling Cutters! Think of it! Now you can get the speed, accuracy and dependability of these high quality cutters at prices that mean *extra* economy on all types of production jobs . . . . long runs, short runs, even general shop tooling.

How is this price reduction possible? You'll find the answer in our plants—engineering research and development, improved manufacturing techniques, increased production. And we are passing these savings along to you.

If you haven't yet tried Super Carboloy Tipped Milling Cutters, now is the time to do it! You'll learn first-hand why production men the country over who are interested in stepping up production and stepping down costs, specify SUPER. Write TODAY for complete details as to descriptions, sizes and new low prices.

All sizes available from stock for immediate shipment

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Carbide Tipped Tools

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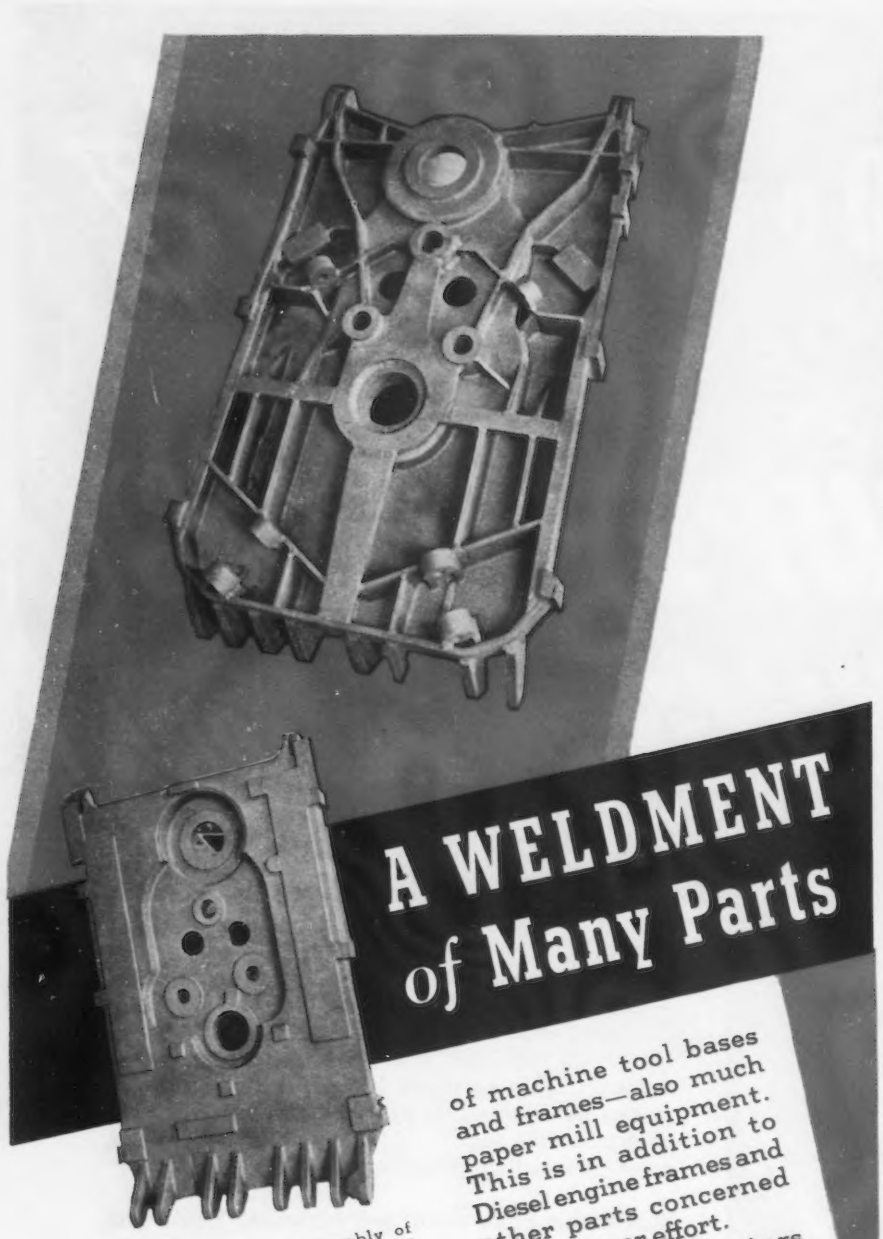

This crane deck is a grand assembly of around fifteen sub-assemblies made up of a great many parts. Steel plates—2¼", 1¼", ⅞", ¼", ⅜" and ⅝"—employed. Total weight, 2,130 lbs.

Here is a weldment that called for a high measure of engineering skill and welding "know-how."

United Welding Company also fabricates an unusual number of machine tool bases and frames—also much paper mill equipment. This is in addition to Diesel engine frames and other parts concerned with the war effort.

Submit your drawings for study and quotation. Engineering advice or service available upon request.

If it can be welded, let us weld it—to increase its strength, lighten the weight and improve its appearance—as well as speed its delivery.

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THE UNITED WELDING CO.
MIDDLETOWN, OHIO
WELDING FABRICATORS OF MODERN DESIGNS

ARMY (E) NAVY

M-21-d Revoked But Other Orders Control Alloy Use

Washington

• • • **Removal of** restrictions on the utilization of steel mill production facilities for the fabrication of corrosion-and-heat-resistant chrome steel and on the use of ferro-alloys was announced by WPB. At the same time, the WPB "unfroze" stainless steels held by producers and consumers. This action will have no effect, however, upon new production and little effect on use of existing inventories, according to WPB.

The specific step taken is the revocation of order M-21-d. This order was issued when facilities and ferro-alloys were scarce and many controls had to be set up to assure maximum supplies of metals for the war program and to recover the alloys contained in such steels for remelt.

Since the issuance of M-21-d, other close controls on the use of ferro-alloys have been instituted through L orders and CMP, and plans for remelting stainless steels held in consumers' inventories have been dropped.

The WPB said that few appeals have been made and that the revocation of this order will not affect the war production program, since fabrication of civilian items remains under strict control.

Grader Needs Up 30%

• • • **Total** 1944 requirements for motor graders are 30 per cent higher than the entire 1943 output, which amounted to 3607 units, the WPB reported to members of the Motor Grader Manufacturers Industry Advisory Committee.

Pending a determination of how many can be manufactured this year, no motor graders will be released for non-military use, including both governmental and other civilian uses, until further notice. All applications for non-military purchase orders are being denied, except those in the first quarter of 1944 already processed.

Silver Coated Beryllium-Copper

Paterson, N. J.

• • • **By a new** process developed by Little Falls Alloy, Inc., spring grade beryllium-copper wire is being silver coated. This coating is said to reduce wear on wire coiling tools, increase surface electrical conductivity, and reduce surface attack during heat treating and hardening.

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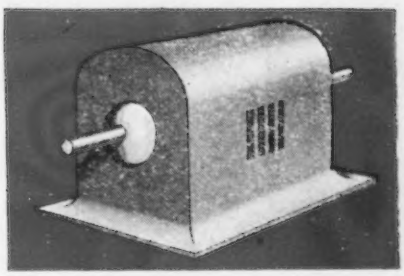
Advances in engineering and design and improved materials will make "The work shop of the world" a new vision of utilitarian beauty.

Pressed Metal Parts and stampings will be used for factory equipment and machinery in the future, just as they have been in the past, but to an accelerated degree. They will make possible revolutionary advances, due to their ability to stand up to abuse, resistance to shock, rugged strength, ability to withstand corrosive conditions, survive radical temperature changes, not to mention low cost and a score of other characteristics, providing requirements not met by any other material.



Sound safe designs literally demand fullest possible use of stampings. Call on the Parish Pressed Steel Company for engineering cooperation. Our services will be found helpful.

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PARISH PRESSED STEEL CO. *Subsidiary of* **SPICER MFG. CORP.**
READING, PA.

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A TYPICAL example of R-S thoroughness in adapting a type of furnace to a particular heat-treating job is the continuous convection, gas-fired furnace illustrated above. Frankly, we are not permitted to divulge full details. Suffice it to say that the production results substantiate our claims of exceptionally uniform and close temperature control (400 to 1300°F.), general over-all efficiency, automatic operation and minimum labor to load and unload. Parts are loaded on the wire mesh belt which moves at a constant, set speed, variable at will.

From the viewpoints of delivery, efficiency in operation and reliability, the R-S Furnace record is truly outstanding. It justifies the use of the expression "Furnaces of Distinction."

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FORGING • PLATE AND ANGLE HEATING • CAR HEARTH
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R-S Furnaces of Distinction

BUY WAR BONDS

Army Axles Exempted From Price Ceilings

Washington

• • • **Exemptions from** price control of the sale and delivery of truck axles by Timken-Detroit Axle Co. to the War Department were announced Jan. 28 by OPA. The exemption applies to axles required for the War Department's truck production program which are the subject of a contract recently negotiated between the War Department and Timken. The actual manufacture will be performed by sub-contractors, with Timken providing engineering direction and knowledge and production supervision, enabling inexperienced sub-contractors to produce the axles. Such an arrangement has been made necessary because of the absence of other facilities for supplying the vitally needed parts.

The Army contract calls for the determination of a firm price after a trial production period, which will enable both Timken and the War Department to determine actual production costs.

In exempting the contract from price control, OPA stated that, in view of the special circumstances of the case as presented by the War Department in requesting OPA action, refusal to exempt the contract would have interfered with necessary war production. The contract with Timken has been drawn so as to avoid inflationary results and the War Department has negotiated the most favorable basis for fixing the final price under the contract that it believes to be possible to obtain under all the circumstances.

WPB Relaxes M-126

Washington

• • • **Even though the** revocation of Order M-126 would not allow new manufacture of 400 classifications of metal articles, according to WPB, the Board decided to relax the order about one eye-dropper full on Jan. 29.

Consequently, the fact that iron and steel may be used for the manufacture of automotive heaters, grease guns and pumps, hose reels and oil pumps, cigarette lighters, motion picture projectors, motion picture sound producing equipment, window shade rollers and stencils, there is no assurance any of these permitted articles will appear on the market in the near future. WPB admits it's "problematical."

FROM AN ORIGINAL DRAWING AND SKETCHES BY ORISON MACPHERSON

EEL FOR WAR

OLD KING COAL

Bituminous coal used for coke making was laid down in form of peat between 200 and 300 million years ago. During this period whole eastern and central part of United States appears to have been in critical adjustment to sea level, now above and now below.

Great push on earth's crust which caused it to fold upwards like pushing together a giant rug, ended more than million years ago and required 60 million years to complete.

Distance Philadelphia to Pittsburgh was shortened by 100 miles during the great up-folding which gave Pennsylvania low volatile coal around Johnstown, medium volatile coal near Indiana, Pa. and high volatile in the vicinity of Pittsburgh.

Mountains 40,000 feet high would have existed in Appalachians if tops of geological foldings had not been eroding away all during the 60 million years uplift.

Ohio River once flowed North up the Beaver Valley and out Grand River into Lake Erie. Course was changed during Glacial Period.

Great Fushun Seam of coal in Northern China varies from 78 to 420 feet thick.

Donbas Basin in Donets Valley, Russia, has 15 seams of coal. Retreating Germans destroyed 140 mines in basin, Russians say.

King Coal's face is washed every day at J&L to prepare him to become better coke when he is roasted in the by-product ovens and converted into fuel for the hungry blast furnaces. Transported direct from the company's mines in river barges, thousands and thousands of tons of coal are daily washed to reduce impurities, such as rock, slate, clay, ash and sulphur, by torrents of water in modern sluice boxes called "launders" which, with vibrating screens, fill the high factory building with loud noise.

The jet black water that has washed the coal is not allowed to run off, but is drained into a pit to precipitate the sediment, which is then dried into dust of coal and blown into steam boiler fireboxes as fuel.

Blending coal, like blending coffees, is done to improve quality. Coals of various types, grades and ages from various mines, or even from the same mine, are carefully, scientifically mixed to insure obtaining coke that is uniform in size, ash and sulphur content.

Coal and Steel: Coal is so essential to steel production that millions and millions of tons of bituminous coal are consumed every year in making steel for war. A ton and seven tenths of coal, converted into coke, is required to smelt the iron ore to make one ton of steel. J&L alone consumes 17 thousand tons of coal every day of the year. Thus, in one day one steel company consumes enough coal to heat 2,500 family dwellings all of a long, hard winter.

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GIVES COMPLETE SPECIFICATIONS ON ALL TYPES OF COUPLINGS

No designer or maintenance engineer should be without the useful information contained in the new Thomas Flexible Coupling Catalog. Easy-to-use charts give complete specifications on couplings for any combination of loads and speeds. Send for your copy today . . . it will help you.

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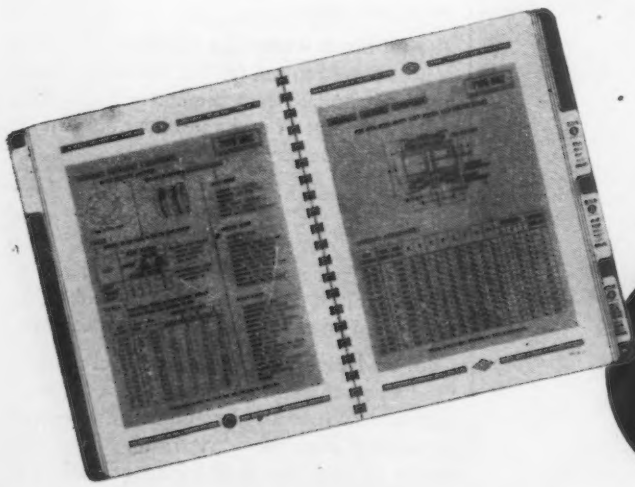
NO LUBRICATION · FREE END FLOAT

These are the five essential features for a permanent care-free installation not found in any other make or type of flexible coupling.



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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

T-6

Stainless Steel Mill Report Eliminated As Supply Eases

Washington

• • • **WPB on Tuesday** announced that it had relieved stainless steel manufacturers of a reporting procedure set up in times of greater stringency. However, the move represents no real relaxation in controls, officials said. Specifically, Direction 1 to Supplementary Order M-21-a, is revoked, but deliveries of rejected corrosion and heat resistant alloy steels, to which it applied, remain subject to all other applicable WPB regulations and orders.

The directive, issued Oct. 4, 1943, was designed to prevent the intentional classification of stainless steels in producers mills as "off-analysis," in order to obtain approval for their application to comparatively non-essential uses. It also was designed to aid producers in the prompt disposition of steels inadvertently melted off-analysis.

WPB officials explained that reductions in stainless steel production, an easing in the ferro-chromium supply situation, and improved inventory procedures are the chief factors making the revocation possible.

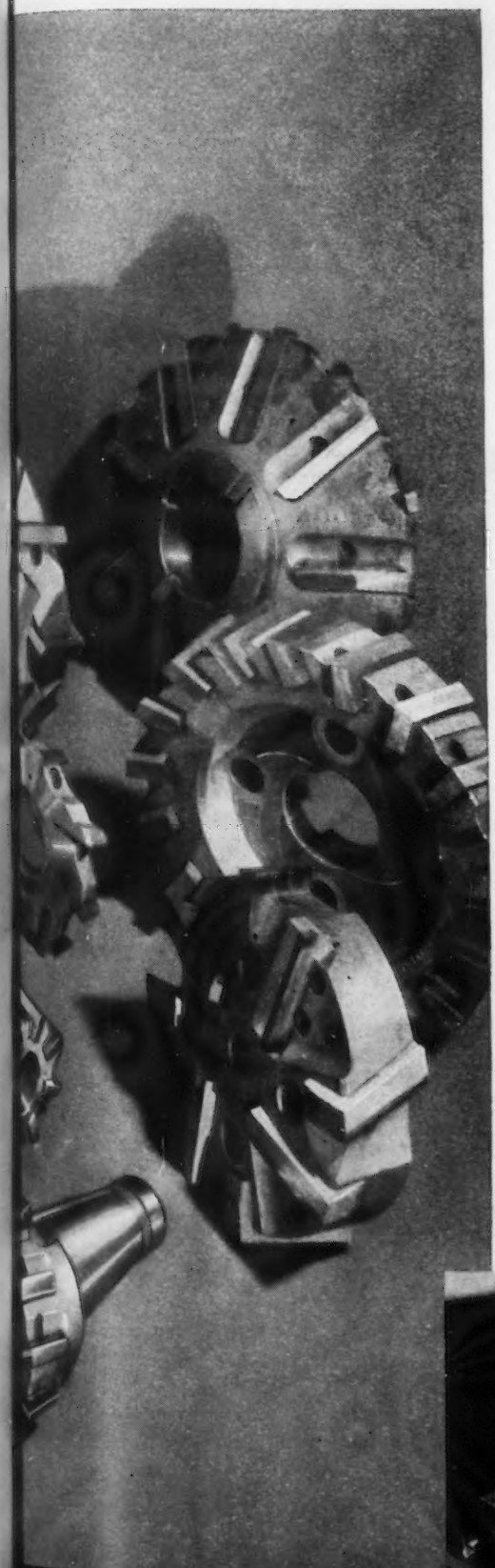
Material Supply List Brought Up to Date by WPB

Washington

• • • **The WPB Conservation** Division has issued its 11th "Material Substitutions and Supply List," which shows an easing of copper and steel. The report emphasizes, however, that "easing" supplies are due rather to the raw materials than to facilities or manpower for fabricating them. This official list carries some 450 materials needed in the war effort, arranged in three groups. Group I shows those whose supply is insufficient for essential needs, Group II those in approximate balance, and Group III those in excess of essential requirements. The total number of materials classified in Group I is slightly smaller than that in October's report.

Tin continues to be short in supply, an exception to the general improvement in the supply of non-ferrous materials. It is recommended that tin be used as little as possible in bronzes and plating. As groups, chemicals and plastics are somewhat tighter than on the previous listings, while textiles and fibres remain about the same. Supply of lumber, in which there is a continued shortage, shows neither improvement nor decline.

AS GOOD AS THEIR CUTTERS



Your machine, regardless of how well designed and equipped in other appointments, gives the best performance only when operated with cutting tools designed for the job.

•

As a natural consequence of meeting and solving many machine problems in milling, Ingersoll has developed a line of milling cutters in types and sizes to suit the conditions of the work. These include cutters for face-milling, end milling, side milling, slotting, channeling, slabbing, form-milling, and many types of boring.

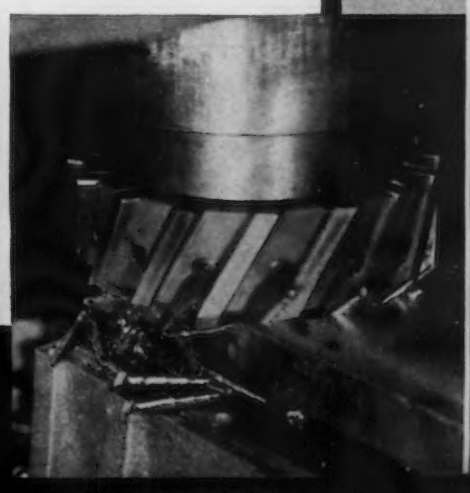
•

If you are not entirely satisfied with the performance of your machines, investigate their tooling. One example of how you may benefit is described at the bottom of this page.

•

In stating the conditions of your work give (1) Kind of material being cut. (2) Width and depth of stock removal. (3) Nature of cut, such as face-milling, slotting, etc. (4) Type of machine drive. (5) And if convenient a sketch of the work-piece.

The same machine was used in both steel milling cuts shown below. The Shear Clear cutter on right, designed for jobs of this type, removed twice the amount of stock in less than half the time. The Shear Clear consumed less power and produced a smoother finish. Are you using the proper cutters in your shop?



ROCKFORD, ILL.

Clean and lubricate your chain!

LENGTHEN ITS LIFE

Here's one good method. Clean your chains regularly. Wipe the links clean, then apply grease or heavy oil mixed with graphite. • Note this exception: Chains should be cleaned but not be lubricated when they come in contact with dirt and sand. • Select good chain (of course we recommend American), care for it regularly, and you'll obtain excellent service. • The highest possible preference rating should be obtained and shown on orders placed for chain.

• USE WELDLESS CHAINS

Weldless Chain is being substituted successfully in many applications, for smaller sizes of welded chain and manila rope. From time to time we have open equipment for manufacturing the following types of weldless chains and attachments: Tenso, Lock-link, Jack, Register, Safety, in steel and brass; American Pattern, in steel; Sash, in steel and bronze. Attachments —"S" hooks, rope snaps, swivel snaps, rings and special designs. Write for information.

AMERICAN CHAIN DIVISION

York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland

AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT • CONNECTICUT

In Business ACCO *for Your Safety*

Eutectic Welding Alloys Co. Demonstrates Its Processes

New York

• • • **Demonstrations of low temperature** welding techniques were made last week for members of the technical press and the American Welding Society on the occasion of the third anniversary of the formation of the Eutectic Welding Alloys Co., New York. The development of eutectic welding was started in Switzerland in 1906 by Hughes Wasserman, close associate of Dr. Hans Goldsmith, the inventor of the thermit welding process. Low temperature eutectic welding alloys in their present form were perfected by his son, R. D. Wasserman, president of the New York firm.

In these processes, which are similar to brazing, the alloys and base metals develop a strong affinity for one another, even though the melting point of the applied metal is far below that of the parent metal. So-called Autochemic fluxes used with "Eutectic" alloys aid the surface alloying that occurs and increase penetration. That such alloying of diverse metals actually occurs at a temperature below the melting point of either metal was demonstrated by literally pushing an aluminum base rod through a brass plate. Over 40 different alloy rods and fluxes have been developed for joining various metals.

Tests showed that a lap weld made on steel with Eutectic No. 16 rod had a greater strength than the parent material. Another test showed that the Rockwell hardness of deposited Bronzochrom metal could be raised considerably by peening. Such alloys are being used to build up mismachined parts.

Postwar Research Allowed

Washington

• • • **WPB will permit** the use of aluminum for postwar experiments. Heretofore, requests for allocations of the light metal for experiments to work out models for civilian goods after the cessation of hostilities have been refused.

Under the new policy, requests for small amounts of aluminum for experiments will be approved provided experiments can be carried out without diverting manpower, technical skills, or facilities from activities connected with the war effort. The new policy will be carried out within the provisions of order M-1-i, which controls allocation and use of aluminum and aluminum products.

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Straight or Self-aligning . Extra Heavy Duty or Special Light Type

LIGHT WEIGHT NON-METALLIC CAGES OR STANDARD BRONZE TYPE

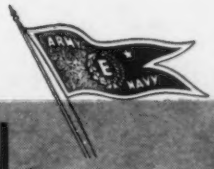
★ *Early Delivery* ★

Also any type of

PRECISION MACHINE WORK OR GRINDING

to unusual accuracy in large diameters

ATMOSPHERE HARDENING • FLAME HARDENING • PRECISION HEAT TREATING
METALLURGICAL LABORATORY • MICROSCOPY AND PHYSICAL TESTING



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For excellence in production of extremely precise, unusually large ball and roller bearings

THE KAYDON ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON, MICH.

Specialists in Difficult Manufacturing

TWO STANDARD PRODUCTION TYPE DRILLING MACHINES *for* MULTIPLE *or* SINGLE SPINDLE OPERATIONS *by* LE MAIRE

A DRILLING MACHINE WITH FLEXIBILITY

Desired rapid advance and feed can be had by adjusting dogs on side of head. Hand and automatic index tables can be furnished.

In addition to the above illustrated machines a 15 H.P. slide type unit is available, giving a wide graduated range of vertical production type machines for the average requirements.

Write us today for complete information on vertical and horizontal units from 1 to 20 H.P. with strokes up to 24".

Consult us NOW regarding postwar plans on any production problems.

BUY WAR BONDS

LeMaire TOOL AND MFG. CO.
2661 TELEGRAPH ROAD DEARBORN, MICHIGAN
ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Milestones

• • • **Laclede-Christy Clay Products Co.**, St. Louis, is celebrating the completion of its first century. Started in 1844 as a firebrick manufacturing company, Laclede has since expanded until today its line of products includes almost every phase of the refractory business.

The company pioneered in the manufacture of firebrick by the dry press method, and in the development of alumina refractories through the use of bauxite. It became the world's largest producer of glass-house refractories for the glass industry, when, in 1931, it acquired the entire assets of the Buckeye Clay Pot Co., Toledo.

Cleveland Ordnance District Output Set at $2 Billion

Cleveland

• • • **Col. H. M. Reedall**, district chief, Cleveland Ordnance District, last week stated that more than $2-billion in finished ordnance materiel had been produced by district contractors during 1943. About half of this total, according to Col. Reedall, represents the district's disbursement to prime contractors for finished material while the other half represents the value of material made and inspected here. The approximate $1-billion figure reflects an increase of 55 per cent over 1942 when disbursement was $448,500,000.

In analyzing the contract figures, Col. Reedall said that as of Dec. 31 there were 3021 prime contracts and purchase orders with a value of $2,157,000,000 under administration in the district.

A partial breakdown of the production from the district included: 195,687 military vehicles, 400,000 engines and transmissions, 3864 tanks and tank hulls, 100,000 bullet-sealing gasoline tanks, 2,500,000 tires for military use, 129,526 gun tube forgings, etc., 14,980 carriages, 7,086,842 carbines and related equipment, 471,000 fire control items, 69,000,000 cartridge cases, 28,000,000 shells, 13,000,000 fuses, 5,000,000 shot, 750,000 aerial bombs and hundreds of millions of small ammunition component parts. In finished machinery, 2751 items for Lend-Lease are reported as well as thousands of jigs, fixtures, cutting tools, etc.

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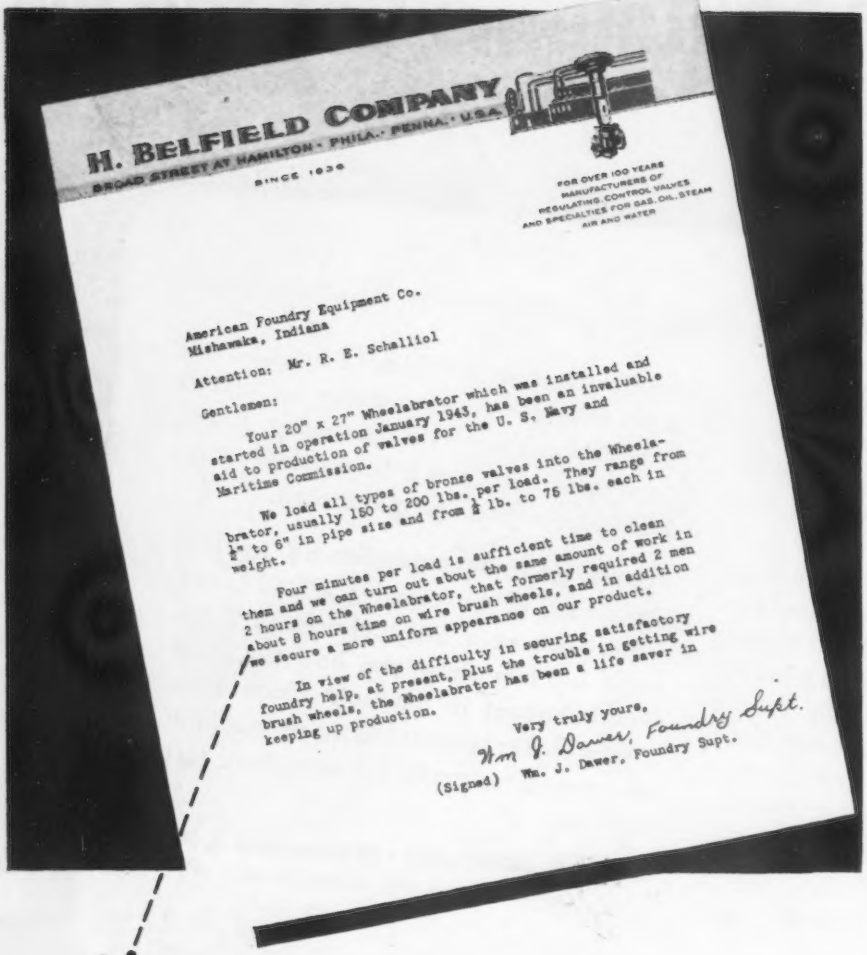
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Mishawaka, Indiana

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Gentlemen:

Your 20" x 27" Wheelabrator which was installed and started in operation January 1943, has been an invaluable aid to production of valves for the U. S. Navy and Maritime Commission.

We load all types of bronze valves into the Wheelabrator, usually 150 to 200 lbs. per load. They range from ¼" to 6" in pipe size and from ¼ lb. to 75 lbs. each in weight.

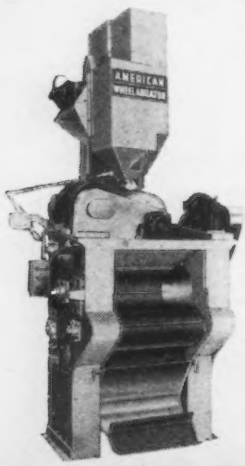
Four minutes per load is sufficient time to clean them and we can turn out about the same amount of work in 2 hours on the Wheelabrator, that formerly required 2 men about 8 hours time on wire brush wheels, and in addition we secure a more uniform appearance on our product.

In view of the difficulty in securing satisfactory foundry help, at present, plus the trouble in getting wire brush wheels, the Wheelabrator has been a life saver in keeping up production.

Very truly yours,
Wm J. Dawer, Foundry Supt.
(Signed) Wm. J. Dawer, Foundry Supt.

final cost ...IS THE PAYOFF ... IN METAL CLEANING

Today the emphasis is on all out production at any cost. Proof that the American Airless Wheelabrator speeds production comes from countless satisfied users like the statement in the letter above, "invaluable aid to production of valves for the U. S. Navy and Maritime Commission."



Tomorrow it will be different! In the post-war world the keynote will be: cost based on efficiency of operation. Proof of the efficiency of Wheelabrator is evident in the above letter as stated, "we can turn out about the same amount of work in 2 hours on the Wheelabrator that formerly required 2 men about 8 hours . . . and in addition we secure a more uniform appearance on our product."

Every day Wheelabrator is giving faster, better production with less cost and a minimum of maintenance. Why not arrange for a demonstration to see for yourself how your products may be cleaned better by Wheelabrating? The world's largest builders of Airless Blast Equipment show record results in final cost . . . and that is the payoff in metal cleaning.

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Briefly Told—

• Class I railroads put 28,708 freight cars in 773 locomotives into service during 1943, Association of American Railroads reports. This was the smallest number of cars installed since 1940 but the greatest number of locomotives since 1930. On Jan. 1, 1944, the roads had 35,737 freight cars and 955 locomotives on order, including 339 steam, the electric, and 613 diesel locomotives. ODT reported 33 new locomotives on order on Jan. 1944, by other than Class I carriers.

•

• A new, simplified complete steel price list containing data required to determine or check prices of steel purchased from warehouse stocks, is offered free by the Earle M. Jorgensen Co., steel distributors operating warehouses in Los Angeles and Oakland, Cal., and Houston, Tex. Through the use of this new price list, almost anyone can quickly and accurately establish or check prices of practically all steel items purchased from warehouse stocks because this list contains all data required for this purpose without referring to supplementary extra schedules of any kind. Moreover, whenever extras or deductions are applicable to the pricing of any commodity specific references are made to the tables to be used and the tables show the amount of the extras or deductions.

•

• Colonial Radio Corp., Buffalo, reports production of two-way radios for U. S. aircraft up 400 per cent during the past year while the working force was increased only 50 per cent. President Allen H. Gardner gives much of the credit to the labor-management committee "which has done amazing things in improving worker morale and reducing absenteeism." Sub-contracting also was a factor in the gain.

•

• Rockwood-Sprinkler Co., Worcester, Mass., is turning out large quantities of fire fighting equipment for landing barges. The company's water fog equipment smothers oil fires instantly.

•

• St. Pierre Chain Corp., Worcester, Mass., has a contract for 22,500,000 lb. of anchor chain for the landing craft program. The order represents 325 miles of chain. Work is about to get under way and must be completed in 15 months, according to Henry St. Pierre, president.

•

• The greatest tonnage in history will be carried by Great Lakes freighters through the Soo Locks this year, according to Lieut. Commander Theodore A. Dahlburg, commanding the Coast Guard base at Sault Ste. Marie, Mich. Veteran skippers expressed hopes they would be getting up steam by April 1 but, despite the mild weather, reminded that anything could happen over the lakes in the next two months. The lakes are not iced up very much now, as compared with last year, but there still is plenty of time for deep freezes.

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Metal Treatment Developments in Seized Patents

• • • This is the fourteenth list of seized enemy patents available on license from the Alien Property Custodian. These patents are grouped in classes. In the following lists, subclass numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationality, and the date the patent was issued.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time rules and procedures for obtaining the papers were described, along with full information about their usage and possibilities. Seized patent applications were listed in THE IRON AGE on July 8.

Class 148—Metal Treatment

(1) 1,689,456. Process of producing gray iron comprising melting iron having a high silicon content and cooling same rapidly by casting it in an iron mold. E. Schuz, Germany. 10-30-28.

(3) 1,877,063. Method of producing hard alloys of the stellite type on the basis of cobalt, chromium, tungsten and carbon. E. Schulz and K. Lobbecke, Germany. 9-13-32.

(3) 2,129,382. Method of centrifugally casting pipes in chilled molds. E. Piwowarsky, Germany. 9-6-38.

(4) 1,635,384. Case-hardening process for steel articles. F. Pacher, Germany. 7-12-27.

(4) 2,112,497. Plant for the manufacture of bronze colors which permits the starting material, i.e., small pieces of the metal, chips, coarse powder, foil waste and the like, to be transformed into finished polished bronze powder in one continuous operation. E. Kramer, Germany. 3-29-38.

(4) 2,225,064. Method of and apparatus for improving the strength properties of round or nearly round metal bars, particularly round iron bars, by cold working. E. Lukacs, Hungary. 12-17-40.

(4) 2,245,366. Method of hardening certain cobalt-nickel-chromium-iron alloys having improved mechanical properties at elevated temperatures. W. Rohn and H. Cornelius, Germany. 6-10-41.

(4) 2,247,643. Method of hardening certain cobalt-nickel-chromium-iron alloys having improved mechanical properties at elevated temperatures. W. Rohn and H. Cornelius, Germany. 7-1-41.

(6) 1,642,309. Process for the production of a weatherproof oxide layer on electron metal. W. Pieper, Germany. 9-13-27.

(6) 1,853,437. Process for producing an insulating coating on articles containing aluminum. E. Kuttner, Germany. 4-12-32.

(6) 1,923,502. Process and product for protecting aluminum, magnesium, zinc and their alloys against corrosion. P. Prier, France. 8-22-33.

(6) 1,995,225. Method of preventing bright metal articles containing silver or silver alloys from tarnishing under the influence of the atmosphere and solids, liquids or gases contained therein. E. Raub, Germany. 3-19-35.

(6) 2,161,319. Well-covering coating composition intended for the protective coating of articles having non-absorbent surfaces. F. Schamberger, Germany. 6-6-39.

(6) 2,163,984. Process for the preparation of a rust-preventing coating on metallic objects. V. Petkovic, Germany. 6-27-39.

(6) 2,219,977. Process for producing coatings on zinc and galvanized articles. O. Brill, Germany. 10-29-40.

(6) 2,288,552. Method of surface treating objects of cast magnesium base alloys. G. Siebel and E. Nachtigall, Germany. 6-30-42.

(6.50) 1,893,495. Process for making coating materials for deoxidation of rust. R. Eberhard, Germany. 1-10-33.

(6.50) 1,997,141. Process for bronzing articles and parts made of iron and alloys of iron and carbon. B. Guerini, Italy. 4-9-35.

(6.50) 2,230,319. Process of producing iron sheets for laminated electric transformer cores. A. Canzler, Germany. 2-4-41.

(7) 2,129,840. Method of increasing the re-

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To make this hexagon head bolt from round wire on bolt-making machinery we start with 26,100 lbs. of raw material. When we have produced 100,000 bolts they also weigh but 24,300 lbs. Hardly 5% of material used becomes scrap!

The difference between the weight of raw material required for manufacture from hexagon bar stock and the weight of raw material required for manufacture from round wire is 22,600 lbs.—which is the amount of critical raw materials the bolt manufacturer avoided (1) buying, (2) stocking, (3) consuming, (4) converting to scrap, and (5) causing to be re-melted and re-fabricated!

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If you need (or think you need) a "special" bolt—before you make it yourself—find out if you really need the special design or size, or if you can adapt *your assembly design* to use existing "standard" bolt types and dimensions and materials—to save time and get as good a product. In most instances—we've found that you can!

If the information we offer you in our Lamson Blue Book, our standard catalog, isn't sufficient to answer your questions—write us or ask a representative to call before you decide upon a *special* bolt that would require *special* dies, *special* production methods and *special* inspections at every step in its manufacture. If you can use a "standard" product made from existing dies on bolt-making machinery, you have obtained the utmost efficiency—*and you've really "standardized."* Make it a rule for the duration—use a "standard" bolt whenever you possibly can.

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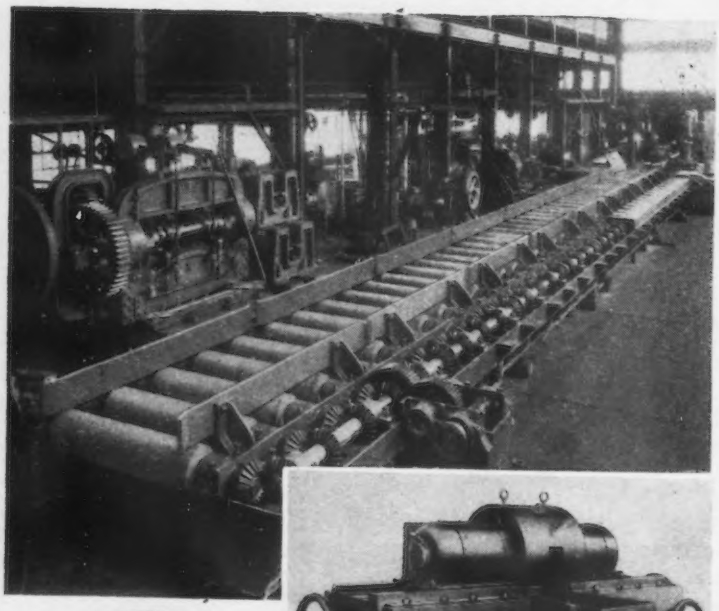

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sistance of heat of objects made of an ... containing iron and aluminum. W. Hes... bruch, Germany. 9-13-38.

(8) 2,118,802. Method of performing ... cessive pickling operations on iron and ... articles in a bath and conserving sulfuric ... pickling liquor used therein. H. Barkholt, G... many. 5-31-38.

(8) 2,125,458. Method of bright-pickl... articles of copper-zinc alloys. F. Osterma... Germany. 8-2-38.

(8) 2,171,981. Method of pickling iron. ... Heimberger, Germany. 9-5-39.

(9) 1,812,239. Method of and machine ... cutting holes by means of an oxygen-burn... in which a burner with a heating and cutt... nozzle is used. H. Hentschel and H. Gregg... sen, Germany. 6-30-31.

(10) 1,795,384. Method of freeing elect... lytically deposited metal coatings from ... sorbed hydrogen gas contained therein. Jul... von Bosse, Germany. 3-10-31.

(10) 2,293,240. Method of producing p... manent magnets. P. Brauburger, Germa... 8-18-42.

(11.50) 1,685,570. Process of improving ... qualities of nickel-beryllium alloy. G. Mas... and O. Dahl, Germany. 9-25-28.

(11.50) 1,726,194. Process of improving a... minum alloys. W. Sander, Germany. 8-27-...

(11.50) 1,924,244. Process for improv... nickel-tin-alloys. W. Koster, Germany. 8-29-...

(11.50) 1,924,245. Process for improvi... nickel-molybdenum alloys. W. Koster, G... many. 8-29-33.

(11.50) 1,949,313. Process for improv... cobalt-molybdenum alloys. W. Koster, Ge... many. 2-27-34.

(11.50) 1,992,325. Process of normaliz... ternary and multiple alloys forming solid s... lutions. C. Schaarwachter, Germany. 2-26-...

(11.5) 2,207,780. Process of treating cobal... tungsten-chromium alloys. W. Koster, Ge... many. 1-14-36.

(11.50) 2,075,283. Process for the produ... tion of magnetizable alloy. A. Heinzel a... F. Duftschmid, Germany. 3-30-37.

(11.50) 2,124,607. Method for manufactu... ing permanent magnets. A. Buchner, ... Neumann, and H. Reinboth, Germany. 7-26-...

(12) 1,672,172. Method of annealing she... metal. W. Reuss, Germany. 6-5-28.

(12) 1,830,550. Method of improving th... physical and mechanical properties of iron a... steel. G. Kerekgyarto, Hungary. 11-3-31.

(12) 1,843,456. Process of treating soft ir... got low carbon steel to render it resistant t... aging. H. Meyer, Germany. 2-2-32.

(12) 1,844,994. Process for the manufa... ture of iron and steel. H. van Royen, Ge... many. 2-16-32.

(12) 1,941,101. Process for producing ... steel having a lesser tendency to blue fractu... and brittleness due to aging. H. Meye... Germany. 12-26-33.

(12) 1,957,427. Process for increasing th... mechanical strength properties of steel. H... Buchholtz, Germany. 5-8-34.

(12) 2,027,554. Chrome nickel steel allo... product and method of making the same. P... Schafmeister and E. Spenle, Germany. 1-14-36.

(12) 2,067,036. Process of producing meta... having desirable electrical properties such a... a low watt-loss, high magnetic induction an... high maximum permeability. A. Wimmer... Germany. 1-5-37.

(12) 2,085,118. Magnetic material and ... manufacture thereof. F. Noll, Germany... 6-29-37.

(12) 2,113,537. Method of rolling and treat... ing silicon steel for the manufacture of ma... terial suitable for use as transformer cores... H. Hiemenz, Germany. 4-5-38.

(12) 2,121,415. Process for the manufa... ture of sheets, bands, tubes, rods, and the... like, and in particular wire. A. vom Brauck... Germany. 6-21-38.

(12) 2,173,240. Method for manufacturing... magnetic material of high permeability in... sheet form. G. Wassermann, Germany... 9-19-39.

(12) 2,174,368. Method of treating iron-... aluminum alloys. F. Noll and P. Wolf, Ger... many. 9-26-39.

(12) 2,190,536. Method of manufacturing... hollow bodies, in particular cartridge cases... shell cases and the like, from metals, espe... cially non-ferrous metals. K. Staiger, Ger... many. 2-13-40.

(12) 2,224,934. Easily machinable mag... netizable body having a small coercive force... and the method of producing the same. P... Schuhmacher, Germany. 12-17-40.

(13) 1,732,615. Process for improving the... strength qualities of steel wire. W. Pungel... Germany. 10-22-29.

(13) 1,873,155. Process of producing mag... netic alloys of the nickel-iron class with high... initial permeability and with reduced varia-

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tion of permeability in small magnetic fields. B. Scharnow, Germany. 8-23-32.

(13) 2,011,976. Process of treating cobalt-tungsten-iron alloys. W. Koster, Germany. 8-20-35.

(13) 2,048,647. Process of producing hard alloys for special technical use containing as main constituents paladium and silver. O. Feussner and A. Jedele, Germany. 7-21-36.

(13) 2,048,648. Alloy intended as a substitute for platinum, for instance, in connection with dental work or for making contacts of electrical apparatus, etc., and process for making same. O. Feussner and A. Jedele, Germany. 7-21-36.

(13.10) 1,990,277. Process for the production of a shaped object with technically valuable properties from a metal consisting of platinum, palladium, gold and alloys consisting substantially of these. O. Feussner and A. Jedele, Germany. 2-5-35.

(13.1) 2,166,365. Process for the heat-treatment of metals and alloys. J. Michel, Germany. 7-18-39.

(13.1) 2,201,111. Heat treatment of metals, especially of aluminum base alloys. J. Michel, Germany. 5-14-40.

(14) 2,097,024. Process for the production of a protective layer on iron. W. Enders, Germany. 10-26-37.

(14) 2,219,004. Formation of chromium-containing layers on ferrous surfaces. K. Daeves and G. Becker, Germany. 19-22-40.

(14) 2,219,005. Formation of chromium-containing layers on the surface of ferrous articles. K. Daeves and G. Becker, Germany. 10-22-40.

(14) 2,255,482. Process which consists in causing chromium to diffuse. K. Daeves, G. Becker, and F. Stejnberg, Germany. 9-9-41.

(15) 2,204,005. Process of hardening steel wires. R. Suchy, Germany. 6-11-40.

(15) 2,248,732. Process for the hardening of steel. C. Albrecht and K. Bonath, Germany. 7-8-41.

(16) 1,803,276. Process for producing homogeneous metalliform carbonitrides and for superficial nitrification of tungsten. R. Walter, Germany. 4-28-31.

(16) 2,231,120. Process for producing malleable iron castings. G. Herrmann, Germany. 2-11-41.

(16) 2,236,209. Process for the manufacture of articles which are made of iron or steel and are threaded or possess surfaces which make tight joints. K. Daeves and G. Becker, Germany. 3-25-41.

(16) 2,240,099. Method of bright annealing elongated rigid metal bodies. O. Schincke, Austria. 4-29-41.

(16) 2,249,556. Method of annealing iron sheets or strips. W. Fackert, Germany. 7-15-41.

(17) 1,848,958. Process for the hardening of iron and the like with the aid of a gas generated in the hardening furnace. H. Lindhorst, Germany. 3-8-32.

(18) 1,876,170. Process of treating steels and like metal alloys which consists in plunging them while hot into a hardening pectin solution. R. Ripa, Germany. 9-6-32.

(18) 1,893,077. Hardening medium and process for hardening tools of iron or steel. A. Garweg, Germany. 1-3-33.

(21) 1,700,674. Method of treating low-carbon steel and the like. A. Fry, Germany. 1-29-29.

(21) 1,764,844. Process for improving the heads of railway rails. J. Lukasczyk, Germany. 6-17-30.

(21) 1,828,325. Process for hardening the heads of rails by the action of a cooling medium. H. Kurz, Germany. 10-20-31.

(21) 1,968,960. Heat treatment of manganese hard steel objects. H. Resow, Germany. 8-7-34.

(21) 2,288,999. Process for manufacturing gears with a hardened surface and a tough nucleus from carbon steels. V. Fabian, Germany. 7-7-42.

(21.10) 1,656,502. Process of improving aluminum alloys containing crystallizable constituents capable of forming solid solutions with aluminum. W. Sander, Germany. 1-17-28.

(21.10) 1,892,840. Process of refining an aluminum alloy. O. Kamps, Germany. 1-3-33.

(21.10) 1,921,089. Tempering of age-hardened aluminum alloy. K. Meisaner, Germany. 8-8-33.

(21.1) 2,063,022. Process for improving the resistance to corrosion of aluminum base alloys. A. Beck, Germany. 12-8-36.

(21.1) 2,063,023. Process for improving the resistance to corrosion of aluminum alloys. A. Beck, Germany. 12-8-36.

(21.1) 2,165,441. Process of rendering aluminum alloys suitable for working with cutting tools. A. Beck and H. Bohner, Germany. 7-11-39.

(21.20) 1,692,936. Method for increasing the hardness and elastic limit of copper alloys

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particularly a copper alloy containing silicon and manganese. F. Heusler, Germany. 11-27-28.

(21.20) 2,068,817. Copper alloy amenable to heat treatment. U. Raydt, K. Hanser and M. Venzlaff, Germany. 1-26-37.

(21.2) 2,145,065. Drawn brass bearing alloys containing an excessively high copper content and method of producing same. E. Vaders, Germany. 1-24-39.

(21.50) 1,661,907. Steel alloy and process of making the same. E. Pakulla, Germany. 3-6-28.

(21.50) 1,704,410. Process of treating welded rail joints. C. Stedefeld, Germany. 3-5-29.

(21.50) 1,733,669. Method of heat treatment of steel of all kinds, including carbon and alloy steels. S. Makita, Japan. 10-29-29.

(21.50) 1,746,356. Process for the improvement of the properties of iron-beryllium alloys. G. Masing and O. Dahl, Germany. 2-11-30.

(21.50) 1,829,118. Process for making steel insensible to the action of hot gases and vapors. B. Strauss, Germany. 10-27-31.

(21.50) 1,835,667. Process of hardening copper containing steels for structural and similar purposes. F. Nehl, Germany. 12-8-31.

(21.50) 2,059,746. Process of heat treating a homogeneous armor plate made from a steel alloy. F. Rittershausen, Germany. 11-3-36.

(21.80) 1,692,842. Method of manufacturing black-heart malleable cast iron from white cast iron. T. Kikuta, Japan. 11-27-28.

(21.80) 1,882,327. Method of manufacturing stron black-heat malleable cast iron. T. Kikuta, Japan. 10-11-32.

(21.80) 2,090,899. Manufacture of articles from malleable cast iron. K. Roesch and O. Schleimer, Germany. 8-24-37.

(22.50) 1,927,940. Iron-containing alloy for permanent magnets. W. Koster, Germany. 9-26-33.

(23) 1,764,604. Composition for use in soldering the ends of links or rings of mesh fabric, chains or the like, comprising a metal powder, red phosphorus, and an oil. G. Brunhubner, Germany. 6-17-30.

(23) 1,876,846. Agent for welding metals containing carbonyl compounds of metal of the iron group. L. Brandt, Germany. 9-13-32.

(23) 1,989,557. Flux for soldering objects sensitive to corrosion comprising colophony and diphenylguanidine. R. Muller, Germany. 1-29-35.

(23) 2,172,979. Soldering composition for the soft soldering of aluminum and particularly magnesium aluminum alloys. F. Kohler, E. Rouette and W. Standop, Germany. 9-12-39.

(24) 1,722,040. Welding and soldering composition in the form of a powder or paste which may be used for all metals and more especially for soldering or welding together either like or different metals. C. Dursch, Germany. 7-23-29.

(25) 1,772,952. Manufacture of soldering paste consisting of powdered tin solder, a flux in the form of organic amines and a suitable binder such as vaseline. G. Knoth, Germany. 8-12-30.

(25) 2,155,307. Soldering composition for the soft soldering of aluminum. W. Hagemann, Germany. 4-18-39.

(26) 1,653,482. Flux applied in soldering aluminum and its alloys. O. Spengler, Germany. 12-20-27.

(26) 1,669,840. Flux for use in autogenous welding of cast iron. F. Politz, Germany. 5-15-28.

(26) 1,675,664. Soldering or welding medium for aluminum. W. Reuss, Germany. 7-3-28.

(26) 1,714,445. Soldering and welding medium for aluminum. W. Reuss, Germany. 3-21-29.

To be Continued in an Early Issue

Contracts Awarded by DPC and War Dept.

• • • **Defense Plant Corp.**, RFC subsidiary, authorized the following contracts:

General Electric Co., Schenectady, N. Y., to provide additional equipment at a plant in Erie, Pa., at a cost in excess of $200,000, making a total commitment of more than $2,000,000.

Lombard Iron Works Co., Augusta, Ga., to provide additional equipment at a plant in Augusta at a cost in excess of $45,000, making a total commitment of more than $265,000.

Gulf Distilling Corp., Gretna, La., to provide additional equipment at a plant in Gretna at a cost in excess of $130,000, making a total commitment of more than $250,000.

Nathan Mfg. Co., New York, to provide equipment at a plant in New York at a cost in excess of $160,000.

James B. Beam Distilling Co., Clermont, Ky., to provide plant facilities in Clermont at a cost in excess of $140,000.

Packard Motor Car Co., Detroit, to provide additional equipment at a plant in Detroit at a cost in excess of $120,000, making a total commitment of more than $2,650,000.

Woodall Industries, Inc., Detroit, to provide additional facilities at plants in Monroe and Detroit at a cost in excess of $170,000, making a total commitment of more than $800,000.

Babcock & Wilcox Tube Co., Beaver Falls, Pa., to provide additional facilities at a plant in Beaver Falls at a cost in excess of $50,000, making a total commitment of more than $145,000.

Keystone Mfg. Co., Boston, to provide equipment at a plant in Boston at a cost in excess of $175,000.

Lock Nut Corp. of America, Chicago, to provide equipment at a plant in Chicago at a cost in excess of $25,000.

Hammer Dry Plate & Film Co., St. Louis, to provide plant facilities in St. Louis at a cost in excess of $450,000.

Pittsburgh Plate Glass Co., Pittsburgh, to provide facilities at a plant in Martinsville, W. Va., at a cost in excess of $420,000.

The Henry & Wright Mfg. Co., Hartford, Conn., to provide additional equipment at a plant in Hartford at a cost in excess of $55,000, making a total commitment of more than $125,000.

The War Department announced:

Brown & Rott, Inc., Houston, Tex., award of contract for construction of firing-in range, runways, taxiways and apron expansion at Matagorda Peninsula, Tex., Bombing Range. Estimated amount of contract is $1,011,404.10. Work will be supervised by the Galveston district office of the Corps of Engineers.

Truck Output Hits 100,000 Mark

South Bend, Ind.

• • • **Studebaker's production** of military trucks has passed the 100,000 mark, indicating that the company is among the largest producers of trucks at this time, surpassed only by one other concern in the manufacture of vehicles above the two-ton classification.

Studebaker's output for war purposes is exclusively in the four and six-wheel drive classification. Output of 100,000 units of the heavy duty cargo carrier type was said to be three times the number built in that category by the entire automotive industry in the peak year of 1941.

Correct working pressure

MEANS BETTER OPERATION OF PNEUMATIC EQUIPMENT

Better control helps operators get more production. Many jobs on arbor presses, riveters, air chucks, cylinders, air vises, and other pneumatic machinery can be handled better at reduced pressure rather than at full line pressure. With a Hannifin piston-type pressure regulator for each machine, the correct and most efficient working pressure is instantly available. The wide range of adjustment makes this valve adapted to many different service needs. Write for Bulletin 56-A.

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Memo
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AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 North Ravenswood Avenue,
Chicago 40, Illinois
"Your Partners in Production"

Machining Plastics

(CONCLUDED FROM PAGE 61)

lubricant, to wash away the grindings and keep the wheels free.

Vulcanized fiber may be sawed, sheared, drilled, tapped, milled, turned, threaded, punched and shaved with ease and it can also be formed in dies much the same as sheet metal is formed.

Molding and Extrusion Processes

Compression molding as generally practiced in the plastics molding industry is an old and apparently very simple process requiring only a heat-reactive molding compound which is placed in the mold, pressure to close the mold and a heat source to heat the mold to a correct temperature, while the pressure is forcing the mold to a closed position.

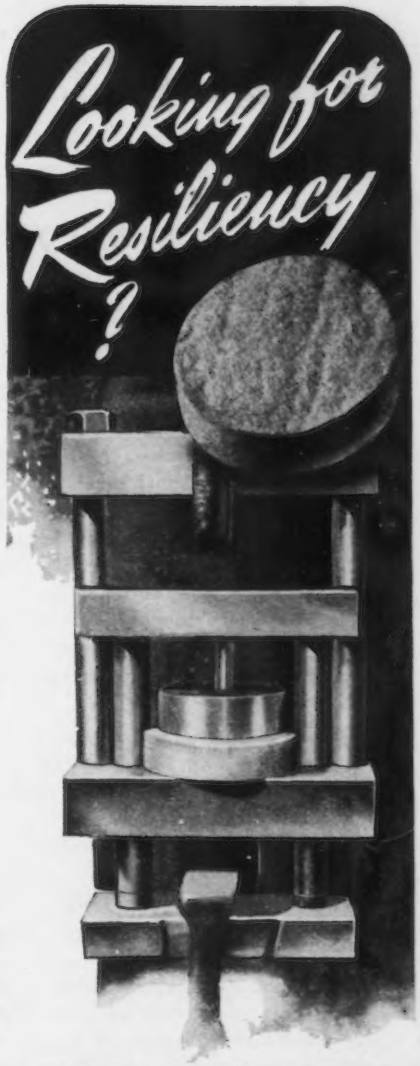
Injection molding consists essentially of transforming granular plastic material into a flowing state by the application of heat, and by forcing it under high pressure (usually averaging 20,000 to 35,000 lb. per sq. in.) into a cold mold where it forms. In actual practice the process is almost entirely automatic and the operator's duties consist mainly of closing the mold by means of electric controls. Ejection of the finished article may or may not be automatic and the material for injection molding can easily be classified as thermoplastic.

Transfer molding is defined as the process whereby a thermosetting material is subjected to heat and pressure, and then forced into a closed mold cavity and cured therein. In other words, it is the injection molding of heat hardening materials and differs from the injection of molding of thermoplastics in that the mold is maintained at elevated temperatures and the parts are ejected from the mold without any cooling. Transfer molding is especially adapted to production of complicated parts for telephone systems, airplane engines, ammunition, block holders and other parts held to extremely close tolerances. Some transfer molds are made of plaster of paris where only a few pieces are made and molds are also made of bronze and steel, however, steel molds are not hardened until it is certain they are dimensionally correct.

Jet molding is a continuous injection molding of thermosetting and thermoplastic materials. In continuous injection molding of thermosetting resins by the jet molding process, all of the heat necessary to polymerize the material to be molded is introduced into the material before it reaches the die. Thus the mold is used only to shape the plastic during the relatively brief setting time that thermosetting materials require, once polymerization is completed.

Continuous dry extrusion as its name indicates is a technique of almost uninterrupted production. The method may be compared to squeezing toothpaste from a tube. The plastic in powder, granular, cube or sheet form is fed constantly into the extruder. As the material is spiralled through a heated cylinder by the action of a mechanical screw, it forms a molten molasses-like mass. Pressure finally forces the plastic through an orifice in the die, and the shape of the die determines the shape of the finished extrusion. As the hot plastic comes from the die, it is cooled by air or liquid and then carried off on a conveyor belt or cutting mechanism.

Continuous wet extrusion is used for the cellulose plastic materials. This process is performed only by a limited number of concerns in the country, principally because the preparation of the raw material is a very important part of the process. The raw materials are placed in a large steel mixer and are thoroughly kneaded into a homogeneous mass and after a definite mixing period (which is determined by the type of material desired) the stock is filtered to remove solid impurities. From there, the stock is either remixed to reclaim the solvents and then put on calendar rolls, or it goes directly to the rolls. The stock is rolled until the necessary amount of solvent has been driven off and the color has become completely and uniformly absorbed. The stock may then be rolled into a thick blanket and then formed in a long cylinder which is known as a jelly roll, or it may be taken off in short strips. Wet extrusion machines are of the hydraulic type known as stuffers or the screw type machines.



IN EXTENSIVE laboratory tests, the compression of certain (½-inch thick) Booth felt samples under load of 150 lbs. per sq. in. resulted (after load removal) in "permanent" loss in thickness of only .005 inch!

Yes, Booth "prescription" felt manufacture can be controlled to give you the amount of resiliency, or almost any other quality, desired in your material.

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Booth
TRADE MARK
PRECISION CUT FELT PARTS

MACHINE TOOLS

. . . News and Market Activities

Drastic Screening Reduces Order Volume

Cleveland

• • • **The immediate prospects** of the machine tool industry here are varied but on the whole not very optimistic. Orders are continuing to fall off and the outlook at present is that this trend will continue with increasing impetus during the next 60 days. Backlogs are widely varied as between manufacturers, with some still having fairly comfortable volume on hand while others are reaching the bottom of order backlogs. Contract work in machine tool plants is at a satisfactory level.

Special tool orders are helping considerably in filling the gaps for some manufacturers and have been responsible for a portion of the industries present volume although even these orders are reported on the decline in line with the prevailing trend.

It has been particularly noticeable here that the government is screening priorities extremely closely for the purchases of new machines and a considerable pressure is being exerted to force the buying of pool machines rather than new machines from the makers even though in some cases the pool machine is not the most efficient for the job involved.

Certain manufacturers are experiencing a little boom from the return to buying activity of industries that have been heavily restricted until recently. Most notable among these industries has been the oil industry whose current buying is boosting threading and tapping equipment sales temporarily. One threading machine manufacturer is reported turning business away through extended delivery promises caused by the current volume.

National Acme is planning to embark within the next two months upon a tool rebuilding program which will offer users of its machines complete retooling and rebuilding on machines of about the last three models which cover about the last 15 years' production. The unsatisfactory experience of other makers who have engaged in rebuilding programs has not discouraged National Acme and the current plant appears sound.

Rumors brought to town from Washington indicate that foreign buying of machine tools on a cash basis is due to develop within the next few months. The trend appears to be away from Lend-Lease. The British procurement contracts are reported now to be incorporating cash payment. A heavy Russian machine program is believed in the offing and is expected to be on a cash basis.

Cushman Chuck Starts Closing New Plant

Hartford

• • • **Beginning with** the release of 175 employees last week, the Cushman Chuck Co., Hartford, has begun to close down its new plant on Windsor Street, according to an announcement made by George A. Highberg, president. The company's decision to stop production in the new shop was made due to a "business letdown," Mr. Highberg said, and will release between 300 and 400 workers in the next two months. The company will continue to operate its old plant.

Machine Tool Element Standards Approved by ASA

New York

• • • **The American Standards Association** has recently approved two standards in the field of small tools and machine tool elements. The American Standard, Tool Shanks and Tool Posts for Lathes, Planers, Shapers, Boring Mills, and Turret Lathes (B 5.2-1943) covers (a) the cross-sectional dimensions and lengths of flat of shanks of single-point tools, solid or tipped; (b) corresponding tool post openings and recesses for lathes and for planers and shapers, and (c) shank dimensions of tool holders for other lathe tools, such as cut-off tools, and for carbide tipped tool holders.

The second standard approved, Spindle Noses and Arbors for Milling Machines (B 5.18-1943), covers the series of designs and dimensions of the spindle, spindle end and arbors for a line of medium and heavy milling machines previously adopted as a standard by the National Machine Tool Muilders Association. All of the dimensional data are given for sizes 30, 40, 50 and 60, corresponding to gage diameters of the spindle nose taper of 1¼, 1¾, 2¾, and 4¼ in., respectively.

The new standards may be obtained from the American Standards Association, 29 West 39th Street, New York 18. The standard for tool shanks and tool posts is 35c. a copy and the standard for spindle noses & arbors for milling machines is 25c. a copy.

Increase in Layoffs Expected As Orders Decline

Cincinnati

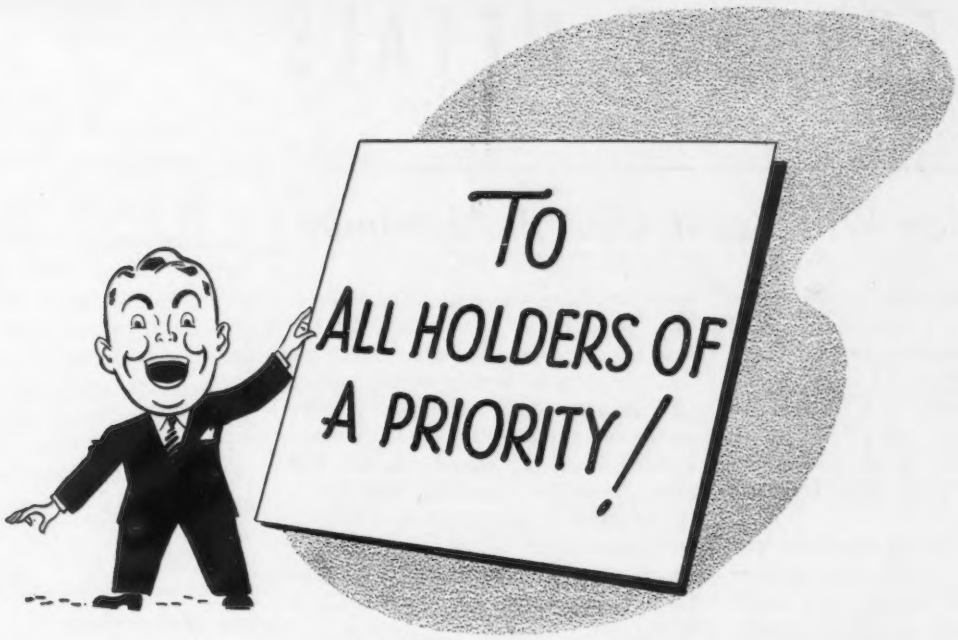
• • • **Most tool plants** in this area are gradually getting down to the bottom of the pile of orders and as the bottom approaches, the problem of continuing to maintain employment forces intact increases. Virtually all plants in the area have some direct war manufacturing or are subcontracting for manufacturers who are in need of machining or still have some parts for machine tools to be manufactured. The release of employees has not been great, since most plants have adopted a very conservative position in regard to replacing men taken in the draft or men who leave the machine tool plants. Despite this, however, there has been some layoffs and some indication of further layoffs is expected, unless extensive amount of new business comes in.

New business has not been disappointing, but is not in sufficient volume to keep operations at the high rate that has been maintained heretofore at the expanded capacity brought about through war increases.

Big Billet Shear Shipped

Buffalo

• • • **Buffalo Forge Co.**, Buffalo, has completed a billet shear for Timken-Detroit Axle Co. that will slice 10-in. round or 9-in. square soft steel billets. The huge machine also will slice 7¼-in. round and 6½-in. square nickel steel billets. The shear, largest of its type ever built, weighs 165,000 lb. and has a knife pressure of 4,500,000 lb. It will make 6 cuts a min. Designed by Gustav H. Zimmer, Buffalo Forge engineer, the shear's main frame is of steel armor plate and its 11½-ft. bull gear has machine-cut teeth. The clutch and holding device are air operated. Power is supplied by a 125-hp. electric motor.

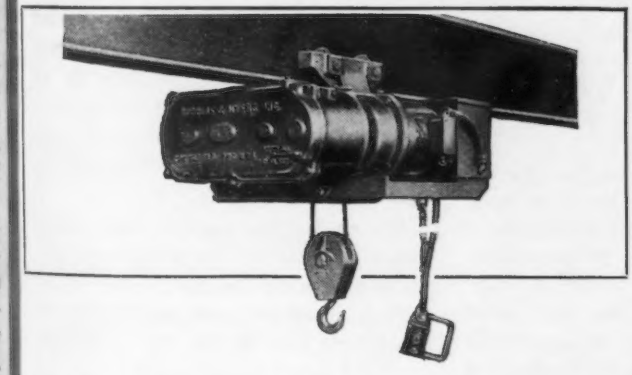


MAKE THE MOST OF YOUR MANPOWER, NOW...

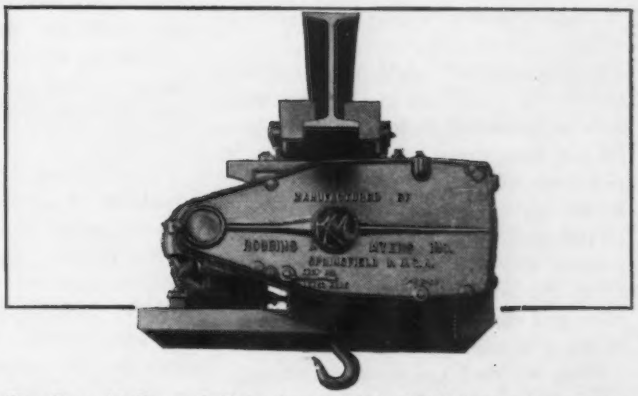
GET R & M HOIST DELIVERY *promptly!*

Eliminating the need for "muscle" on many jobs, R & M Hoists suit today's production requirements. Their simplicity of operation offers increased output ... with less fatigue for inexperienced workers—with greater benefit to management.

In a short time, you can make the most of your manpower. You can move materials faster and easier with fewer men when you use an R & M Hoist. Two of the many hoists available for quick delivery are shown below.



The R & M Type F½ Hoist has 1,000—2,000-pound capacity. It is provided with pendent, push-button control. A step forward in improved design, better materials, and manufacturing economies that provide a better hoist at lower cost in both purchase price and operation.



The R & M Type F Hoist has 1,000—15,000-pound capacity. Push-button control is standard. Operating with low headroom and handling loads from any angle with perfect balance, the Type F Hoist makes a one-man job of many otherwise cumbersome operations.

Begin, today, to enjoy the benefits of simpler, more profitable materials handling

Get in touch with your nearest R & M Sales and Service Office.

Albany.....364 Broadway
Atlanta.....319 Walton Bldg.
Baltimore, Lombard & Concord St.
Boston.....74 Needham St.
Chicago...2400 W. Madison St.
Cincinnati.....418 New St.
Cleveland. 470 Rockefeller Bldg.
Denver.....1420 16th St.
Detroit....2921 E. Grand Blvd.
Houston..3715 Harrisburg Blvd.
Jacksonville...305 Bisbee Bldg.
Kansas City, Mo..215 Pershing
Meriden, Conn..135 Colony St.
Newark.....700 Bergen St.
New York.....200 Varick St.
Philadelphia....401 N. Broad St.
Pittsburgh....H. W. Oliver Bldg.
Providence.....44 Clifford St.
San Francisco, 116 New Mtgmry. St.
Seattle.....216 Walker Bldg.
Syracuse...204 State Tower Bldg.
Montreal....Lyman Tube & Supply Co., Ltd.

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NON-FERROUS METALS

. . . News and Market Activities

Competition Will Boost Use of Aluminum

• • • **Although aluminum production** today is six and a half times what it was in 1939, the postwar demand for the metal will absorb every pound that can be turned out, Walter L. Rice, president of Reynolds Mining Corp., said recently in an address to members of the New York Institute of Finance.

Mr. Rice, who is also vice president of the Reynolds Metals Co., pointed out that WPB still restricts the use of aluminum, although one of its officials recently said that the nation now had so much of this metal that it was "running out of our ears."

Mr. Rice suggested that the statement was only intended to mean that the supply of aluminum was ample for use in the manufacture of airplanes and not that this country had more of it than could be used after the war.

After outlining postwar uses for aluminum in fields other than aviation, Mr. Rice predicted that a million-ton aluminum industry will look small to this country within the next 10 years.

In the postwar world, Mr. Rice said, the use of aluminum in transportation will be increased materially. He pointed out that prior to the war only 29 per cent of aluminum produced had gone into transportation, but predicted that this figure would be increased to between 60 and 70 per cent after the war, when trucks, automobiles and railroad cars would be made, at least in part, of aluminum.

"But whether the production of airplanes declines after the war from 100,000 planes a year to 25,000 or even 5000, it is expected that other transportation facilities will demand the bulk of all the aluminum that can be produced on a competitive basis in this country."

Mr. Rice pointed out that, prior to the war, there was only one producer of aluminum in the United States. For that reason, he said, aluminum was virtually a "luxury metal," which had always sold at a relatively high price compared with steel, copper, zinc, lead and the heavier metals. The prewar low for aluminum was 20c. a lb., he pointed out, but now aluminum and magnesium are the only metals which have decreased in price. The former, he pointed out, sells for 15c. a lb.

Mr. Rice predicted that aluminum would be used in the manufacture of automobile doors, gas tanks, crankcases, gas feed lines, wiring, radiators, generators, lamps distributor housing, valve chamber covers, intake manifolds, fuel pumps, connecting rods, camshaft timing gear and even the chassis.

He said that with the rebirth of the aluminum industry in the last three years, tremendous advances had been made in the purity of the metal and in its treatment. He also pointed out that the unprecedented use of aluminum during this period has educated a new group of technicians in the treatment and application of the metal.

Contrasting the postwar and prewar position of aluminum, Mr. Rice said: "A majority of the manufacturers of automobiles, trucks, refrigerators, radios, railroad cars, household furniture, building material and other durable goods would automatically rule out 20c. aluminum available from a single source of supply, but would feel quite differently about 15c. aluminum available from two or more dependable and competitive sources."

The sudden expansion of the aluminum industry during the last few years may give the industry some growing pains in the months following the armistice. "The government," he said, "may well be expected to protect the industry with respect to large inventories of specially alloyed metal necessary to maintain the flow of sheet, rod, extrusions and forgings to the aircraft plants. Certain stock piling measures may also be in order. But when the period of adjustment is passed, I expect aluminum to play a major role in the new age of light metals."

United States Mine Production in Terms of Recoverable Metal, in Net Tons

	Lead		Zinc		Copper	
	1942	1943*	1942	1943*	1942	1943*
Western States and Alaska	256,535	229,975	310,035	318,619	1,018,880	1,025,408
Eastern States	4,475	4,600	199,809	198,500	14,202	14,202
Central State	235,229	211,773	258,181	223,468	46,979	48,020
Total United States	496,239	446,348	768,025	740,587	1,080,061	1,087,630

*Preliminary figures

From: U. S. Bureau of Mines

Corrosion Resistant Film for Magnesium

San Diego, Cal.

• • • **A protective coating** said to make magnesium alloys as noncorrosive and abrasion resistant as aluminum alloys has been developed by engineers of the Consolidated Vultee Aircraft Corp.

This anodic film is described as extremely tight and readily withstands a potential of 110 volts which, together with its resistance to wear and impervious surface, accounts for its ability to retard corrosion.

Convair engineers say accelerated tests show magnesium alloys coated with the new finish holding up as well as, and in some cases, better than anodized duraluminum, and that abrasion resistance is 50 to 100 times superior.

Search for the coating was undertaken in 1941 at Consolidated's San Diego plant but the satisfactory method was developed only recently at the company's Fort Worth, Tex., division.

WPB Thaws Inventories

• • • **Frozen inventories of copper** and copper base alloy pipe, tubing and fittings in the hands of utilities were freed by WPB for use in underground gas and water supply and distribution installations outside buildings.

This action was effected by amending Supplementary Conservation Order M-9-c-4 and was made possible by the better supply-demand situation of copper ingot, which makes purchase of completely fabricated material for remelt no longer necessary. In the past, finished products were remelted to furnish ingots for items more needed in the war effort.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.: ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

Scrap Shipments From West Coast Cause Conflicting Reports

New York

• • • **Conflicting reports** have been received during the past two weeks concerning the movement of scrap from the west coast to steel mills in the midwestern and eastern areas. First reported from San Francisco was the fact that from 10,000 to 20,000 tons would be moved eastward during February because west coast mills were stocked for at least 90 days. Late in January, this shipyard scrap was selling on the coast at from $1 to $2 below the ceiling, and turnings and borings were going at far below ceiling prices.

Last week shipments of several thousand tons of scrap from the coast were made to a Chicago mill, but because of the easy situation on scrap that has developed in the Chicago area, it was reported that this would likely be the last major remote territory shipment to the area. Plentiful scrap supplies plus an adequate supply of pig iron in the area resulting from full operation of the district's blast furnaces seemed to highlight a ban on such scrap movement for the time being at least.

However, during the past week the Maritime Commission was reported to be shipping about 75,000 tons of producers' scrap to northern Ohio and other points eastward, as well as to Chicago. This scrap is being moved over land grant railroads, with the purpose of draining off excess scrap on the coast. These deliveries are scheduled to continue at least through February.

As has been known for some time, alloy borings and turnings have not been bringing ceiling prices. The stock of such grades has grown to such proportions that dealers and brokers have been unable to handle the large supply and yards as well as mill stocks are reaching the overflowing point. One Cleveland mill has had a railroad embargo placed upon it because of the inability to clear sidings of scrap laden cars. However, turnings from the Cleveland area were finding their way into the Pittsburgh district this past week at ceiling prices. This further indicates that surpluses are accumulating in the Cleveland area and the price must naturally be pretty weak if they can be shipped to Pittsburgh and still be sold at ceiling prices.

WPB Acts to Speed Car Wrecking

Washington

• • • **Because many** vehicles finding their way into auto wreckers' yards have not been promptly dismantled, WPB this past week ordered that such vehicles be dismantled within a reasonable time so that serviceable parts are made available for replacements and scrap metal moves without delay. In June, 1943, WPB prohibited the scrapping of serviceable used automotive parts.

The new order provides that when it is determined by WPB that motor vehicles acquired by an auto wrecker are not being dismantled at a rate sufficient to meet the needs for scrap and serviceable parts, WPB written direction may order any auto wrecker not to purchase or accept delivery of additional motor vehicles until he has dismantled a specified number then in his yard.

A point which has apparently troubled scrap dealers is also clarified. By adding the words "as scrap" to the order, it is made clear that the prohibition against scrapping used parts does not apply when scrap dealers purchase parts "as scrap."

The original order requested purchasers of used parts to turn in parts of similar type and size. As such turn-ins are not always practicable, the amendment to order M-311 does away with this requirement where the part for which the replacement is purchased has been consumed in use, lost or stolen, or when the part is ordered by telephone, telegraph, or mail and is shipped to the purchaser.

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CINCINNATI—The district scrap market is without noticeable brilliancy. Cast grades and rails for melting are in rather stiff demand, with the supply not too good, although coverage of current needs is reported. Open hearth consumers are apparently in good shape, because of lack of pressure from this source, with some indication that scrap users are cagey and watching inventories carefully. Dealers indicate that movement to yards continue to be in a small amount, but sufficient is moving to take care of current pressing needs.

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BOSTON—Demand for all kinds of scrap except alloy far exceeds supply. The trade is largely dependent on production scrap, the supply of which is steadily decreasing as more and more plants stop making munitions. Those plants not having war contracts report difficulty in getting operating schedules above 50 per cent of capacity. A majority of yards report a falling off in shipments each month, while the largest brokers say their business is at a record low level.

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CLEVELAND—The Cleveland market is nearly at a standstill from the standpoint of local deliveries, but a good demand for open hearth grades for Youngstown and vicinity is noted. Turnings are very weak and are further aggravated by the continued railroad embargo of one of the largest local turnings consumers. Light movement of alloys into the Pittsburgh area have been reported with some sales going below the ceiling. Blast furnace demand has been poor. Steel furnace cast is also fading in demand although cupola cast is in heavy demand and poor supply. Requirements, however, are being met. Plentiful supplies of foundry iron are expected to cut cast scrap demand soon.

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BIRMINGHAM — The railroads have been ordered by the Alabama Public Service Commission to reduce minimums on the intrastate shipment of sheet scrap, 16 gage and lighter, from 50,000 and 80,000 lb. per car to 30,000 lb. for the duration. This order was asked by scrap dealers to facilitate movement of the light material to concentration points where presses are located and where the material can be processed by bailing and made suitable for open hearth furnace use.

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PITTSBURGH—Prices are firm on all grades, although some exceptionally light low phos plate clippings are probably finding their way into heavy melting steel. In the past two weeks, quality rejections have been heavy, but in the past few days the rejections have had the effect of tightening up grading. Although turnings are being sold here at the OPA ceiling, the fact that they are being imported from long distances would indicate no real strength at the source of supply.

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ST. LOUIS—Consumption of scrap iron by steel mills in the St. Louis industrial district continues heavier than receipts, one plant using 10,000 tons more than it received in January. Inventories are said to be sufficient for five weeks. Scarcity of scrap and labor to handle it has caused receipts to decline. Most scrap coming in is allocated from remote areas.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH	LAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
						Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.00	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles: No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.; at Memphis, 50c.; Great Lakes ports, $1; New England, $1.25. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.00	24.00	24.25	24.50
Chicago, Philadelphia Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

	BASE PRICE SEGREGATED Solids, Lb. Cont. W	BASE PRICE SEGREGATED Turnings, Lb. Cont. W	BASE PRICE UNSEGREGATED SOLIDS	BASE PRICE UNSEGREGATED TURNINGS
Type 1	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2	1.60	1.40		
Type 3	1.25	1.25	$1.15 per lb. contained W if over 1% and less than 5%.	$1.00 per lb. contained W if 1% and less than 5%.
Type 4*	0.125	0.105		
Type 5*	0.135	0.115	$0.80 per lb. contained Mo if 1½% or more.	$0.70 per lb. contained Mo if 1½% or more

*Per lb. of scrap material.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 8, 1944	Feb. 1, 1944	Jan. 4, 1944	Feb. 9, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 8, 1944	Feb. 1, 1944	Jan. 4, 1944	Feb. 9, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 141-153.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Feb. 8, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 16
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia[a]
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢).					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 } Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 } Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)		(Weirton = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢) 2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢a	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢g	2.10¢		(Bethlehem = 2.10¢)			2.45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢.			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[8]	$5.018a	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3 758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	8.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.80	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.78[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.96	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.68	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60 1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60 1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ 60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.60/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80 1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NF 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90 1.20	.040	.040	.20/ .35	.30/ .50	.30/ 60	.08/ .15	.75	15.00	1 25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30 .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20 1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) **Philadelphia:** Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

Per Gross Ton

Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

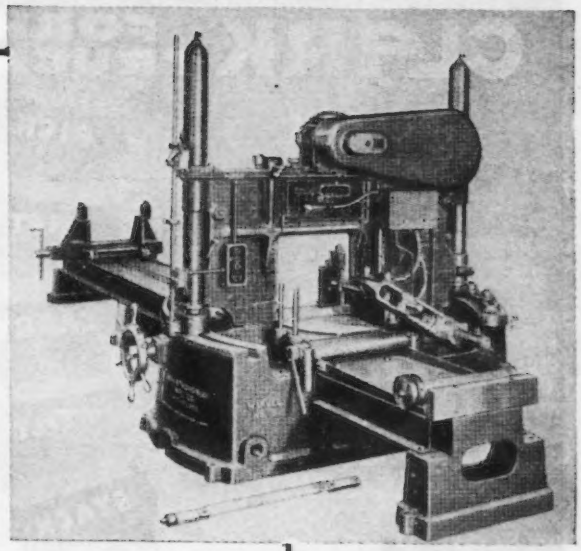
	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"

Cuts, angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

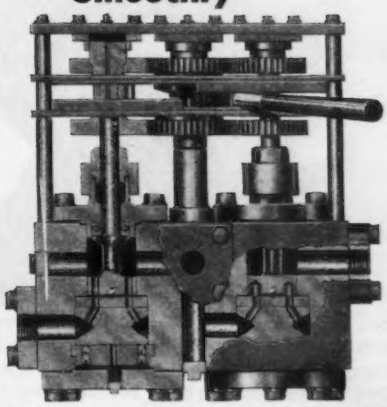
MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St
New York

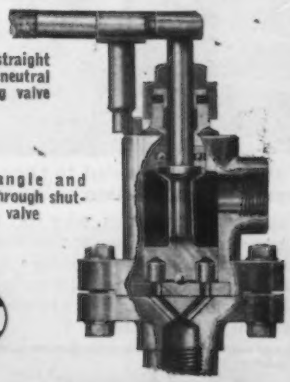
Hydra Venturi-Vacuum Valves

Operate Quickly Easily Smoothly



Hydra Venturi-Vacuum Valves embody a new principle—no springs or cups to bother with. Operation is instant and without noticeable effort. Installations in many industrial plants have reduced valve troubles to near zero and effected substantial economies.

Write for descriptive folder



3 and 4 way straight operating or neutral point operating valve

2 way angle and straight through shut-off valve

HYDRA VENTURI-VACUUM VALVES

ALBRIGHT EQUIPMENT CO.
FERNDALE, JOHNSTOWN, PA.

MANPOWER, TIME, COST AND FLOOR SPACE
plus delivering the goods on time to and from factories, yards, docks and warehouses.

A product of
CLARK EQUIPMENT COMPANY
POST WAR ENGINEERING SERVICE AVAILABLE. *WRITE*—
WE ARE READY TO SERVE YOU

CLARK TRUCTRACTOR
DIVISION OF CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN, U.S.A.

GOOD SPRING DESIGN
was never MORE IMPORTANT!

With facilities crowded to the rafters, it's more important than ever to be sure every item in war production be designed and produced accurately, speedily and economically.

That goes for springs, wire forms, and small stampings, too! Helping to combine operations—to eliminate waste motion—to streamline production has been common practice with B-G-R spring engineers for years. Successful experience in meeting peace-time mass-production schedules puts B-G-R in a position to meet the super-production needs of the largest spring users in the world today—our fighting forces. Let B-G-R "spring-skill" help you, too!

BGR Springs · Wire Forms · Small Stampings
ARMY NAVY E DETROIT PLANT
BARNES · GIBSON · RAYMOND
DIVISION OF ASSOCIATED SPRING CORPORATION
TWO PLANTS FOR SPRING SERVICE
DETROIT and ANN ARBOR MICHIGAN
BOTH PLANTS
B-G-R PRODUCTS SERVE OUR COUNTRY-ON LAND, AT SEA, AND IN THE AIR

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.35
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60
By-product, New England	13.75
By-product, Newark	12.40 to 12.90
By-product, Philadelphia	12.35
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30
By-product, St. Louis	12.00
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coke are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$64.00
First quality, Pa., Md., Ky., Mo., Ill.	51.50
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.50
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.00

Silica Brick

Pennsylvania and Birmingham	$51.50
Chicago District	58.50
Silica cement, net ton (Eastern)	9.00

Chrome Brick

	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $38.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $48.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.95
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

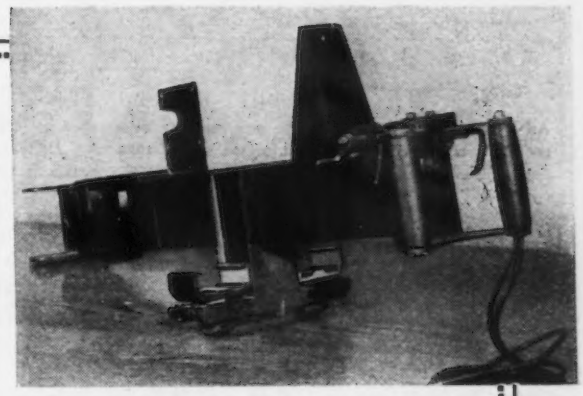
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.



GUN ADAPTER, for synchronizing machine guns and aerial camera . . . built by Brandt of high-tensile stainless steel . . . by stamping and welding processes . . . for use on Martin Marauders.

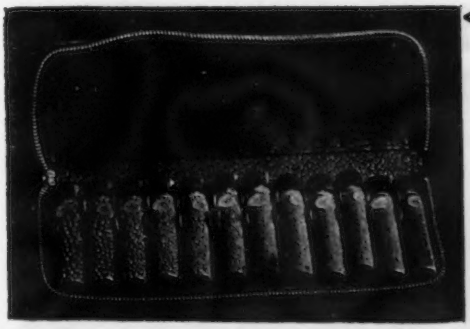
Small Parts or Big Installations—

Call **BRANDT of Baltimore**

for Precision in Heavy Plate and Sheet Steel Work

Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. For information, address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

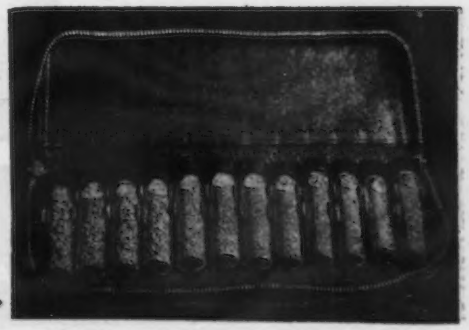
The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire



HEAT-TREATED STEEL GRIT

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.90	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

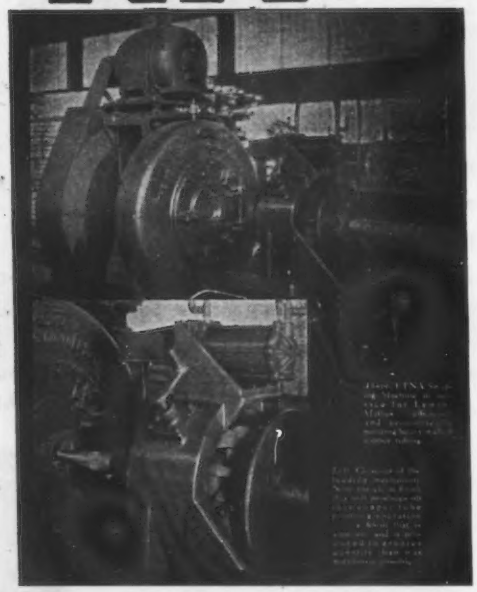
(3) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

LEWIN-MATHES *Got the right answer at*

ETNA



They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

ETNA MACHINE COMPANY
TOLEDO OHIO

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	3.15
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED

ELECTRIC CRANE . . .

● **Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.**

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

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• • Results are what count, and the performance record of this wire rope continues to make and hold friends.

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PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	145.00
Ton lots (packed)	145.00
Packed, 200 lb.	138.00

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher or 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(*Per gross ton, delivered, carloads, bulk*)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

PRICES

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. producer's plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. or more	$1.90
Ferrovanadium, 30-35%, contract basis, f.o.b. producer's plant, usual freight allowances, any quantity, per lb. contained vanadium.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroborom, contract basis, 17.50% borom minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	28c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$6.25
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Mousanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.
Less ton lots	9.75c.

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The use of worm gear speed reduction in Reading Electric Hoists is the reason why there are only four moving parts. This means fewer wearing parts, both gears and bearings and a simpler more compact design. The result is a minimum of maintenance that can be handled by the average mechanic.

It will pay you to investigate the money saving features of Reading Electric Hoists. For full technical information write for Bulletin 1004.

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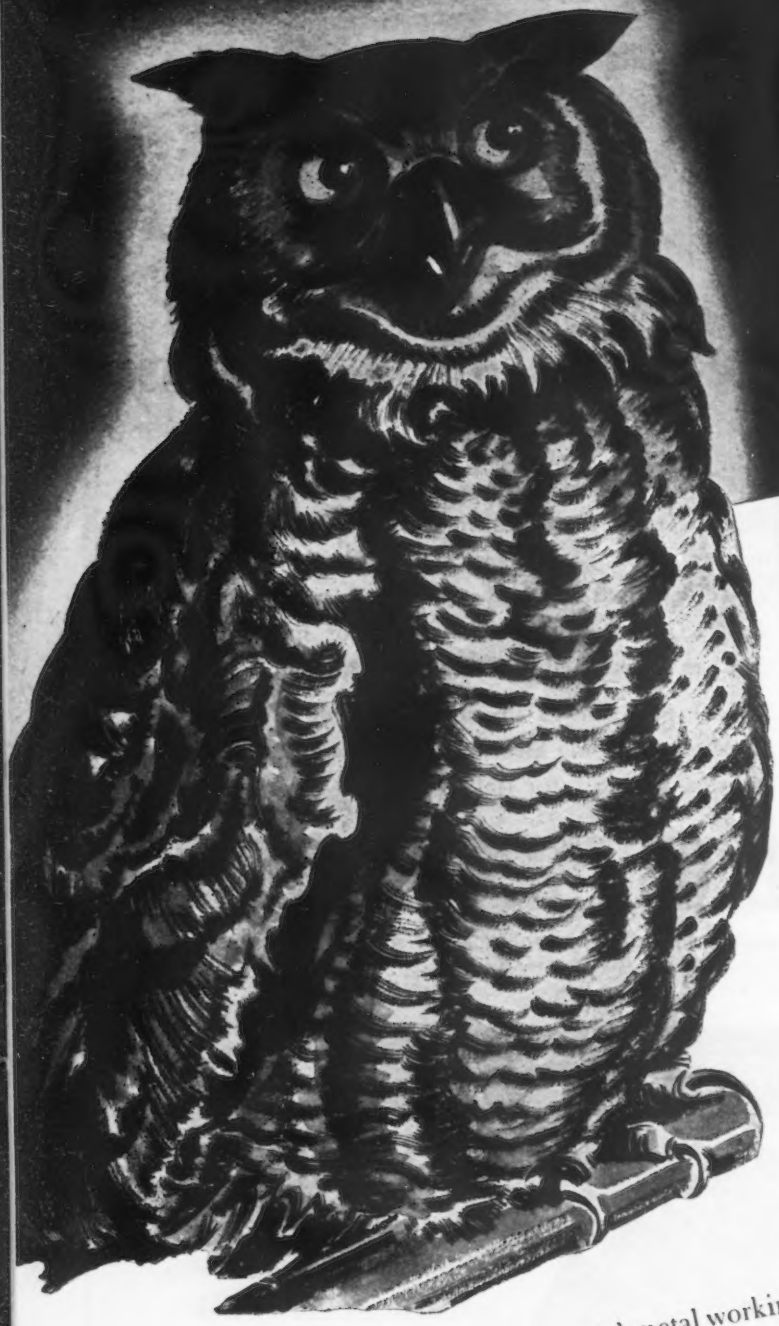

Obsolescenc

Stuffed owls cannot fly, nor can obsolescent machinery be used in profitable production. *New competition* in the form of new markets, new products, new low prices, new materials, new methods, new companies and new equipment will force revolutionized production lineups. You'll be wise if you check over your situation now! Be ready to meet this multiple competition!

Most production lines will be modernized by a revamping of existing facilities. Perhaps it will be the addition of a Yoder Roll Forming Machine and Automatic Cutoff, A Tube Mill Line or some special metal working machine. The forward thinking of Yoder Engineers and the advanced design of their machines can help you to meet the new competition.

For over thirty years, Yoder customers have been saying, "Yo get the improvements first from Yoder."

A bulletin on our line of metal working machinery is availab In special cases, send rough sketches, notes and blueprints — w be glad to submit suggestions and cost estimates.

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ESTABLISHED 1855

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FEB. 17, 1944

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Cutbacks and Consumer Goods

HERE and there and from time to time we read reports of cutbacks in the war material program and of emergence of certain items from the critical materials list. And some people wonder why these things cannot be immediately reflected in an increased allowance of consumer peacetime products.

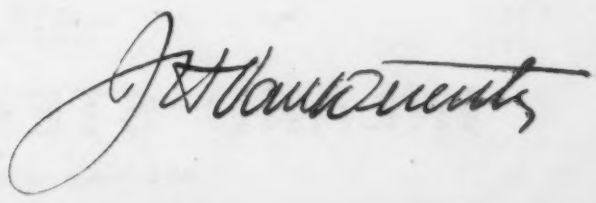
The answer to this question is twofold. One reason is that the war is not yet won and with its constantly changing pattern we cannot afford to tie up our manufacturing materials or resources in non-war work, even when a little slack develops here and there. We might, for example, find it expedient to cutback on steel for tanks because of current supply, or change in military strategy and terrain. This or any other change in unforseeable conditions may result in curtailing the output of a few steel furnaces for a time. But in a day or two or a week or a month, fresh demands may come especially with a war program that is growing in intensity and has not yet reached its peak and that may require the use of idle capacity at a moment's notice.

The second reason why cutbacks here and there do not immediately result in releases for consumer products is that very few of these are made of one material and most of them are made of many. Take washing machines for example. The largest amount of metal in them is iron and steel but there also are other materials like brass, tin, lead, zinc, leather and rubber and components such as gears, bolts and nuts and electric motors. Until you get an adequate supply of all these materials and parts, having enough of one of them does not do much good.

And then there is the element of labor which enters all products. Here again, having a surplus of one kind at one place does not solve the labor problem, because there are as many or even more kinds of labor than there are of materials and each product requires a certain kind. You can't shift labor from a steel mill into a washing machine plant and get what you need or vice versa.

It is true that we have had certain shutdowns of steel furnaces during the past few months. But as long as present requirements keep our steel producing capacity running at a rate of 95 per cent or better, there is not much chance to enlarge the area of distribution. Steel plants that run continuously at this rate may be compared to automobiles that run at 95 per cent of top speed, in that it does not do either of them any good and is likely to result in a breakdown.

From time to time we may get allotments of metals for civilian uses as the war goes on but I do not think it will be particularly noticeable until the big push is over over there. So don't expect too much until then and what you do get will be all the more welcome.



"Flying" bulldozers and scrapers will quickly repair this bombed airfield.

"Come on—Back the Attack —Buy War Bonds!"

Bulldozers That Fly

An airfield is bombed, but within a few minutes after the "all clear" signal is given Yankee engineers are at work repairing the damage with sturdy bulldozer and scraper units that are small enough to be flown anywhere by transport plane or glider. But repairing airfields is not the only job performed by these husky units—they also help build new airfields and vital supply routes, prepare camp sites, and perform many other chores so important to Victory.

Much of the steel used in these "flying" earthmovers is furnished by Inland to the La Plant-Choate Manufacturing Co., Cedar Rapids, Iowa. Producing steel for tough construction equipment is an old assignment to Inland steelmakers and metallurgists. A large tonnage of the steel shipped for this purpose before the war was Inland Hi-Steel—the steel that builds stronger and saves weight—the steel that will again be used for peacetime machinery when released from the demands of war.

INLAND STEEL COMPANY

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The IRON AGE
FEB. 17, 1944

NEWS FRONT

► To forestall the imposition of a mandatory 48-hr. week and the placement of Pittsburgh in the Group 1 critical labor status, the Labor-Management unanimously approved of the Pittsburgh Manpower Budget Plan, to be effective March 1.

Employers will be divided into three classifications: Those with direct Army, Navy or Maritime contracts will be permitted to hire men for both replacement and expansion needs; those whose activities are considered essential will be allowed to hire men for replacement only, and non-essential employers who will be permitted to hire women, veterans, boys under 18 and 1-A draft registrants awaiting induction.

► Copying the installation of 75 mm. gun on the Mitchell bomber, used with telling effect by Americans against the Japanese, the British are now putting a similar gun on the B-26, Martin Marauder.

How the Marauder gets off the ground with a 75 mm. gun, plus such very heavy ammunition, is a mystery. The Marauder practically has no wings, and seems to fly on its two propellers.

A 75 mm. shell fired from the gun would seem to have a flatter trajectory and greater accuracy than any form of rocket could have.

► Little Big Inch pipeline is now coming through after many weeks delay due to "defective pipe". Moving about 50 miles a day, the head of the column of heating oil passed Norris City on Feb. 8, and was expected at East Coast terminals late in February. Initial capacity (100-150,000 bbl. in March) is low because half of pumping stations are incompleted.

► Lockheed's cold water spray quench for aluminum uses a water-air atomizing nozzle to produce a dense fog. Uniformity of quenching which compares favorably with that of an immersion quench is thus obtained.

In all cases, ultimate tensile strength, yield strength and elongation meet or are above Army-Navy specifications. Distortion of parts like cowlings and thin contour skins is minimized by this spray-type quench.

► Properties of cold-blast pig irons have been closely duplicated by synthetic mixtures. Not only are the same chemical compositions fracture and mechanical properties achieved but chilling characteristics as well.

Mixtures are calculated to give a mean chemical and mechanical analysis closely approximating that of the cold-blast sample.

► The British have developed a new method of using guns in their night bombers to repulse German night fighters. British night bomber losses have dropped appreciably over the past month--not only a lower percentage but a lower total.

► In England there have been a number of cases of British soldiers committing robbery, so as to get money to enable them to compete with the far better paid U.S. troops for the favor of the girls they want.

► From the relief of Stalingrad to the present position in the Dnieper area, the Russian advance has been 2 miles per day. Also from Kharkov to the present Polish (Polesia) position, the Russian advance has been also 2 miles per day, except in one section where it has been 1.65 miles per day.

From this, a pessimist would assume that the best Allied advance from France to Germany would be 2 miles per day. And, it is some 800 miles from Paris to Berlin.

► Approximately 70 per cent of the auto parts and equipment manufacturers are supplying aircraft needs. Of these, 62 per cent expect to be in aviation work after the war, about double the number in this field prior to the war.

Few, however, expect aircraft parts to be a major factor in their operations.

When the Evansville Ordnance Plant cut in half its working force of several thousand men and women, personnel officers of neighboring plants were invited to go to the Chrysler plant and set up interviewing and hiring facilities.

► Attorney General Robert W. Kenny of California and Chad C. Calhoun, vice-president of the Kaiser Co. want the Geneva steel plant in private, independent hands, preferably Westerners. Sale of its finished steel products should be put on a new local basing point, they say, to eliminate the Pittsburgh-plus system.

Diecasting of Fuse Bodies

By H. E. SHEPARD
Assistant Manager, Rupert Diecasting Co., Kansas City

. . . By substituting zinc alloy die castings for brass fuse bodies formerly produced on screw machines, manufacturing costs are reduced and amount of scrap generated minimized. Procedure from die casting to machining and final packaging of the fuses for 20 mm. projectiles are herein outlined in detail.

FUSE bodies for 20 mm. projectiles needed by the Navy are being manufactured economically without sacrifice in quality at the Rupert Diecasting Co., Kansas City. Formerly, these bodies were produced from brass rod on screw machines in other plants. But the great demand for brass rod (in which the waste in chips is high for a part of this shape) and a belief that the job could be done with greater economy by die casting led to the development of the Rupert method.

This operation is indicative of what the die casting industry could accomplish with many parts not too economically produced by screw machines alone. In justice to the screw machine, it should be said, however, that its chief fault is that so much stock is converted into chips, as is done when bars are used. But the Rupert method minimizes scrap production by die casting. The product is finished by lathes converted to automatic chucking machines with very little metal converted into chips.

That the process has proved highly successful is indicated by the fact that the same basic method is now being applied to making larger fuse bodies from die cast zinc alloy for the 1.1 in. anti-aircraft projectile. These plugs are now being cast in the same shop. Both plugs are, in effect, hollow ogives having, at the inner end, an integral collar which is precisely threaded both inside and outside. As the die casting is step-cored and the outer ogive surface as well as the hole are cast to finished size and shape, only an insignificant amount of metal has to be machined off. Hollow sprues and runners, forming parts of the gates of castings as well as the chips from the machining operation are, of course, remelted and reused in the die casting machines.

An important factor in the success of the die casting method lies in the care used in making the 12-cavity dies employed. The cavities are made in cylindrical inserts in which the ogive shape is first hobbed to approximate size and then brought to precise size with a finishing hob. The o.d. of the block or insert is ground to be concentric with the ogive and then is pressed into a ground hole in the die block. This is highly important, as it insures a central cavity having its axis square with the die face and coaxial with the core pin. Without this precaution, it would not be possible to hold the close eccentricity limits imposed.

Several dies are in continuous use and they are checked four times an hr. to make sure that the eccentricity

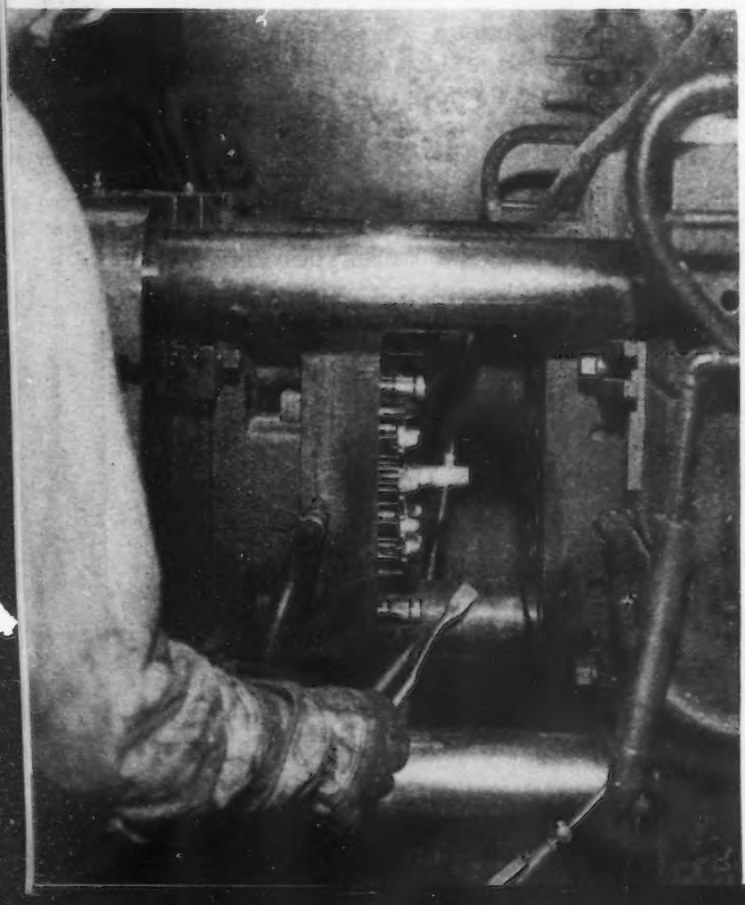

FIG. 1—Gate of castings in Zamak-3 (high-purity zinc alloy) are about to be removed from the casting die. There are 12 castings, made under air pressure of 1000 lb. per sq. in., on the gate which is shown already ejected by automatically operated ejector pins and is about to be removed with pliers.

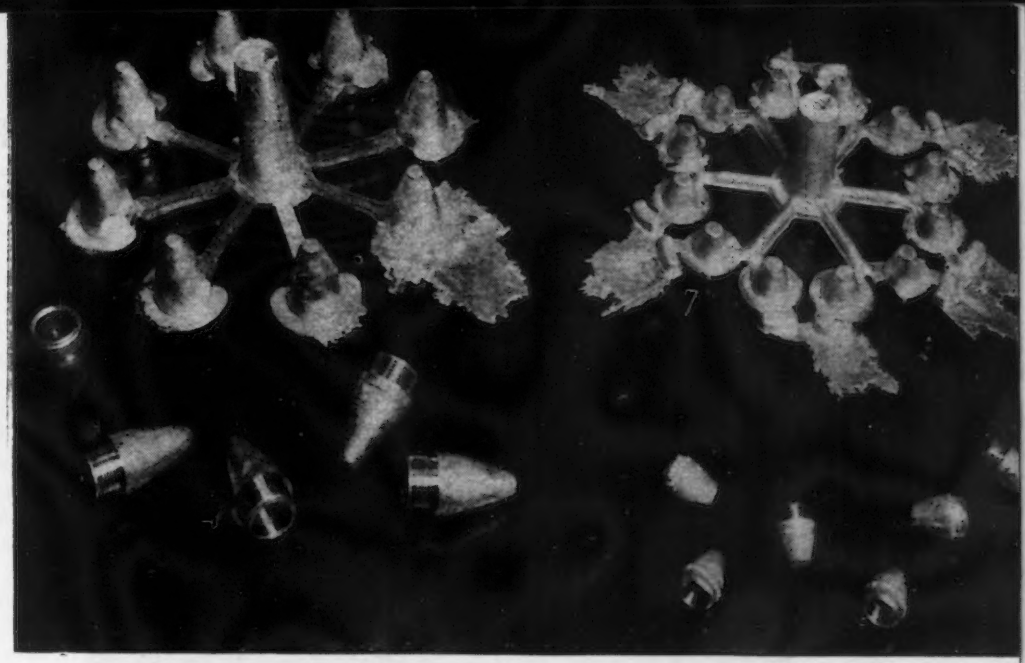

FIG. 2—Two gates of die cast fuse bodies as they come from the die. That at right has 12 castings for 20-mm. shell. The castings weigh 0.03 lb. each (about ½ oz.) when machined. At left is a gate of eight 1.1 in. castings which weigh about 2 oz. each when machined.

limits are held. In the machines for die casting, Fig. 1, it is possible to average 225 to 250 shots an hr., including time for inspections and other delays, and at each shot 12 castings are produced. Dies are provided with ejector pins which are automatically actuated as the dies are opened, ejecting the gate which the operator merely lifts out with pliers and quenches in water. The ejector pins are arranged to bear on runners, hence castings are not marred. These pins are actuated by a plate which contacts with stops on the tie rods of the machine.

Temperature of metal in pots is automatically controlled at 750 deg. to 760 deg. F. As a result of careful development, the gating and overflow wells (Fig. 2) are so arranged as to avoid porosity, especially in the tip of the ogive which is only 0.030 in. thick. The foregoing facts apply to the 20-mm. body to which all further details relate except as otherwise noted, although similar practice is followed in the larger fuse body casting. Pressure applied in injecting the metal is 1000 lb. per sq. in. Quenching helps to avoid warpage of the gate of castings as a whole.

The ogive surface is exceedingly

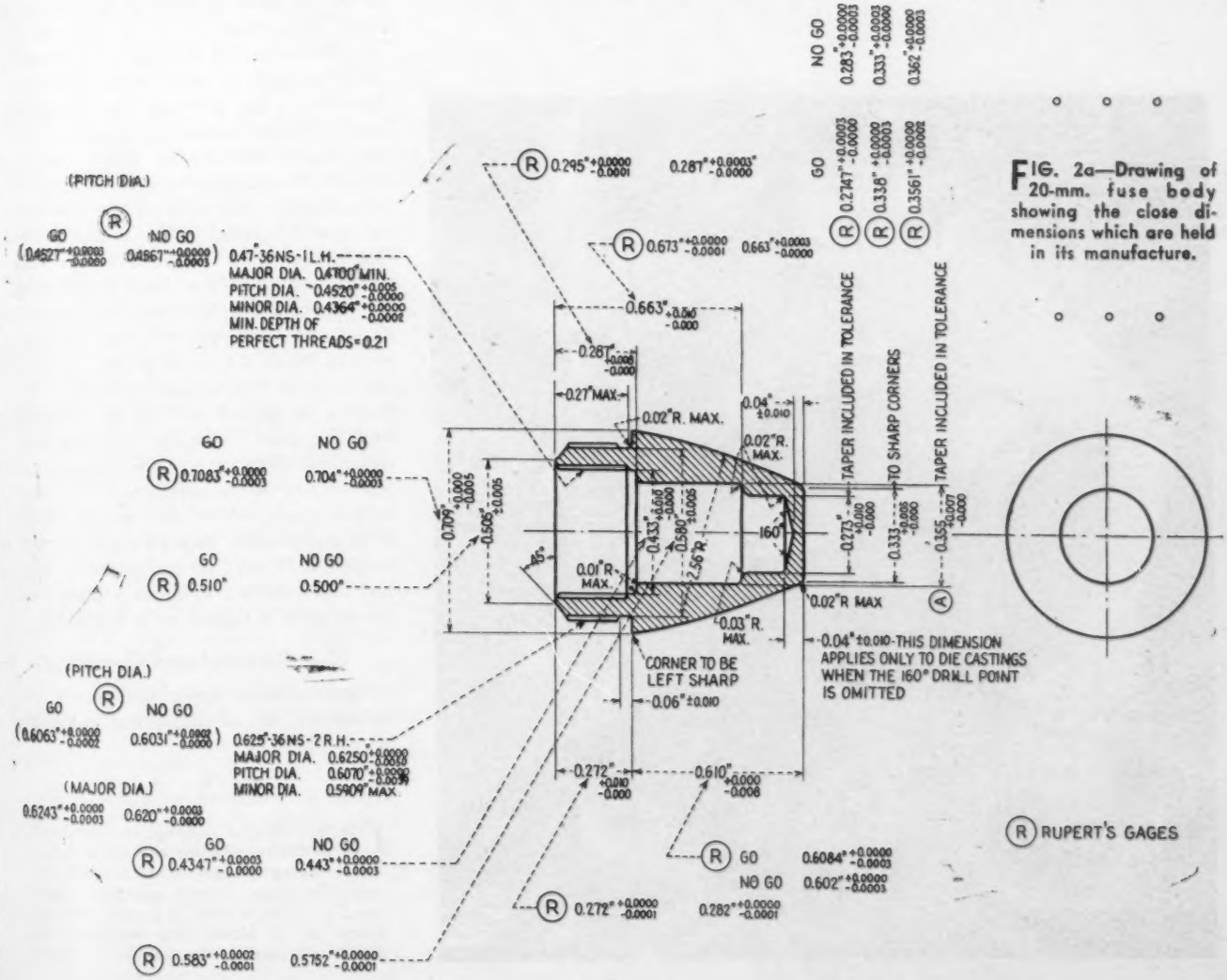

FIG. 2a—Drawing of 20-mm. fuse body showing the close dimensions which are held in its manufacture.

FIG. 3—Setup in Natco machine for tapping six castings at a time while still on gate and then tapping the other six after fixture (here shown in loading position) is indexed 60 deg.

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smooth, as cast, and does not afford a good chuck grip, a factor affecting later operations. This surface is not machined and hence must not be marred by chucking. Partly for this reason and partly to facilitate rapid tapping, the tapping operation is done before the castings are cut from the gate, as shown in Fig. 3, using a six-spindle Natco drill press. Each spindle is equipped with a five-flute left hand tap ground with an 8-deg. hook and having a cylindrical extension which pilots in the cored hole to insure concentricity of the thread. The thread is ½ in. 36 N.S. class 2 fit. Spindles carrying the taps are cushioned and no lead screws are required. Soluble oil is used as a coolant and the threads produced meet exacting standards, as indicated in Fig. 2a.

For accurate positioning of the work, the gate which must be free from warpage is set in a fixture having 12 correctly spaced recesses, one to fit the ogive of each of the 12 castings. This fixture is on a slide which is withdrawn for loading and pushed back against a stop when tapping. The fixture has a recess for the sprue and is pivoted about the sprue center. In tapping the first six holes, the fixture is swung about the pivot against one stop and the table of the machine is raised by pedal to clamp the bodies firmly in their respective recesses against a pressure pad as tapping proceeds. Then the table is lowered, the fixture indexed 60 deg. and the second set of six fuses is tapped when the table is again raised. Finally, the fixture is moved to loading position and the gate (with the runners still attached, turning of the castings is prevented) is removed and dropped into a chute. With this setup, about 3750 gates, each with 12 castings, are tapped in 8 hrs., or almost 6000 tapped holes an hr., which is a high rate for so good a thread as is specified.

Chip Removal and Coolant

Gates sliding down the chute are picked up at an adjoining machine

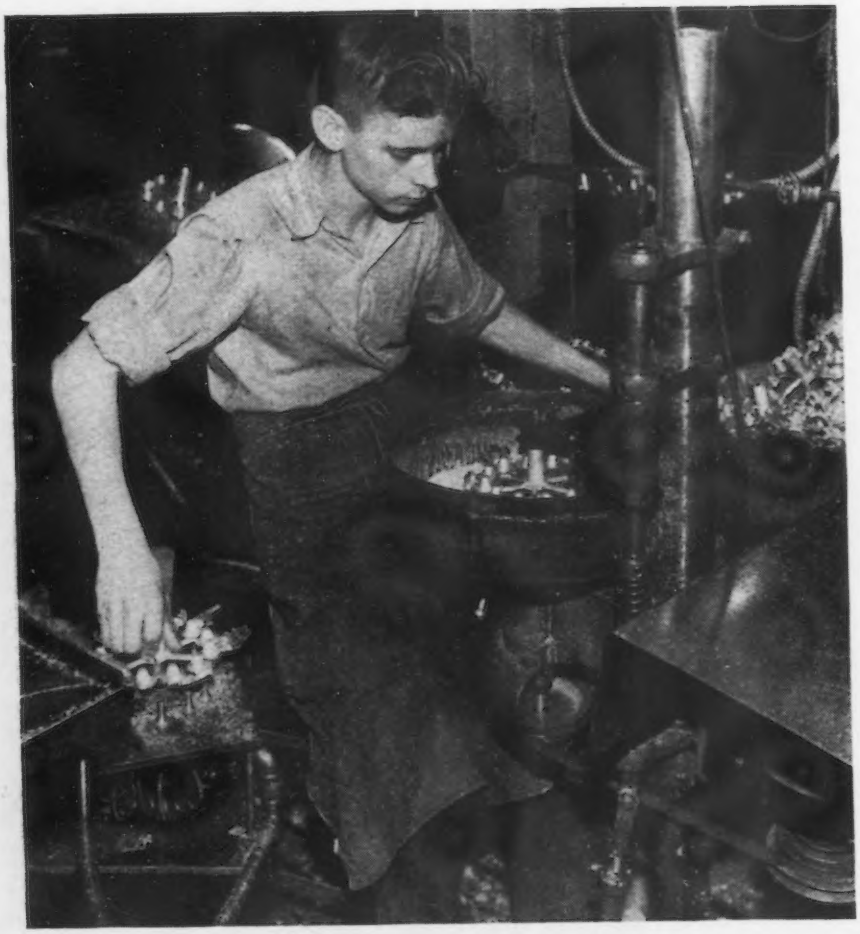

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FIG. 4—Gate of castings in centrifuge which throws off chips and coolant, the latter being caught and drained to sump for reuse. Under operator's right hand is a fixture with 12 nozzles through which air is blown into threaded recesses of castings for removing chips.

which is actually a centrifuge made from an inverted drill press, Fig. 4, with a pedal-operated clutch and brake. The operator drops the gate onto a light chuck which spins the casting. Any soluble oil is thrown off and is caught by the surrounding housing and drained back to the sump of the Natco machine for straining and recirculation. The gate is then dropped onto a fixture having 12 air nozzles spaced opposite the tapped holes in the 12 castings. As the casting is seated an air valve is automatically tripped and air jets, one entering each casting, blow out any chips and coolant remaining in the holes. Then the gate is dropped into another chute leading to a punch press.

This press, Fig. 5, is equipped with a 12-cavity trim die into which the operator sets the gate. The ram of the press carries 12 floating punches which center themselves, one in each casting, as the ram descends and push the 12 castings through the holes in the trim die, cutting them from the gate and shearing off flash. Castings drop through the press bed into a chute down which they slide into a pan for removal to the next operation. Gates and flash remaining on top of the die slide through the back of the press and down another chute into a tote box for return to melting pots of casting machines.

All remaining machining operations, which include machining the shoulder and a groove and cutting the external thread, are done in Logan lathes which have been converted into automatic single-spindle chucking machines, partly air operated. Although these machines, once they are set up and functioning as intended, require constant attendance, all the operator need do is load a small vertical magazine out of which the plugs are fed automatically into the chuck. They then pass through the machining cycle and are ejected, all automatically, at the rate of 2000 pieces an hr. Considerable experimental work was required, however, to develop the feeding mechanism and automatic tool controls, partly because it is necessary (to avoid marring the ogive surface) to hold the latter in the chuck with sufficient pressure for the chuck to drive the piece by friction.

The chuck is mounted, of course, on the end of the lathe spindle. It is provided with a recess ground to fit the ogive. At the center of the chuck is a plunger which is pressed forward by a spring and acts as an ejector. When the piece is loaded, the plunger is pushed inward until the piece seats

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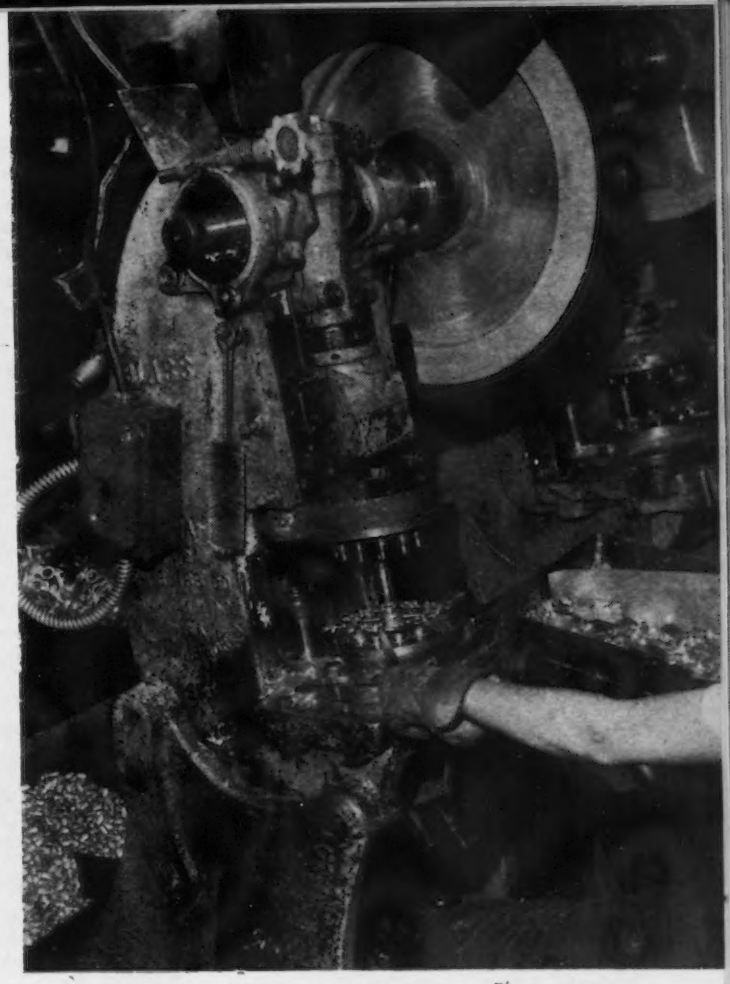

FIG. 5—Punch press setup for shearing flash and cutting 12 castings from the gate in one stroke of the 12 punches which force the castings through the trim die and press bed where they fall into lower chute. Remainder of gate, including flash, is pushed through rear into upper chute, for remelting.

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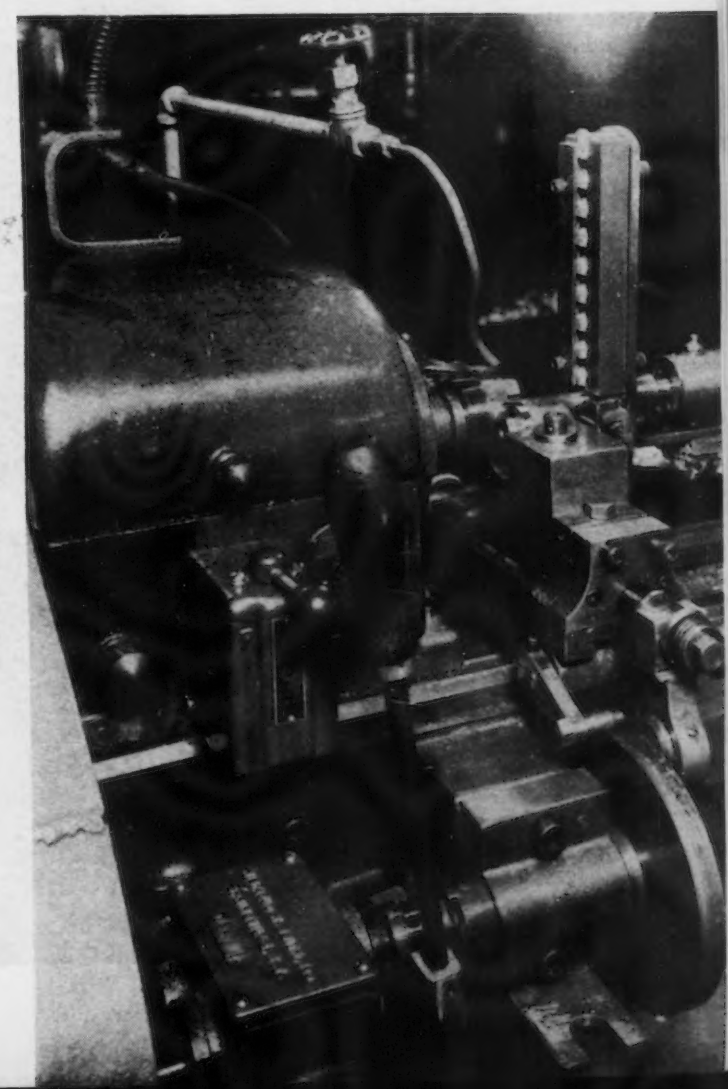

FIG. 6—Headstock, magazine and automatic feeding mechanism as applied to a Logan lathe, converting it into a single-spindle automatic chucking machine. Gear reducer, positive clutch and cam are in foreground. Loaded magazine is above cross slide.

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firmly in the chuck which, of course, centers the piece and positions it endwise.

Automaticity and timing are controlled by a special lay shaft driven by a V-belt driven by a reduction gear. The V-belt runs from a pulley at the rear end of the lathe spindle. (See Fig. 6.) A positive clutch is placed between the reducer and the short lay shaft, but is needed only when the automatic elements are to be disconnected. Cross slide traverse is actuated by a cam from the same shaft engaging a roller. On the slide are two tool holders. That at the front carries a circular type of forming tool which, as it is fed forward, faces the shoulder at the inner end of the ogive and cuts a groove in the shank next to the shoulder where the thread terminates.

When these cuts are completed, the cross slide reverses and the second circular tool, a two-point thread chaser, is fed from the rear. Also on this tool holder is a brass half nut designed to engage a lead screw cut on the outside of the chuck carrying the work. This nut advances the tool longitudinally as it chases the thread. At the same time, a spring plunger is compressed and, when the tool finishes the thread and is disengaged by the cam reversing the cross slide, the spring returns the chaser against a stop which controls its position at the start of the threading operation on the next piece. Cutting of the thread completes the machining and when the tools are both disengaged, the work is ejected and falls into a chute and thence into a box back of the lathe bed.

Feeding of the bodies from the magazine, which is merely a vertical track into which the parts are fed by hand, is accomplished as follows: The tail stock shown in Fig. 7 is equipped with a live center which can be advanced, for loading, and withdrawn at injection, by a plunger in an air cylinder fastened to the tail stock. Motion of the plunger is controlled, of course, by action of air valves, which is coordinated with machining events of the cycles. The air valves are operated by solenoids and the latter are operated by a micro-switch. These are actuated by a rocking shaft mounted in bearings which hold it parallel to the ways on the bed of lathe.

Rocking of the shaft and the consequent functioning of the switches are effected by the same cam disk which operates the cross slide, although a different cam surface controls the cam follower connected with the shaft. On some lathes, including the one shown in Fig. 6, the cam surface for operating the switches is on the periphery of the cam disk. In other machines, it is a track in the face of the cam disk opposite the track for cross slide operation. The switches are at the opposite end of the rocking shaft, below the air valves, which are next to the air cylinder. The hookup is such that, when a machining cycle is finished, one valve relieves the pressure on the plunger which holds the piece in the chuck under 100 lb. pressure, and opens a valve which causes the plunger to be withdrawn.

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ABOVE

FIG. 7—Rear view of the converted lathe. On tailstock is the air cylinder for operating the live center which inserts and holds the work in chuck. Operator is loading magazine to right of which is the rear cross slide tool which does the chasing of the external thread. Ejected parts are feeding into box down the chute.

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BELOW

FIG. 8—Equipment used for gaging parts after machining. Snap gages are at left, thread gages in foreground and height and depth gages in background.

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RIGHT

FIG. 10—Bench for visual inspection of machined castings. Parts dropped through holes appropriately marked are advanced through channels by a belt below bench top and thus are sorted and delivered into corresponding boxes.

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FIG. 9—Unloading a carrier in which machined fuse bodies have been advanced through a trichlorethylene degreaser.

The ejector spring back of the work then ejects the piece.

As the live center is withdrawn, the next casting falls into position to be moved into the chuck and, when the air valves are reversed, the ram and center move forward and push the casting into the chuck where it is locked, thus starting another cycle.

Checking for Dimensional Control

Each chucking machine is checked every 10 min. to make sure that the pieces turned out come within required dimensional limits. The operator assigned to this work takes about five castings from the pan and puts them through the gages shown in Fig. 8. These check both diameters and lengths and there are also go and no-go thread gages. If any parts are found off size, the machine is stopped and the cause of the faulty dimension is corrected, all parts remaining in the pan being checked. If all the parts selected at random for inspection pass the latter, the lot is approved and is shifted to the degreaser shown in Fig. 9.

This machine is equipped with perforated carriers. When a carrier is filled with the parts and the hinged door closed, it automatically travels through the machine in which the container is rotated slowly as the work is brought into contact with the trichlorethylene in spray and vapor form. This results in removing chips and grease. When the carrier returns with the cleaned parts, it is emptied into a chute and loaded into trays for delivery to the inspection bench, Fig. 10. Under the central strip of this unusual bench is a slow-moving belt conveyer running about 2 in. below the top. Partitions divide the space between top and belt into four alleys above each of which there are four sets of openings. The four in each set are marked, respectively: "Good", "dirty", "scrap" and "burrs." There are inspection spaces beside each set of openings and these spaces afford room for four girls at each side of the bench, the top of which has two shallow bins for parts ready for inspection.

Inspection at this bench is purely visual and the girls drop the castings into the holes corresponding to the condition of the part. As the belt advances, it discharges the parts from each alley into a corresponding container. Good parts, that is, those passing visual inspection, are ready for final inspection. Those which are dirty are cleaned and those which have burrs go to a bench where the burrs are removed. Scrap parts,

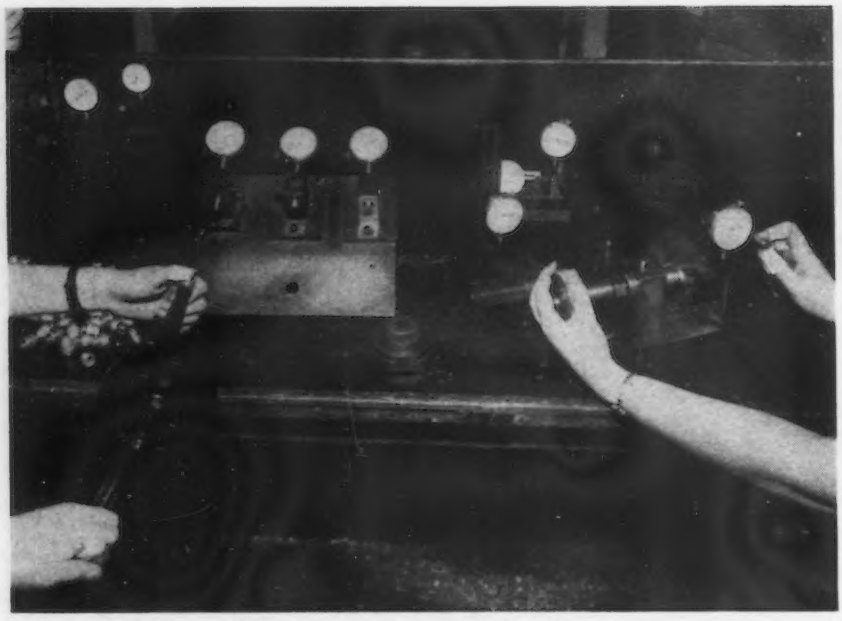

FIG. 11—Gages used for final inspection, including those for measuring eccentricity. Crank "grinder" is used for gages which must be turned into or over threads and saves screwing them in with fingers.

amounting to less than 3 per cent, go to the smelting department for remelting.

Parts which pass visual inspection are placed in trays containing 3000 castings each. From each tray 100 castings are taken at random and are checked on all dimensions. If any rejects are found in this hundred, all remaining castings in the tray are inspected for the dimensions found faulty in the lot of 100. Rejects are remelted but the other castings are ready for government inspection which follows immediately.

Gages used in the final test are shown in Fig. 11. Go thread gages are mounted on the spindle of an ordinary kitchen grinder and are turned by a geared crank while the casting is run into or over the gage. This is much faster than screwing and unscrewing the castings manually. Eccentricity is checked with dial gages mounted on a holder having a hand wheel and a chuck to receive the work. A hinged lever projects into the hole and is pivoted so that the dial gage, bearing at the opposite end of the lever, measures the eccentricity. The gage and lever are on a slide and are so arranged that the lever is lifted automatically as it is moved to the three steps in the hole. Other dial gages check other dimensions, including various lengths.

After passing government inspection and weight-counting, the parts are transferred to the bench, Fig. 12, where they are first fed by hand into a rotating holder turning in a horizontal plane. This machine carries the parts past a marking die as they turn on their own axes. This die applies the part number and maker's trademark, after which the parts are delivered down a chute to a packing bench, which has some unusual features.

Cartons hold 1000 fuse bodies set in 10 layers with cardboard between, the individual castings being held apart by eggcrate type separators, each with 100 recesses. To facilitate loading, an opening the size of the expanded separator is made in the bench top and below it is fitted to the four sides of a box. The bottom or fifth side of this box is made movable vertically by a lever which fits in 10 notches corresponding to the 10 tiers of castings. To start loading, the bottom is adjusted one tier below the bench top, is covered with a square of cardboard and a separator is inserted. A double handful of castings

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FIG. 12—Setup for marking parts with number and trade mark (rotating disk at back) and for packing cartons with a finished part in each opening of the separators, one of which is in recess at center of bench. Lever in foreground lowers and raises packed separators.

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is then spread over the separator and castings fall into the respective openings or are placed in any not thus filled. Then the tier is dropped one space and another card and separator are added and filled. This is repeated until the 10 tiers are filled. Then a carton is inverted over the load it is to receive and the load is lifted by the lever, filling the carton, which is then slid off (the bottom card being at bench height) and turned right side up, sealed and marked for shipment. The advantage of this arrangement is that the operator is always working at bench height and never has to reach down into the unfilled carton. Seventy to 80 boxes can thus be filled in an 8-hr. day.

More recently put into production is the much larger 1.1 in. body for anti-aircraft applications. In this case, the castings, which weigh about 2 oz. when machined, are cast eight on a gate from zinc alloy, as shown in Fig. 13. In this case, the casting is done in a larger machine operating with hydraulic injection at about 200 shots an hr., the pressure applied to the metal in this case being 2500 lb. per sq. in. The castings are sheared from the gate eight at a time in a punch press before being tapped or otherwise machined, the machine work being done later in another plant. These bodies are cast with flats, serving as wrench holds, near the base of the ogive, and this facilitates holding them in a chuck.

Four of these castings are shown in Fig. 14, together with a gate and separate castings of an interior part which is cast of aluminum alloy in a cold-chamber machine. Each of these parts has an off-center core of odd shape.

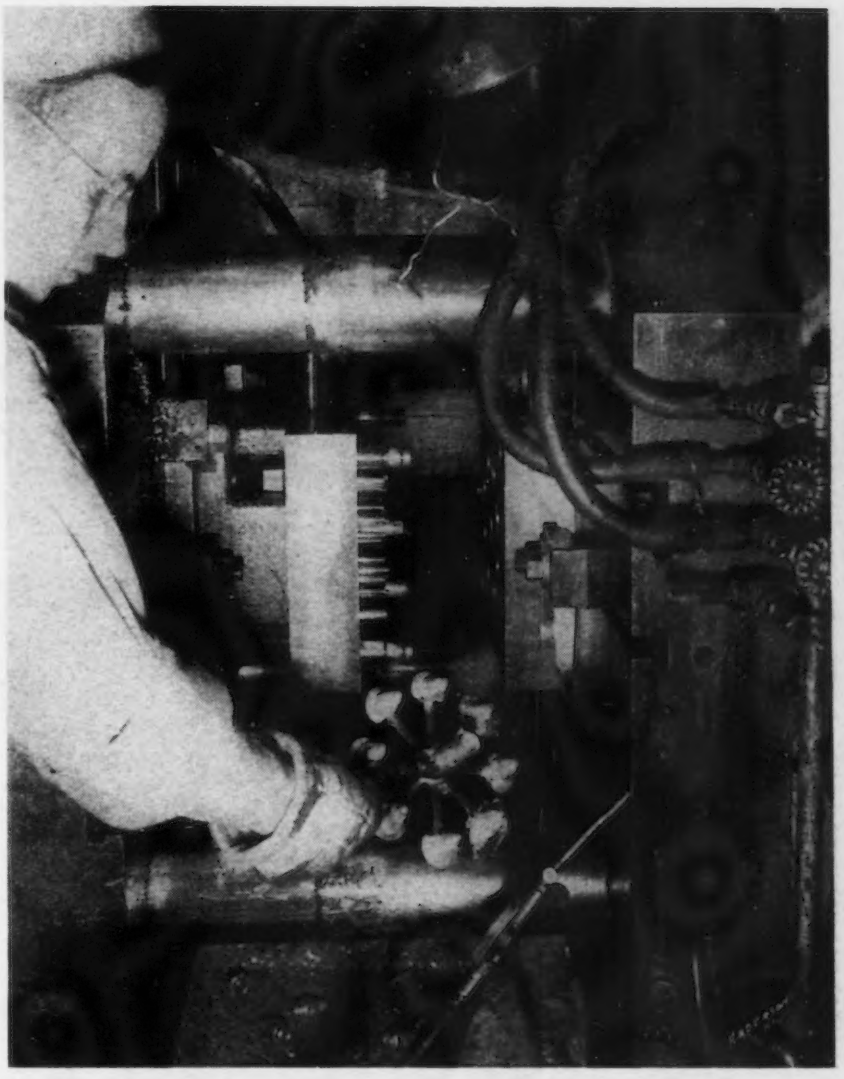

FIG. 13—Gate of eight of the larger 1.1 in. fuse bodies being removed from the hydraulically operated die casting machine.

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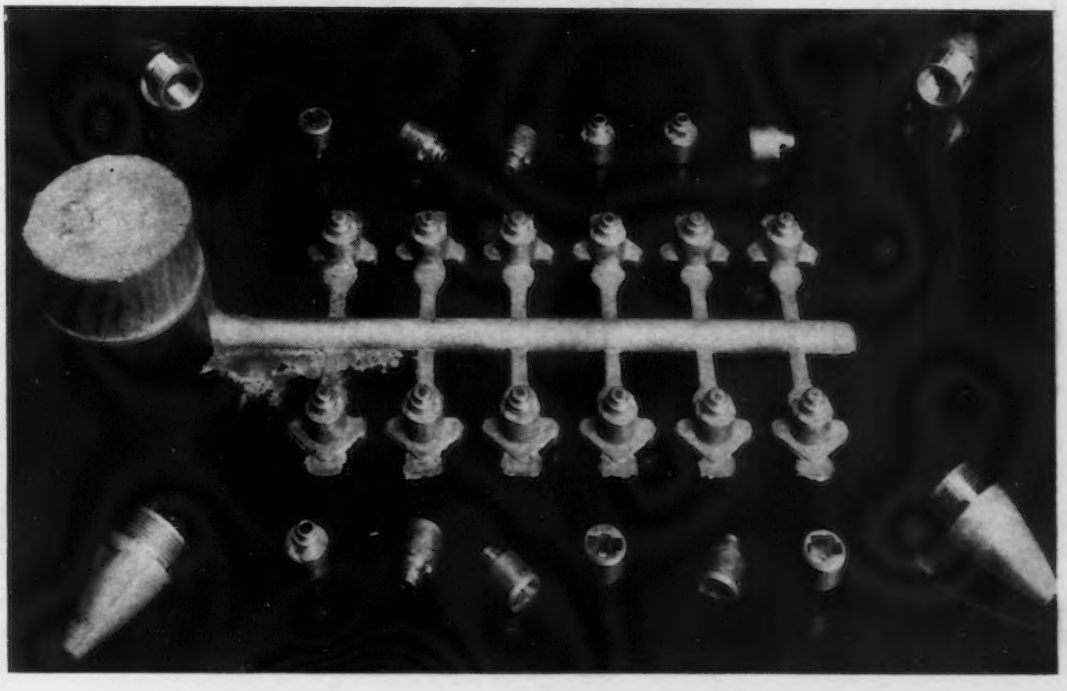

FIG. 14—Four machined 1.1 in. die cast fuse bodies and a gate of aluminum die castings with a set of duplicate castings which are used inside the shell.

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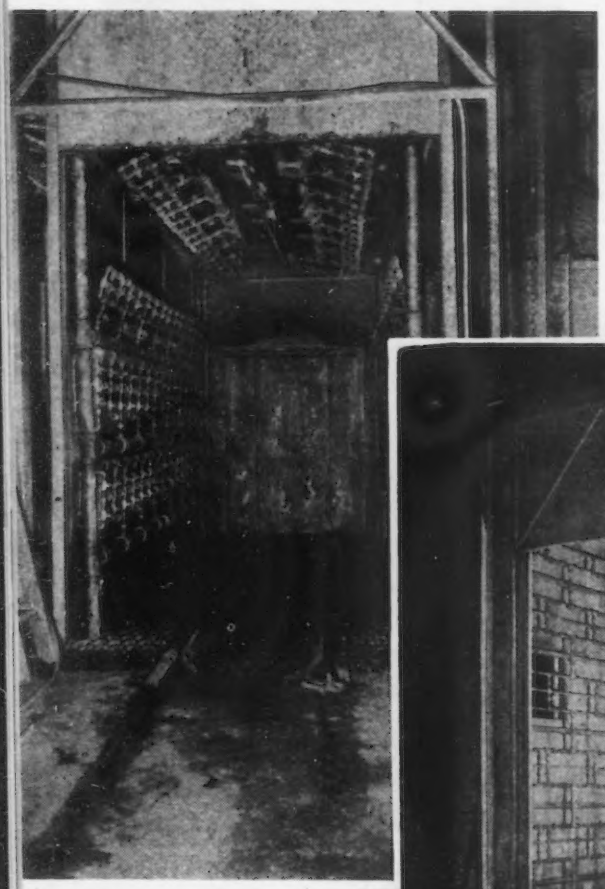
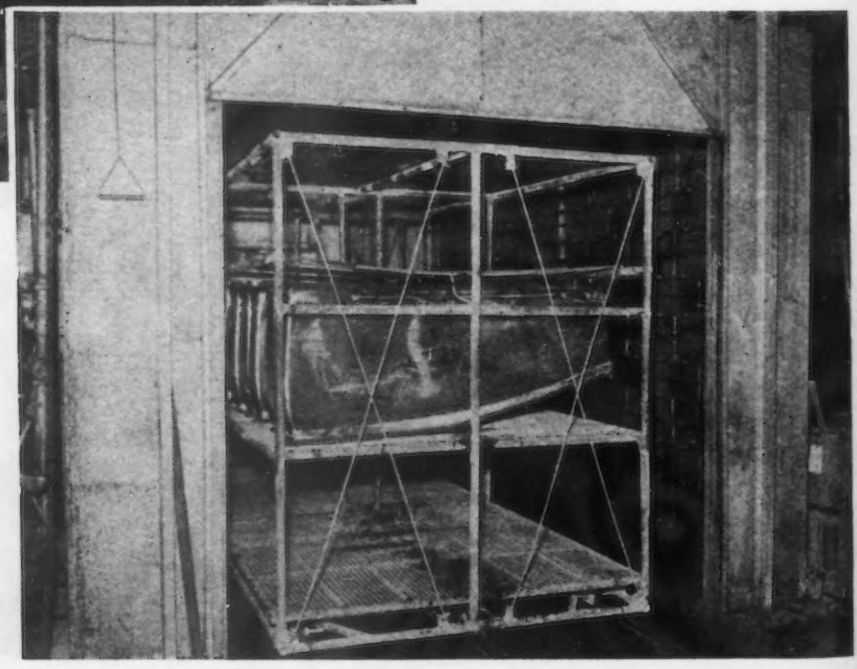
Cold Water Spray

By V. S. SORENSON
Process Engineer,
and
F. O. RIEK
Plant Engineer,
Lockheed Aircraft Corp.
(Factory A, formerly Vega)



ABOVE
FIG. 1—Interior of quench booth No. 1.

ABOVE RIGHT
FIG. 2—Interior of quench booth No. 2.



RIGHT
FIG. 3—Load rack in position in quench booth No. 2.

THE problem of quenching aluminum alloy sheet in heat treatment has always presented many difficulties in the form of distortion and corrosion resistance. A quench has been developed at Lockheed Aircraft Corp. which eliminates a great deal of the distortion trouble and produces results which consistently meet Army and Navy requirements for physical properties and corrosion resistance.

The method involves a cold water spray quench which differs from ordinary spray quenches used in the past in that a water-air atomizing type nozzle is used which produces a dense fog rather than a spray. A filter system keeps the system consistently clean. Uniformity of quenching which

Quench . . .

for Clad Aluminum Alloy

. . . The quenching method described herein, in which a dense fog is used rather than a spray, results in corrosion-free material, and eliminates much distortion trouble. Uniformity of quenching, which compares favorably with that of an immersion quench, is obtained.

compares favorably with that of an immersion quench is thus obtained, and tensile requirements of AC Specification 11067A, Table III are fully met.

Two spray quench booths numbered No. 1 and No. 2 were installed for experimental work. No. 1, the interior of which is shown in Fig. 1, was 5 ft. 2 in. x 12 ft. x 6 ft. 11 in. The nozzles were arranged in five runs of 15 nozzles each, two runs of which were located at the top of the booth. The three side runs were arranged as follows: 22½ in. from the floor, 19 in. above the first run, and 19 in. above the second run. Nozzles in each run were 8½ in. apart. The total spraying system included 120 nozzles.

The No. 2 booth was considerably larger, with dimensions of 11 ft. 1 in. x 16 ft. x 9 ft. The total spraying system was comprised of 450 nozzles arranged as follows: Overhead, 3 runs of 18 nozzles each; bottom, 2 runs of 18 nozzles each; each side, 10 runs of 18 nozzles each. Fulflo filters were installed on air and water inlet lines, filtering to 2½ microns each.

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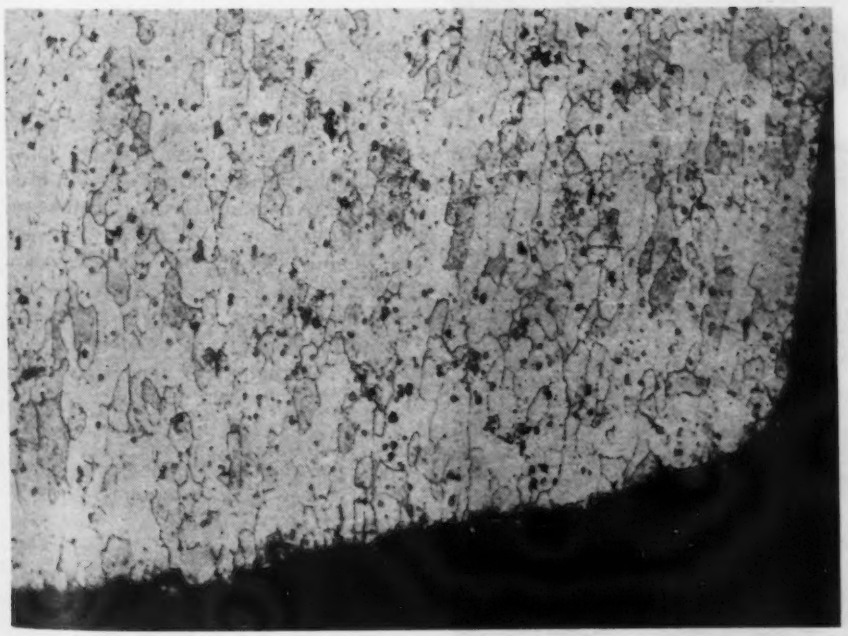
ABOVE

FIG. 4—Booth No. 2, with the door open, during quenching. Note the dense spray obtained.



BELOW

FIG. 5—Photomicrograph of of 0.032 in. 24SO material, spray quenched in booth No. 1, with quench water pressure of 135 lb. per sq. in. and quench air pressure of 35 lb. per sq. in. Shown is the sheared edge of the specimen and a portion of the flat surface of the metal from which the cladding was stripped.

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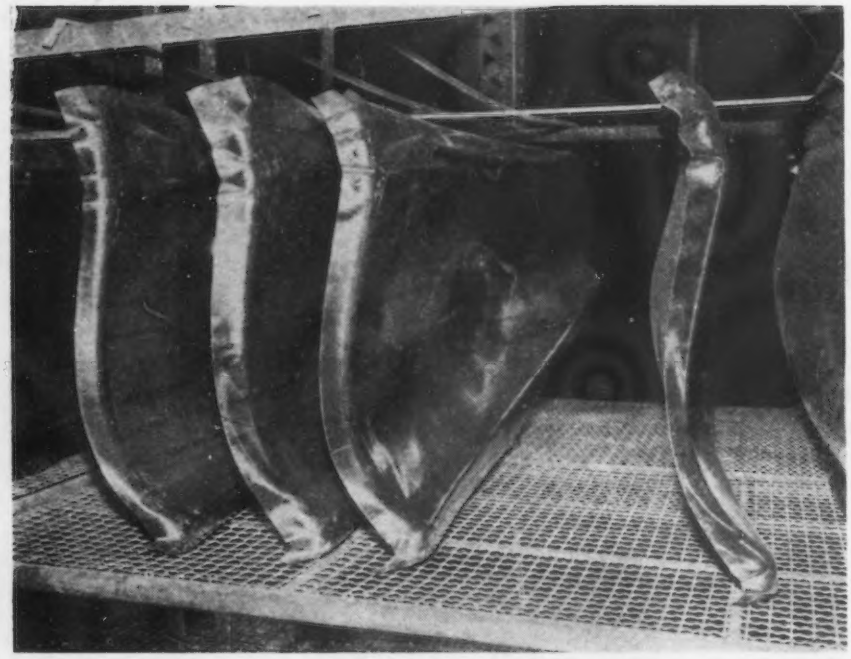

FIG. 6—Photomicrograph of 0.040 specimen and a portion of the flat cladding booth No. 2, with quench water quench air pressure of 40 lb. per sq.

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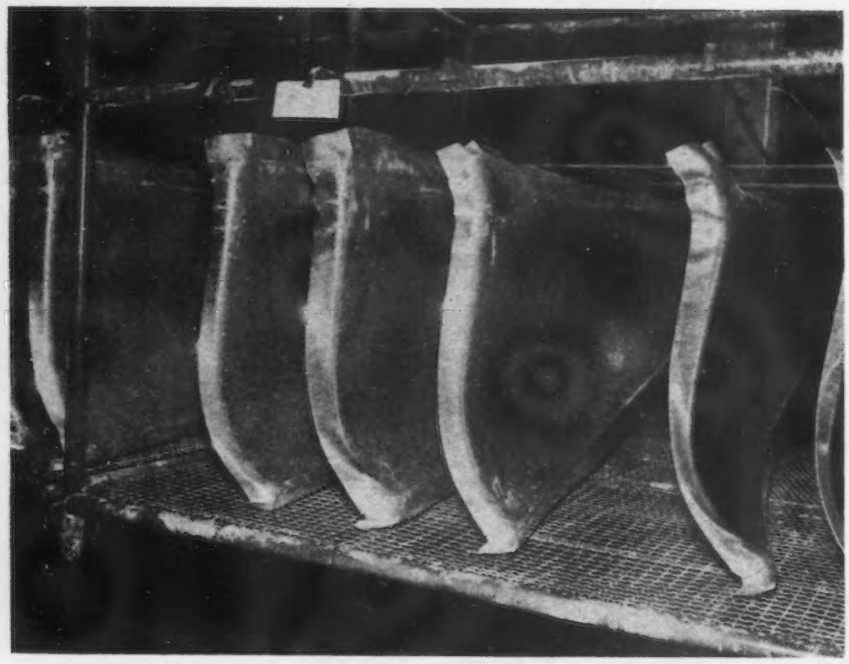

LEFT

FIG. 7—At top are thin skins before heat treatment. Below are shown the same skins after heat treatment using spray quench.

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In both booths, the average temperature of the quench was 65 deg. F. The time required to transfer the load from the furnace to the quench was 7 to 10 sec. The load in the quench booth, and the dense quench spray obtained are shown in Figs. 3 and 4.

Tables I and II show physical properties obtained with the new quenching equipment. In all cases, the ultimate tensile strength is above Army and Navy requirements. Yield strengths on test specimens also were above minimum requirements with

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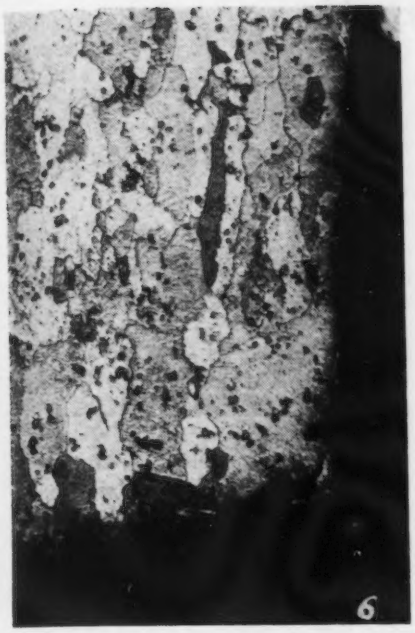
LEFT

FIG. 8—Typical cowling parts, for which spray quench is used.



in. 24SO material, spray quenched in pressure of 135 lb. per sq. in. and in. Shown is the sheared edge of the surface of the metal from which the was stripped.

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the single exception of a specimen quenched in booth No. 1, where the yield was 270 lb. under minimum, which is negligible since the stress strain recorder used could be subject to this much error.

Elongation meets the requirements of Army-Navy specification AN-A-13 in all cases, and meets Air Corps specification 11067-A with one exception from quench booth No. 2, where the elongation was 2 per cent under the 15 per cent required. This specimen was badly scratched, which could have been a contributing factor in affecting tensile tests for elongation.

Corrosion resistance was satisfactory in all cases using the cold water spray quench. Poor corrosion resistance has always been the main argument against a spray-type quench. These tests definitely show that when the quench is properly designed, the difficulty can be eliminated. Photomicrographs, of which Figs. 5 and 6 are samples, taken after accelerated corrosion tests show no evidence of intergranular corrosion. Satisfactory grain contrast is present.

Typical parts made from the spray quenched material are shown in Figs. 7 and 8. It can readily be seen that cowling, thin contour skins, etc., when quenched in a cold water immersion quench would be subject to a great deal of distortion.

TABLE I

Physical Properties and Corrosion Resistance of Heat Treated 2450 Clad Aluminum Alloy, Quenched for 25 Min. in Booth No. 1 After Heat Treating to 920 deg. F.

Material	Quench Water Pressure, Lb. per Sq. In.	Quench Air Pressure, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Yield Strength, Lb. per Sq. In.	Average Elongation, Per Cent in 2 Inches	Corrosion, per Spec. AN-QQ-H-186
0.032	130	35	62,226	38,646	22	None
0.040	130	35	66,833	39,293	21	None
0.040	135	35	62,556	38,570	18	None
0.040	120	40	64,923	39,643	19	None
0.040	125	40	63,040	38,550	19	None
0.040	130	35	64,433	39,790	18	None
0.040	120	40	62,800	38,500	20.5	None
0.032	135	35	63,090	38,655	22	None
0.032	120	38	62,543	37,516	21	None
0.040	135	38	63,890	38,183	21	None
0.040	135	35	65,113	39,470	20	None
0.066	125	38	60,650	36,730	21.5	None
0.040	135	35	62,313	38,380	16	None
0.040	...	..	61,823	37,960	18	None
0.067	135	40	62,240	38,010	20.5	None
0.066	135	35	62,600	38,083	18	None
0.040	125	38	63,188	38,006	19	None
0.062	135	35	62,870	38,710	18	None
0.040	125	38	63,186	38,983	20	None
0.040	130	38	63,060	37,810	16	None
0.040	135	35	62,000	37,810	15.5	None
0.040	145	35	63,130	38,453	20	None

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TABLE II

Physical Properties and Corrosion Resistance of Heat Treated 2430 Clad Aluminum Alloy, Quenched for 25 Min. in Booth No. 2 After Heat Treating to 920 deg. F.

Material	Quench Water Pressure, Lb. per Sq. In.	Quench Air Pressure, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Yield Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 Inches	Corrosion, per Spec. AN-QQ-H-186
0.040	130	35	63,363	38,023	15.0	None
0.032	125	40	63,683	39,133	19.0	None
0.040	120	40	64,170	38,183	17.5	None
0.040	130	40	65,383	38,436	17.5	None
0.040	130	40	64,587	39,533	19.0	None
0.040	120	40	65,740	40,133	15.5	None
0.040	125	40	66,506	39,983	17.5	None
0.040	130	40	66,046	39,853	21.0	....
0.040	130	40	62,505	38,700	19.5	None
0.040	125	40	66,500	40,176	18.5	None
0.040	135	40	66,280	39,973	21.5	None
0.040	125	40	63,090	37,993	16.5	None
0.040	135	40	62,630	38,220	22.0	None
0.040	125	40	62,380	37,330	19.5	None
0.067	125	40	62,260	37,860	18.0	None
0.040	135	40	62,225	38,455	13.0*	None
0.040	135	40	63,280	37,683	18.0	None
0.040	130	40	62,826	37,663	18.5	None
0.040	125	40	64,403	38,950	16.5	None
0.032	125	40	64,613	39,183	20.5	None
0.040	125	40	63,976	38,407	18.5	None

* Material badly scratched.

Development of High Yield Strength in Clad 24S

. . . Four 24S clad aluminum alloy tempers are here discussed, with a description of a precipitation aging process that is sound from a production standpoint. Data on the increase in physical properties of the four tempers are included.

CONSOLIDATED Vultee Aircraft Corp. is now using a process which causes a considerable increase in the yield strength of clad 24S over that obtained by the usual type of heat treatment. This process consists of precipitation aging at elevated temperatures and may be performed on various tempers of the material.

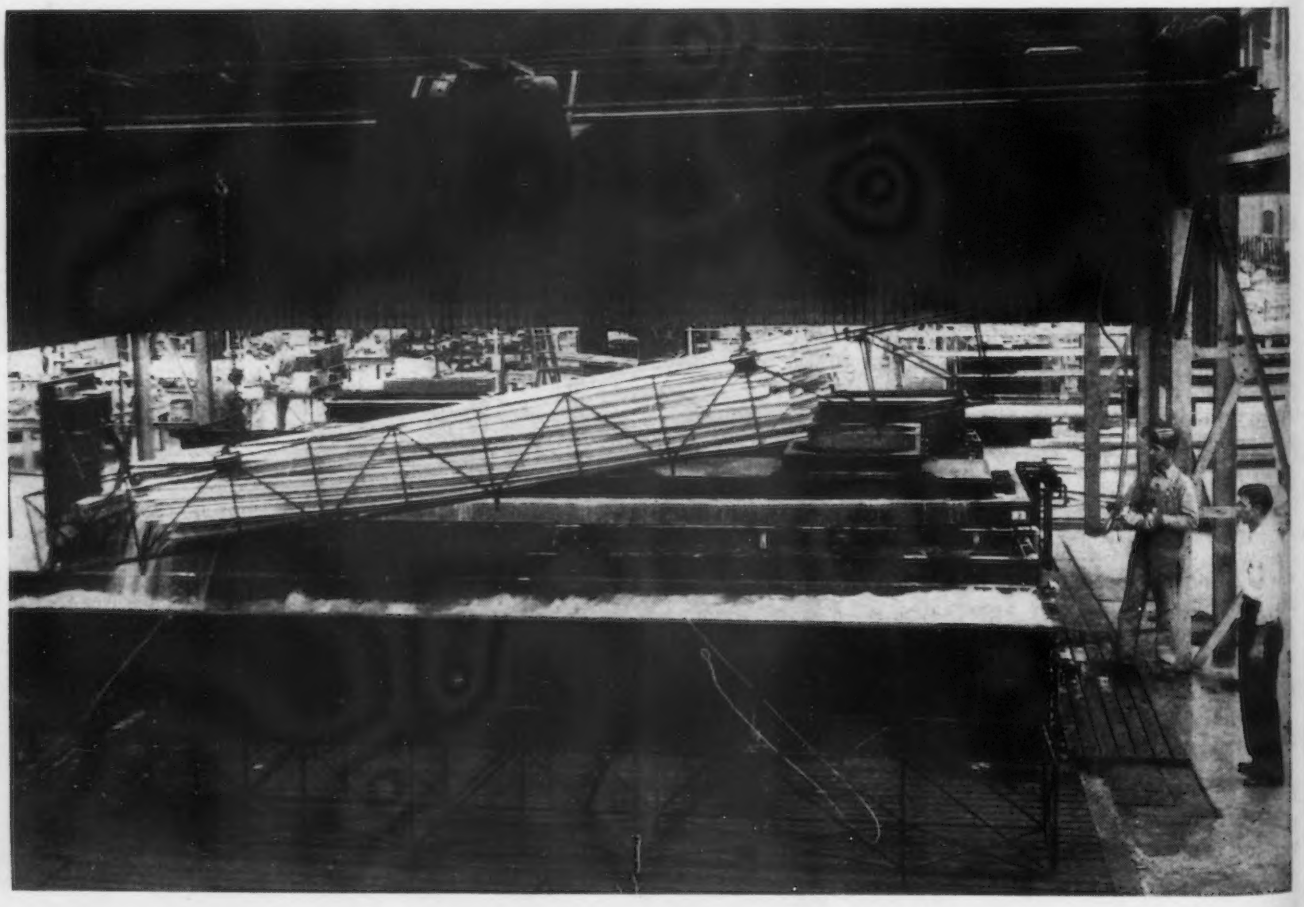
For purposes of clarity, 24S-T temper is referred to herein as 24S-T_3, the subscript standing for the approximately one per cent reduction of area given this material, after heat treatment, for straightening.

Clad 24S-T and 24S-RT may be used without further treatment but 24S-O must be given a solution heat treatment at 910 to 930 deg. F. (Fig. 1) followed by quenching in cold water from this temperature. The resulting temper of the alloy is here referred to as clad 24S-T_6, the subscript indicating that the material has been subjected to no reduction in area following heat treatment.

o o o

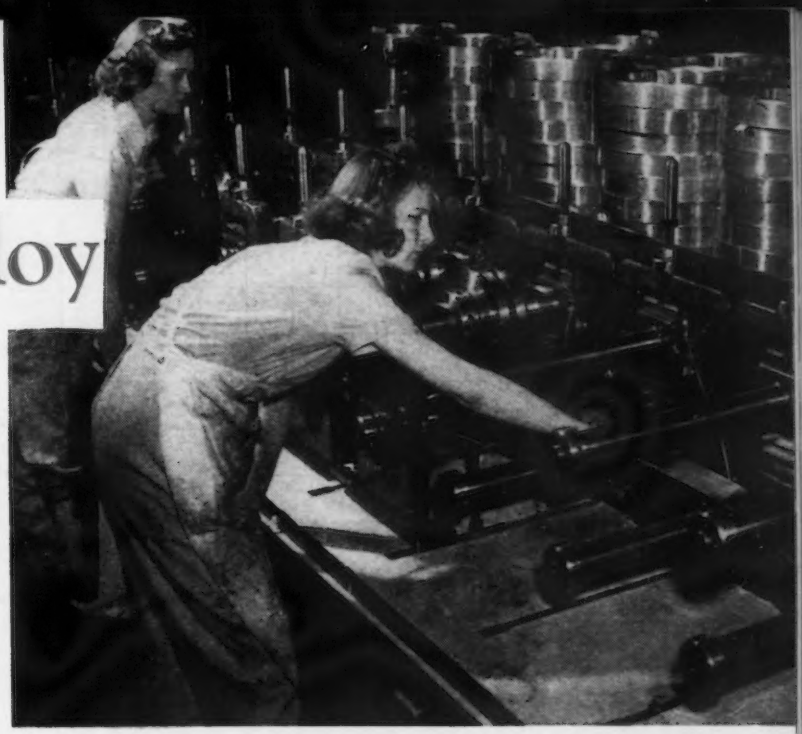
FIG. 1—Heat treated 24S-O material being lifted from 920 deg. F. molten salt bath to be quenched in cold water.

In making aircraft parts, stringers in the shape of "hat" or "Z" sections are frequently made in lengths up to 20 ft. Fig. 2 shows the first step in this operation. These sections are formed from 24S-O material, the finished sections then being subjected to the solution heat treatment and quench described above. These parts are badly distorted by the heat treatment and in order to straighten them it is necessary to stretch them as shown in Fig. 3. Tests made in conjunction with the stretching operation have shown that by stretching to a permanent elongation of 3½ per cent, the yield strength of the material is increased substantially over the original 24S-T_6 condition. Fig. 4 shows the effect on the yield strength of various amounts of stretching. Parts of this type are therefore given a stretch resulting in a permanent



Aluminum Alloy

By EARL R. WEIHER
Chief Metallurgist,
Consolidated Vultee Aircraft Corp.
Fort Worth Division



elongation of 3½ per cent, plus 0.5 per cent, minus 0.0 per cent. Springback of ½ per cent is allowed for in stretching this material. Material given this treatment is designated as clad 24-RT.

The minimum physical properties obtainable in each of the five tempers are shown in Table I for 0.091 in. sheet stock. The increase in yield strength caused by stretching the 24S-T_0 3½ per cent is evident.

Thus there is available material in four tempers; 24S-T_0, 24S-T_3, 24-RT and 24S-RT, which may be used without further processing. However, it has been found that when any one of these four tempers is subjected to temperatures of 325 to 425 deg. F. for periods of 20 to 30 min., respectively, the yield strength undergoes a decided increase. Curves showing the relationship between time and temperature for each of the tempers, to obtain maximum yield, are shown in Fig. 5.

The phenomenon may be explained as follows: The 24S aluminum alloy is a precipitation hardenable alloy in which solution heat treatment causes complete solid solution of the copper, which is maintained during the quenching operation. Upon aging at room temperature for several days, precipitation of the hardening con-

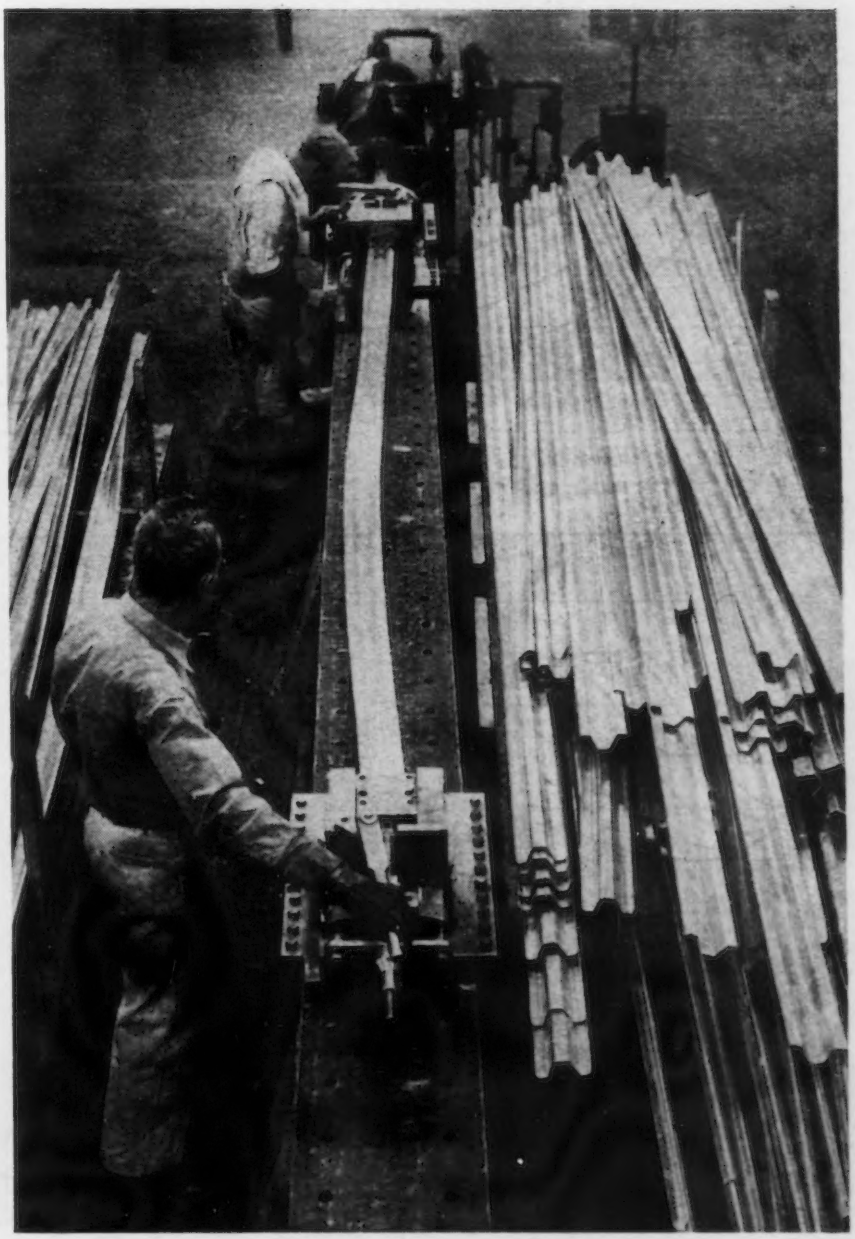


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FIG. 2—Cutting and rolling of 24S-O material, first step in forming stringers.

RIGHT

FIG. 3 — Stretch straightening of clad aluminum alloy, after heat treatment and cold water quench.

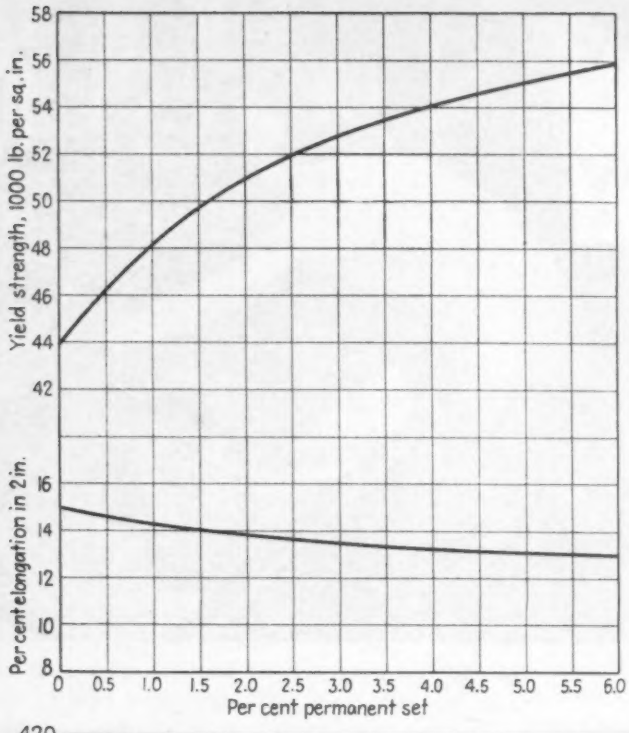


FIG. 4 — Effect of stretching 24S-T aluminum alloy.

stituent, Cu Al_2, takes place to the extent of approximately 50 per cent, and causes the material to develop hardness. By heating at some elevated temperature the precipitation is forced toward completion resulting in a material in which the Cu Al_2, or hardening constituent, is almost completely precipitated from the solid solution.

To take advantage of this phenomenon it is necessary only to select some heating cycle of time and temperature which lends itself well to production. Tests have been made which show that the effects of heating are cumulative and that the highest yield strengths are reached on a smooth curve resulting in a peak of short duration when high temperatures (400 to 425 deg. F.) are used, and of very long duration when low temperatures (325 to 350 deg. F.) are employed. Fig. 6 illustrates this point by showing the effects of various temperatures on clad 24S-T_0 for

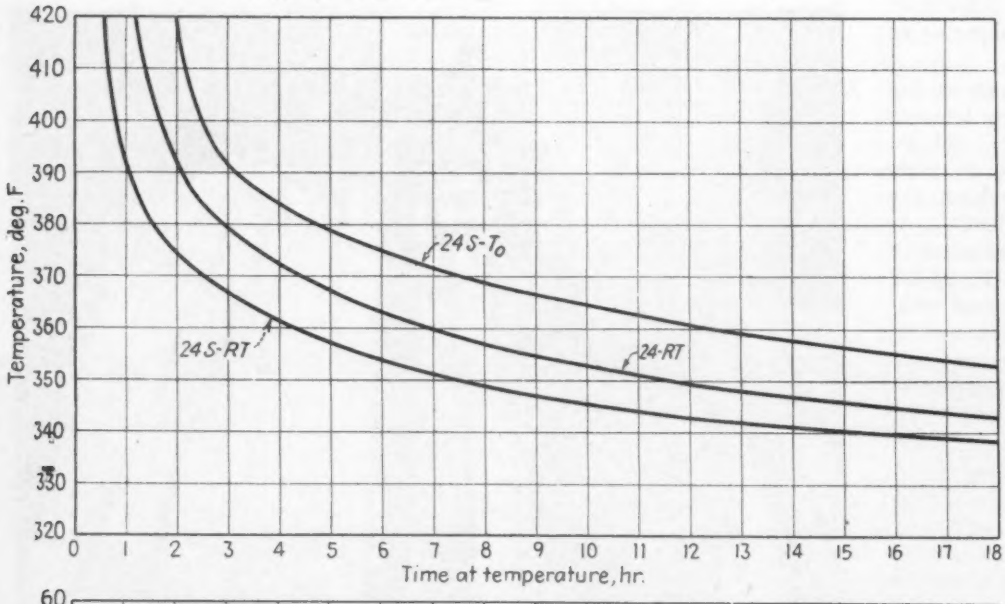


FIG. 5 — Relationship between aging time and temperature, in obtaining maximum properties of 24S-T_0, 24-RT and 24S-RT aluminum alloy.

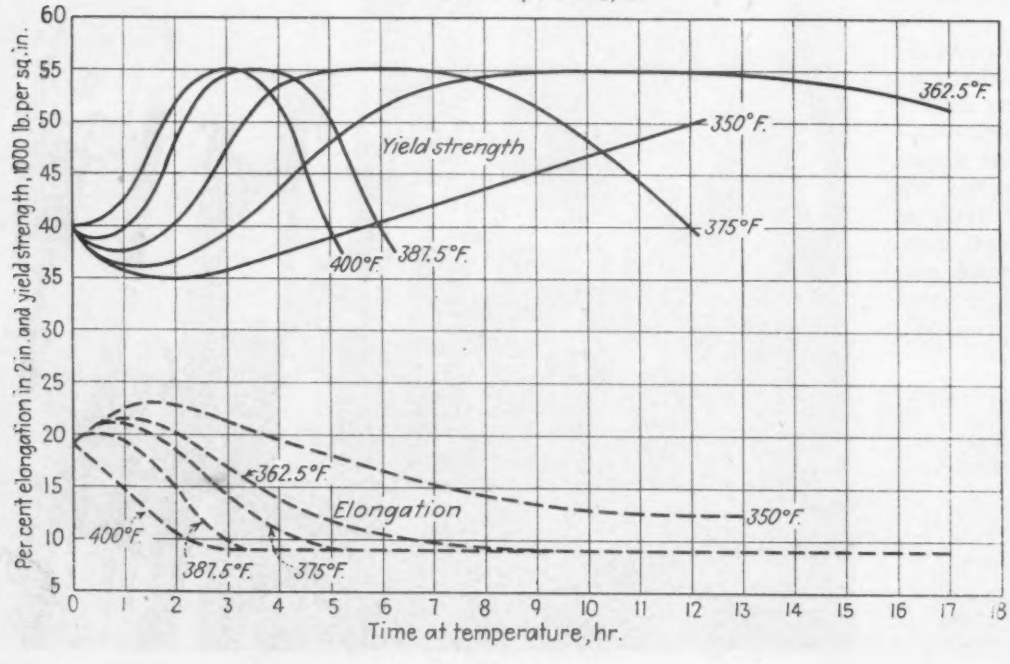


FIG. 6 — Effect of heating 24S-T_0 for various lengths of time at varying temperatures.

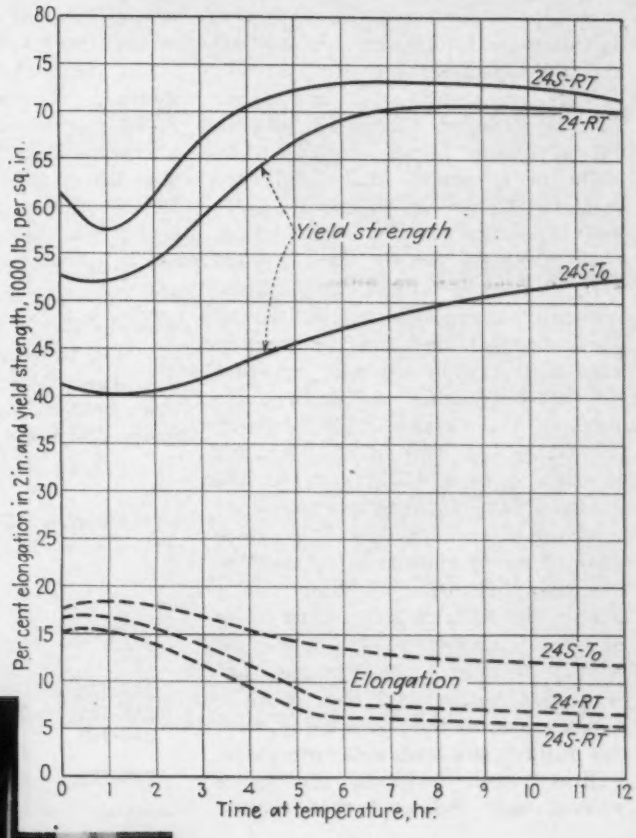
lengths of time ranging from 0 to 12 hr.

Moreover, tests have shown that the position and length of the peak of the aging curve is dependent not only upon time and temperature but also upon the amount of cold work inherent in the original material. For instance, clad 24S-RT, which has been cold reduced 5 to 6 per cent, will undergo complete aging in a shorter period of time than will 24S-T_0, which has not been subjected to cold work. Evidence of this fact is shown in Fig. 5.

It would, therefore, be necessary for a time-temperature cycle, that is sound from a production standpoint, to be devised in such a manner that the maximum properties might be obtained, in all of the tempers, by the use of a short period of time and a controllable temperature, without danger of over or under aging any of the material. Tests have indicated that a temperature of 365 deg. F. ± 5 deg. will achieve the desired results over a period of 7 to 10 hr. U. S. Army Air Corps Specification No. 11354 recommends aging clad 24S-T_0 for 10 hr., 24S-T_1 for 9 hr., 24-RT for 8 hr., and 24S-RT for 7 hr., allowing a ± 15 min. tolerance on the aging time. However, it has been found that aging all tempers at 8 to 8½ hr. at this temperature will produce satisfactory results. Curves showing the effects of heating the several tempers at 365 deg. F. for various lengths of time are shown in Fig. 7.

RIGHT

FIG. 7 — Typical yield strength curves for various 24S clad aluminum alloy tempers, heated at 365 deg. F.



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BELOW

FIG. 8 — This artificial aging furnace at Consolidated Vultee Aircraft's Fort Worth plant is the largest in use by the nation's aircraft industry.

In order to identify the material after aging, U. S. Army Air Corps Specification No. 11354 has decreed that certain designations shall be used:

Before Aging	After Aging
24S-T_0	24S-T80
24S-T_2	24S-T81
24-RT	24S-T84
24S-RT	24S-T86

This specification also covers the processing of all tempers and lists the minimum physical properties required of aged material. Table II lists the designations used for each temper processed and gives the minimum properties for each. As indicated by the table, the aging process causes some increase in the ultimate strength, as well as in the yield

strength. Some decrease in elongation is experienced, although this does not affect the usefulness of the material.

The precipitating aging process has been found extremely valuable for obtaining higher design allowables in aluminum alloys and Consolidated Vultee has installed a large car type furnace for such aging. This furnace, which measures 40 ft. x 9 ft. x 8 ft. and can be automatically started, is gas heated by three burners and has air circulation controlled by three 10 hp. fans which force heated air through the bottom. The furnace load is placed on either of two cars operating through doors at both ends of the furnace. The furnace is capable of handling about 15,000 ft. of "Z" stock at one time or approximately 6500 lb. of aluminum alloy. When fully loaded, the furnace will return to its original temperature of 365 deg. F. within 20 min. Temperatures are controlled within ± 3 deg. F. The furnace is operated 18 hr. a day, with two full furnace loads a day processed.

Most recent tests on the aging process have indicated that riveted assemblies may be aged. According to the above aging cycle when 17S-T rivets are aged they undergo a slight increase in shear strength while A17S-T rivets are not materially affected. It is therefore possible to assemble completely many small parts before subjecting the material to the aging treatment.

Unclad 24S aluminum alloy may be given the aging treatment described above, with corresponding increase in physical properties, but at present only clad material is processed in this manner, since maximum corrosion resistance is desired.

TABLE I

Minimum Properties of 0.091 In. Clad 24S Sheet Before Aging

Temper	Yield Strength, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 In.
24S-O	.....	34,000*	12.0
24S-T_o	38,000	60,000	13.0
24S-T_1	40,000	62,000	13.0
24-RT**	45,000	64,000	11.5
24S-RT	50,000	66,000	10.0

*—Specified maximum to insure full annealing.
**—Typical values—not for design.

TABLE II

Minimum Properties of 0.091 In. Clad 24S Sheet After Aging At 365 Deg. F.

Temper	Material Processed From	Yield Strength Lb. per Sq. In.	Ultimate Strength Lb. per Sq. In.	Elongation Per Cent in 2 In.
24S-T80	24S-T_o	46,000	62,000	10.0
24S-T81	24S-T_1	57,000	65,000	6.0
24S-T84	24-RT	63,000	67,000	6.0
24S-T86	24S-RT	66,000	70,000	5.0

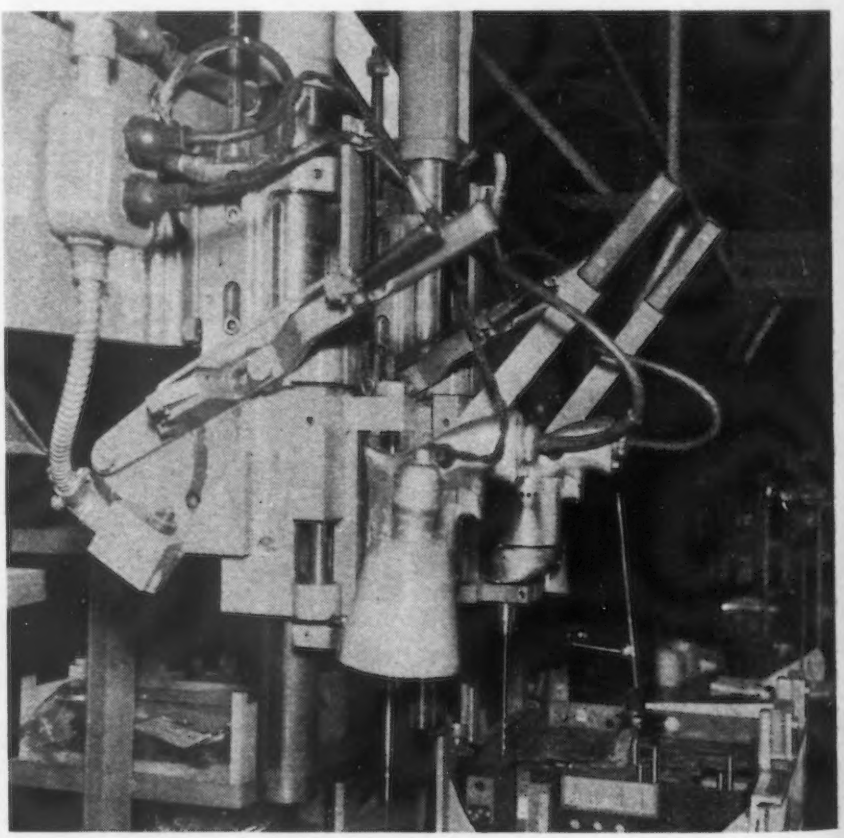
Drill Press Hung from Ceiling

WHEN the AC Spark Plug Division of General Motors began setting up a progressive conveyorized system to assemble a British-designed bombsight in mass production, two points on the line were found where drill press work was needed. However, no standard drill press on the market was found suitable for these installations, because of wide overhang interfering with the conveyor line. To use such a unit meant extra handling and lifting of parts, disrupting progressive assembly flow of the bombsight.

To get away from this wide overhanging problem on a standard press, AC officials designed and built a holding fixture for small electric drills, and mounted the fixture on the ceiling. This eliminated all posts and other obstructions beneath the drill, making it easy not only to get the part from the conveyor, but also to operate.

Another interesting feature of the set-up is the automatic switching arrangment used to start the drill and turn a light onto the work. A Micro Switch is mounted on the side, in position where it is tripped by the lever bringing the balanced drill head down into position for work. A second lever on the other side of the drill controls the actual drilling.

In the photograph shown here, the positioning control coupled with the switch-on arrangement is shown in the foreground. On the far side of the machine is the lever used in actual drilling. In immediate background is a second drill with an identical set of controls.



THIS multiple piercing die is believed to contain more closely coordinated holes than any die previously used in aircraft work, according to Boeing engineers. The 388 punches shown pierce rivet holes in five different sections, including two sizes of flat sheets, two different angle sections and extruded T-sections.

Multiple Piercing Die For Aircraft Parts

. . . In order to coordinate the rivet holes in the assembly of the 10 pieces which make up a catwalk for the Boeing Flying Fortress, a flexible piercing die has been devised which will accommodate itself with minor adjustments to piercing of flats, angles and T-sections. Use of manually operated side guides or stock pushers largely makes this possible.

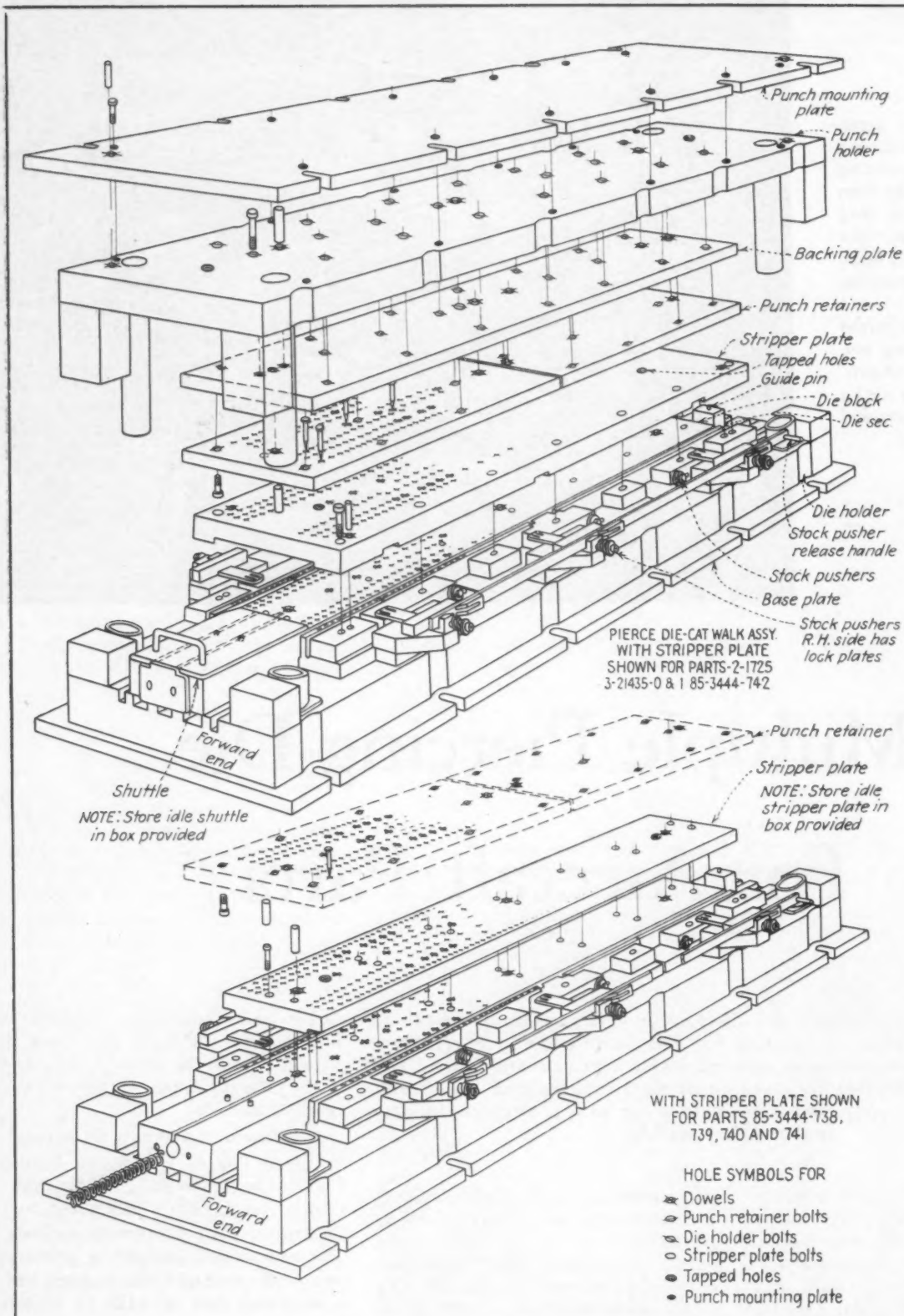
BELIEVED to contain a greater number of closely coordinated punches than any other piercing die ever constructed in aircraft work, the recently developed catwalk piercing die at the Boeing Aircraft Co., Seattle, incorporates 388 punches with a hole location accuracy of 0.0005 in. This unique die pierces a total of 976 rivet holes in the 10 separate parts which, when assembled, comprise the walkway through the bomb bay of the Boeing Flying Fortress. Production time insofar as the making of rivet holes is concerned, is improved 34 times over the old method by the utilizing of the press piercing methods. Because of the extremely close coordination of rivet holes, more rapid assembly is made possible, further increasing the overall usefulness of the die.

More important than the number of punches, however, is the diversity of this die on which 10 separate pieces are punched. These include two differently shaped and sized sheet stock parts, two pair of different angle sections and four extruded T-sections, all materials being 24ST aluminum alloy. Thicknesses vary from 0.064 to 0.150 in.

Flexibility in the use of the tool was made possible by a plan whereby stripper plates can be changed with comparative ease and little time. Aside from this, the only changes made in the die during the five different press operations required to turn out the 10 parts are found in adjustments to the stock pushers, and in the indexing points for the various types of material.

A redesign of the catwalk through the bomb bay of the Boeing Flying Fortress led to the design of the "porcupine," as this die is nicknamed, and the use of high production methods. The new design includes a primary web, or flooring of 0.064 in. dural and a secondary web of 0.125 in. alclad. The primary web receives the maximum 388 holes, while the secondary web gets 218 holes punched in it. The two reinforcement angles, both on upper and lower sides of the walkway are pierced with 51 holes each on the same stripper plate. The thickness of these parts is 0.150 in.

The second stripper plate is used to facilitate loading the four T-sections in the die. The forward extruded T-section receives 40 holes each, while the after two sections get 43. At the



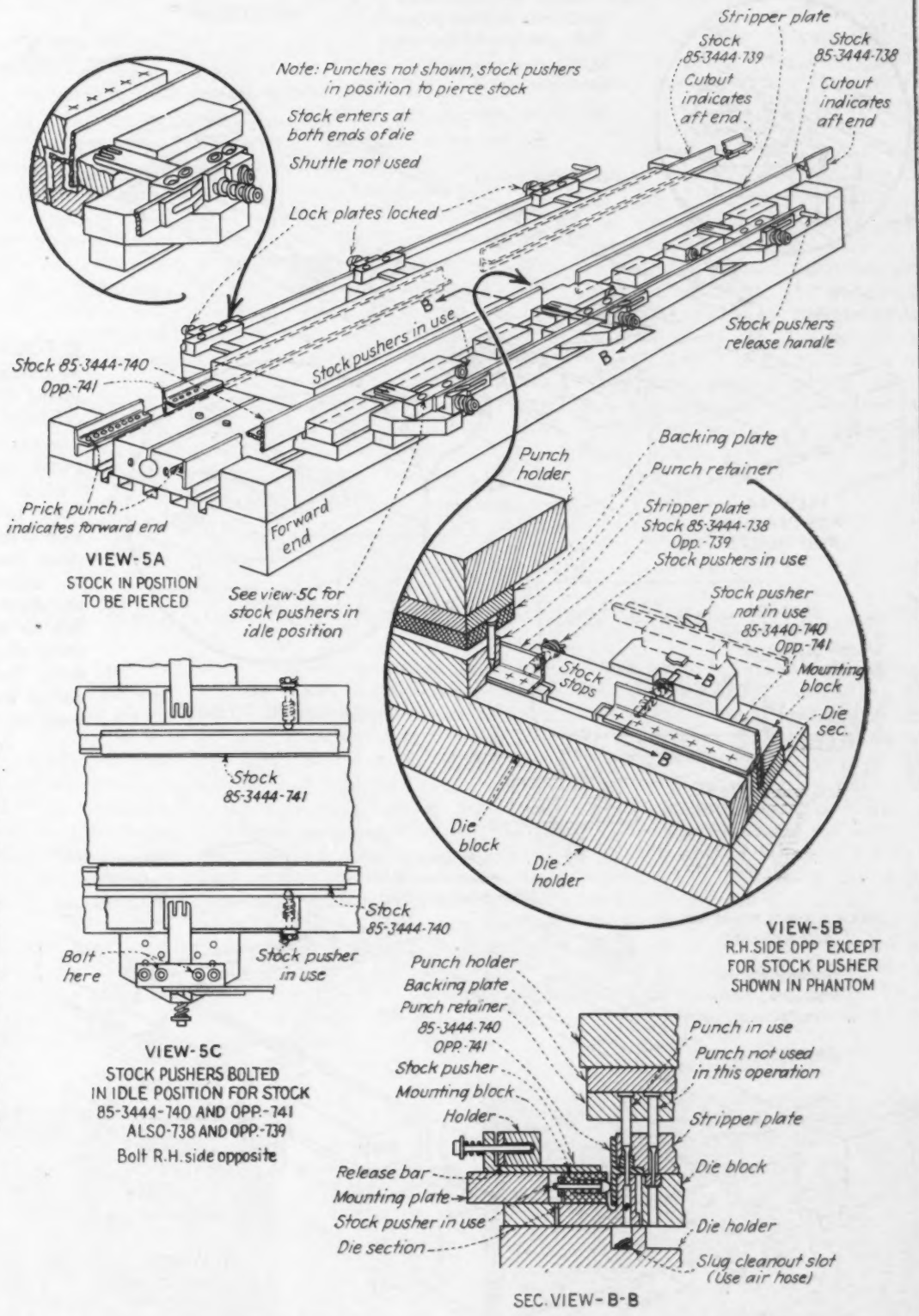
EXPLODED view multiple pierc die, shown set up piercing flat she Note the hand a ated shuttle stock e tor (left center) w provides a posi means of indexing well as rapid ejec of parts from the

point of piercing, these sections are 0.125 in. thick.

Absolute coordination of holes in all parts, both horizontally and symmetrically, was necessitated to make for ease and rapidity of assembly. Symmetrical coordination was of particular importance in that the walkway called for an upper and lower angle reinforcement on each side of the assembly. By piercing the upper right side angle on the lower left, and the upper left angle on the lower right side of the die, an extra stripper plate was avoided.

Use of Stock Pushers

Stock pushers incorporated in the die design provide for four different adjustments, one for each different press operation. This type of adjustment aids substantially in making the die sufficiently flexible to handle the variety of parts. The operation and setting of the stock pushers is explained to the press operator with the aid of production illustrations



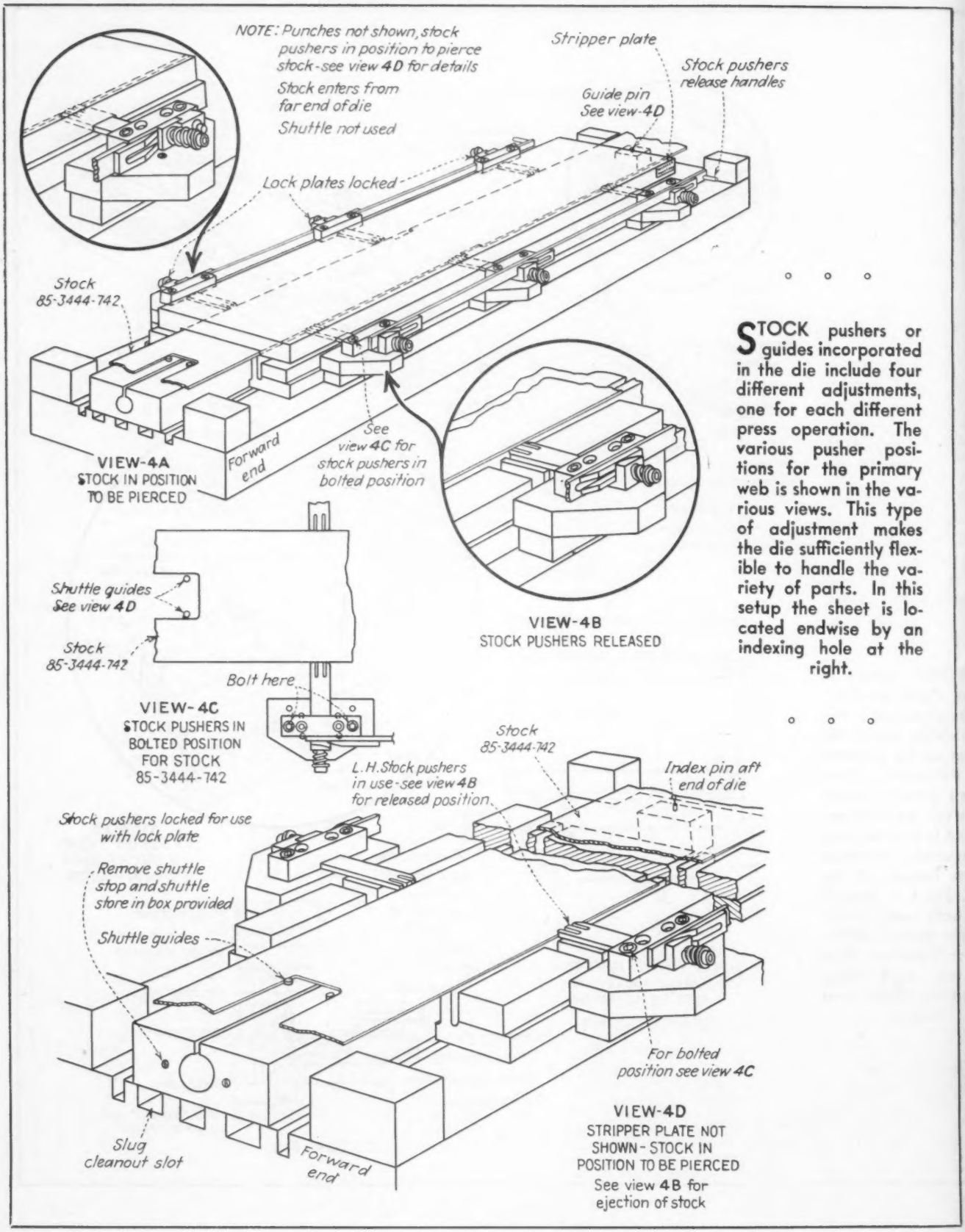
FURTHER details of the stock pushers can be observed in this view which shows the die set up for piercing four extruded T-sections simultaneously. The stock pushers are wedged in position and subsequently released by the handle at the right. Stock is loaded from both ends of die. Stripper plate is different for T-sections than the one used when punching flats and angles.

(see cuts) dealing with the operation of the die. These illustrations are turned over to the manufacturing shop simultaneously with the die.

The close coordination of holes called for a high degree of accuracy in die design as well as fabrication in a jig borer. The original design was projected in true perspective scale by production illustration, whereby mistakes in design and other flaws were caught on paper rather than in metal.

To facilitate ease of maintenance, the punches were mounted in two punch retainer plates. This simplifies the job of grinding the punches as well as replacement, which to date has been extremely low. Similarly, the guide pins were located on the punch rather than the die, to make possible the surface grinding of the die plate without necessitating the removal of the guide pins.

Another problem involved in the die design was the wide variety of gages specified for the redesigned walkway. In order to provide the proper punch



STOCK pushers or guides incorporated in the die include four different adjustments, one for each different press operation. The various pusher positions for the primary web is shown in the various views. This type of adjustment makes the die sufficiently flexible to handle the variety of parts. In this setup the sheet is located endwise by an indexing hole at the right.

clearance to minimize the possibility of flaring while punching and at the same time still produce a clean stripping action, the radial clearance between each punch and corresponding die hole was compromised, leaning slightly in favor of the heavier gages.

With D the punch diameter, and D the die diameter, the original problem was endeavoring to balance the two unequal equations:

$D + 0.005 = D_{10}$ for small punches.

$D + 0.015 = D_{10}$ for large punches.

That the final result was a satisfactory compromise is evidenced by the fact that cross-sectional photos of rivets driven through the series of holes show no unfilled sections, and that no punches have been broken because of improper stripping. Stripping action is aided by maintaining

the punch diameter slightly larger than the shank.

Because the only presses in the Boeing plant of sufficient size to accommodate this large pierce die are of the solid bed variety, five slug relief channels had to be provided under the die. This fact further complicated the problem of providing a sufficient amount of material in the die plate between the outer and secondary row of holes on either side and still provide the proper clearance for insertion of the angle stock, which was to be pierced by the secondary row of punches. Working to close tolerances and proper prepositioning of stock, precision workmanship fulfilled the design at these critical points, where the 0.167 in. holes are ½ in. apart on centerline, leaving a relatively small amount of material in the die "rail" section. At the thinnest section it is 0.186 in.

The indexing of the different parts is accomplished by a variety of methods. The secondary web and the reinforcement angles are controlled by the shuttle stock ejector. This makes a positive method of indexing, as well as a rapid means of ejecting parts from the die. The T-sections are indexed against a stock stop block installed during the changing of the stripper plate which is used for this piercing operation. The primary web is located in the die by an indexing hole. The reason for not indexing this part on the cutout shown (in the lower left corner of view 4-C) is that this removal of stock is accomplished on a router, which does not make a sufficiently accurate cut for locating purposes.

It is interesting to note that no master gage or template was used in making the die. The system of all hole location is a dimensional layout on which each hole is accurately located in respect to X and Y coordinates, making possible the reproduction of any part of the die by drilling all holes on a jig borer. Thus costly master tools were eliminated. The inspection of production parts was also simplified by the die. The aircraft inspection of production parts was also simplified by the die. The aircraft inspector checks the die when it is set in a press to make certain it has not been damaged and to verify that the die bears the stamp of a Boeing tool inspector, signifying that the punches are sharp and properly positioned.

Wire Bending Attachment on Spot Welder

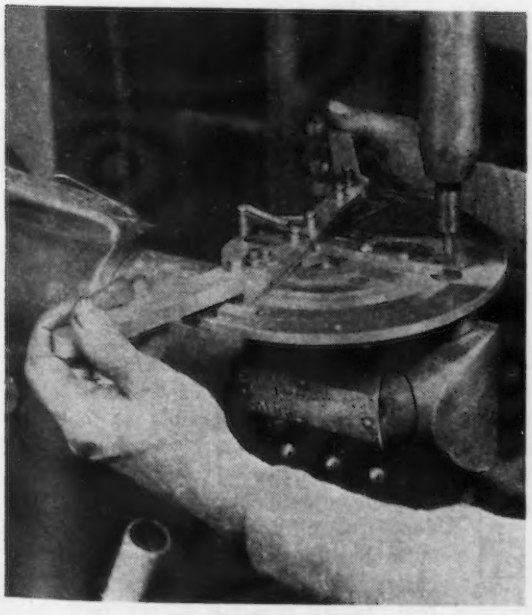
THOUSANDS of hours spent in the manufacture of small hose straps used in Boeing Flying Fortresses have been saved by the use of a simple bending attachment on a spot welder. The device was designed and produced by the tool design department of the Boeing Aircraft Co. in Seattle and has resulted in two workers producing as many straps in 1 hr. as six persons did previously in a full day.

The strap, or tube lock, used to secure hose and tubes installed in Fortresses is bent from a piece of stainless steel wire into an oval shape about 3 in. long and then the free ends are welded together. Previously the wire was cut in one shop, formed in a second and flash welded in a third. Because cutting left the ends too irregular for flash welding, they had to be ground until they met each other squarely. Despite the extra process of grinding, rejections on inspection were running about 5 per cent because of faulty welds.

Leon Mooradian, assistant chief research engineer, and his associates decided that spot welding would be more satisfactory than flash welding. The problem was how to form and spot weld the straps with a minimum of effort and time.

The answer finally evolved itself into the attachment illustrated. Attached to the spot welder arm, the fixture holds a die around which the wire is bent into the form of the strap by two hand levers which join the ends in position for welding. A foot lever then operates the welder.

Wire is still cut to length before it is inserted in the bending die, as the production did not warrant use of an automatic cutting device on the attachment. Neither did it warrant automatic bending of the wire, so the device is operated by hand. There have been no rejections since the fixture has been in use.



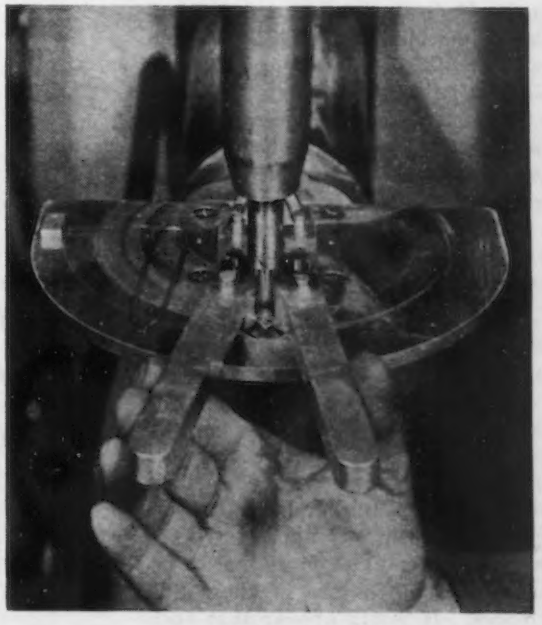
LEFT

THE stainless steel wire stock is located in the fixture by using as a guide the end locator on the left of the semicircular plate. The rear end of the forming block acts as a front locator. The operator then pulls on the forming arms of the fixture, causing the wire to bend to the contour of the form block.

o o o

RIGHT

THE forming arms have a slight tip which causes the wire ends to cross directly over the lower welding electrode. The weld is then made.



Cold-Blast Irons Duplicated

By J. E. HURST, D. Met.
Lichfield-Staffs, England

o o o

THE fact that the properties and behavior of pig irons frequently vary in a manner which cannot be predicted from the knowledge of the chemical composition, or even the fractures, is quite well known. Numerous examples of incidents confirming this have been reported by reliable observers over a long period of years.

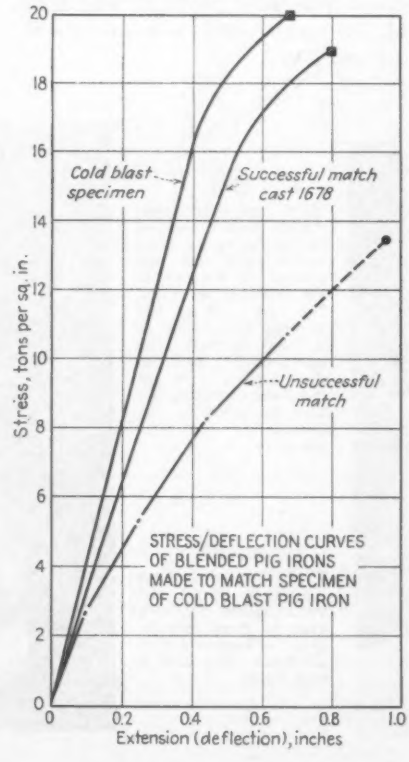
Perhaps the outstanding examples of difference in properties and behavior for irons of similar composition are to be found in comparison of the properties of cold-blast and charcoal pig irons with pig irons made by other methods. These differences in properties and behavior are still utilized in the section of the iron founding industry devoted to the production of cast iron rolls where pig irons produced in cold-blast furnaces are still used on account of their desirable properties. The high cost of true cold-blast irons has frequently operated as an incentive to endeavor to produce pig irons by cheaper methods which would still possess those properties of cold-blast irons, frequently described as intrinsic properties.

There are quite a number of recorded attempts to this direction, and as an example it is possible to quote the work of the late J. E. Johnson, Jr., in the U. S. A., whose investigations culminated finally in a British patent for a method of duplicating cold-blast pig iron from hot-blast pig iron. The method consisted of blowing oxygen gas through molten hot-blast pig iron and was based principally on the observation that metal so treated yielded a structure under the microscope possessing characteristics similar to cold-blast iron specimens examined.

There are plenty of references in the technical literature of the world to these experiences of differences in behavior and methods of making hot-blast irons equal to irons produced by cold-blast furnaces. References were given to some of these in THE IRON AGE, July 1, 1943, by Ralph H. Sweetser. There does not appear to have been any attempt to investigate systematically the nature of these differences. It would appear that such an investigation should precede any attempt to formulate methods of duplicating the properties.

For a number of years now the writer has given some attention to this matter in the research laboratories under his control, and as a starting point endeavored to summarize the differences in properties claimed for cold-blast irons by those who had had considerable experience of their use. Inquiries revealed general agreement that cold-blast irons had differences in the various attributes of their strength properties, and also differences in the chief characteristics obtained when casting either chill test pieces or actual chilled rolls.

FIG. 1 — Stress-deflection curves of blended pig irons made to match cold-blast pig iron.



The views on the strength properties may all be summed up fairly in the statement that cold-blast irons are tougher than other irons. The chill characteristics are described by references to the depth of chill and its hardness; the depth of mottled portion following the chill; the type of chill which is described in terms of brightness and utilizes such descriptions as bright, dull, medium bright, normal, etc.; and the type of general fracture following the chill and mottle which is described in terms of closeness, openness and grayness. It is unnecessary almost to state that the comparisons of these chill characteristics are made upon test specimens cast under controlled conditions of size and chill surface, and are considered in relation to the chemical composition of the specimens. While to the experienced eye these chill characteristics are readily distinguishable, none of them, with the exception of the depth and hardness values, is capable of being expressed in numerical quantities, and this, of course, makes investigation somewhat difficult. There are, of course, several ways of overcoming difficulties of this type.

In a like manner, in the case of toughness, little enough evidence of a quantitative character is available, and this state of affairs is due probably to the fact that the measurements of the "toughness attribute" of the strength properties of cast irons has not been practiced in testing laboratories, most workers being generally satisfied with the simple determination of the ultimate breaking strength, which, of course, is not necessarily related to the toughness.

Further discussion of these problems with experienced users of cold-blast pig irons revealed the fact that it is frequently possible to obtain other types of irons possessing some of the properties. For example, it is possible to duplicate the hardness and depth of chill quite frequently by suitable manipulation of the chemical composition, but it appears to have been rarely possible in the past to

by Synthetic Mixtures . . .

. . . Differences between the characteristics and properties of cold-blast pig irons and other types of pig irons have been observed and experimentally investigated. The results are reported by the well-known English metallurgist herein. These results in part answer the question propounded by Sweetser in "What is the 'It' in Charcoal Pig Iron." The Iron Age, July 1, 1943.

duplicate all the properties in the same brand of pig iron.

Good Resilience Values

It was considered that any investigation work undertaken with the object of attempting to duplicate the properties of cold-blast irons should be concerned in the first place with determining the quantitative value of the differences in the various attributes of the strength properties. With this end in view, a large number of specimens have been examined for modulus of elasticity, resilience value, limit of proportionality, permanent set, internal stress, elastic hysteresis, in addition to the ultimate breaking strength or modulus of rupture. These tests confirmed the observation that cold-blast irons showed differences in properties. The details of these tests are to be found in the Foundry Trade Journal, February, 1935. Here the properties of a series of specimens taken from reputable brands of cold-blast irons are compared with those of an ordinary refined iron. Special attention is directed to the marked difference in the resilience value in addition to the differences in ultimate breaking strength.

These investigations were followed up by the examination of the same properties in a variety of pig irons prepared by the various methods in common use and derived from different districts and countries. A large number of these results were published by the author in a paper, reference to which will show widely differing properties. (Manchester Association of Engineers.) Eventually it was decided that this might form the basis of additional scientific blending methods with the object of duplicating exactly the properties of a given type of pig iron. Following this decision, the chemical analyses of pig iron supplies have been reinforced by the complete mechanical analysis in which the properties as above mentioned are determined. In order to match the specific properties of a given type of cold-blast pig iron the procedure followed is first to determine the chemical analysis and the complete mechanical properties of the particular brand or consignment of iron required to be matched. With this information available, a mixture is devised from the various materials in stock of which the chemical analyses and mechanical properties have been determined. The mixture is calculated to give a mean chemical and mechanical analysis closely approximating that of the sample desired to duplicate. The success of this procedure relies on the assumption that the differences in properties of the mixed materials survive remelting, and this assumption has been submitted to experimental verification.

This experimental work demonstrates clearly that the intrinsic properties of cold-blast irons can be matched both in mechanical properties and chill characteristics by this method. The actual details of the methods adopted in matching the exact properties of different pig irons can be followed from the description of the experimental procedure followed in matching a well known brand of cold-blast iron from a sample submitted. The sample received was in the form of a half pig and the chemical analysis taken on drillings from the face of the pig in the manner recommended in the B.C.I.R.A. sampling methods gave the results shown in Table I.

FIG. 2—Elastic hysteresis of blended and cold-blast pig irons.

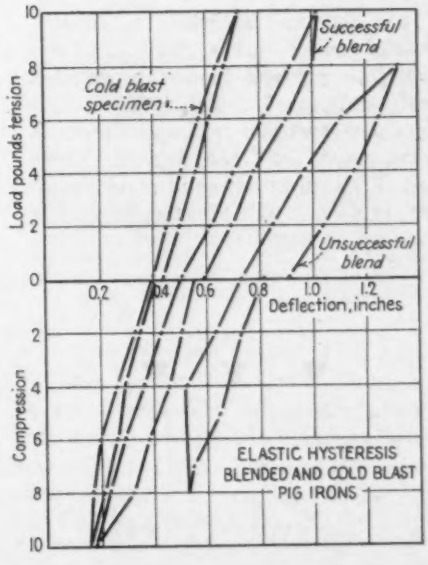


TABLE I

Analysis of Sample and of Test Specimen

	Original Iron, Per Cent	As Remelted for Test Specimen, Per Cent
Total carbon	3.55	3.40
Silicon	1.83	1.82
Manganese	0.87	0.74
Sulphur	0.050	....
Phosphorus	0.48	0.47
Nickel	Nil	....
Chromium	0.050	....

The supplier confirmed that the rather unusual silicon and manganese contents revealed by this analysis were representative of the normal quality of this iron as purchased by them. For the determination of the various attributes of the strength properties a portion of the specimen was remelted in a Morgan oil-fired crucible furnace using a clean new standard Morgan Salamander crucible. The metal was heated to a temperature of 1495 deg. C. (2723 deg. F.), as recorded by means of a Foster optical pyrometer, and test pieces were cast from this temperature into the form of the standard "Star" test bar molded in oil-sand molds standing at a temperature of 85 deg. C (185 deg. F.), measured by a mercury thermometer inserted down the ingate of the mold. The fins of the "Star" bar when broken showed very slight chill, not more than 1/16 in. at the

extreme edges and standard test rings were machined from the cylindrical barrel of the test bar. These rings were used for the determination of the following properties: (1) Internal stress value; (2) modulus of elasticity (end value); (3) modulus of rupture (tensile strength); (4) stress deflection curves; (5) resilience value; (6) permanent set value; (7) elastic hysteresis curve; and (8) Brinell hardness (Firth Hardometer 2-mm. ball, 30-kg. load).

Results Obtained

The ring tests and stress calculations were made in accordance with the methods laid down in B.S.I. Specification No. 5004. Chemical analyses were made of the remelted specimens with the object of ascertaining the magnitude of any changes which may have taken place in remelting. The results are given for comparison alongside those of the original specimen, and the only change of any magnitude to be noted is the reduction in total carbon and manganese contents. The mechanical-test results obtained are summarized in Table II.

In the case of some of the determinations three separate tests were made, in which case the average of the three determinations has been recorded in Table II. The stress-deflection curve and the elastic hysteresis curve are illustrated in Figs. 1 and 2. In general, the results obtained are typical of good cold-blast irons. The resilience value is somewhat lower than the results obtained from previous examinations of this same brand of iron, and this may be due possibly to the fact that the silicon and manganese contents are higher in this than in previous specimens examined. The fracture of this specimen prior to remelting was described as a fairly close No. 3.

With these test results available, a mixture was calculated utilizing pig irons of known mechanical properties in addition to the chemical compositions. The mechanical properties of the pig irons used were determined on rings machined from "Star" bars cast from remelted specimens of the irons, following the method exactly as above outlined. The mixture as calculated was remelted and cast into pig form, and a specimen of pig taken for the determination of the properties. Here again the same procedure of remelting and casting a "Star" test-bar was followed.

The test results of two mixtures calculated to duplicate the properties of the specimen submitted are included. The first attempt did not provide a satisfactory duplication and these results are included as further evidence to show that, although the chemical composition was matched quite closely, the mechanical properties may differ quite substantially. The second attempt from a modified mixture, Cast 1648 (Table III), gave a very satisfactory duplication of the properties of the specimen submitted, as will be seen from an inspection of the test results in column 2, Table II, and the stress-deflection curves and elastic-hysteresis curves in Figs. 1 and 2.

TABLE II

Properties of Cold-Blast and Synthetic Irons

	(1) Cold Blast Specimen Submitted for Matching	(2) Blended Iron, First Attempt	(3) Blended Iron, Cast 1648 Successful
Tensile strength, tons per sq. in. (ring test)	20.6	16.5	21.2
Resilience value	20.6	14.4	19.8
Permanent set value	12.5	30.6	10.9
Internal stress value	+ 0.003	+ 0.004	+ 0.005
Modulus of elasticity (end value)	18.7	13.5	17.9
Brinell hardness	215	207	207

TABLE III

Chemical Analysis of Specimens Cast 1648 Exactly Duplicating the Cold-Blast Pig Iron (Table II, Column 3)

	Pig Iron, Per Cent	Remelted Specimen, Per Cent
Total carbon	3.70	3.42
Silicon	1.95	1.90
Manganese	0.95	0.88
Sulphur	0.029	....
Phosphorus	0.51	0.50
Nickel	Nil	....
Chromium	0.026	....

The chemical analysis of the successful match taken from drillings from the pig and from the remelted test-bar is given in Table IV. In this case the test-bar was cast from a temperature of 1480 deg. C. (2696 deg. F.) into an oil sand mold standing at 81 deg. C. (178 deg. F.). The fracture of this pig iron was described as a scattered No. 4.

The results in column 2 of the table and the stress-deflection and elastic-hysteresis curves in Fig. 2 show quite substantial differences from the required values, even although the chemical compositions of the specimens are quite close to those required, as will be seen from the results shown in Table IV.

TABLE IV

Chemical Analysis of Specimens, Column 3, Table II

	Pig Iron, Per Cent	Remelted Specimen, Per Cent
Total carbon	3.62	3.49
Silicon	1.96	1.92
Manganese	0.90	0.79
Sulphur	0.042	....
Phosphorus	0.50	0.49
Nickel	Nil	....
Chromium	0.031	....

Summary

Differences between the characteristics and properties of cold-blast pig irons and other types of pig iron have been observed and experimentally investigated. It has been shown that the chemical composition, fracture and mechanical properties of cold-blast pig irons can be very closely duplicated in all their characteristics by synthetic mixtures, and that irons which so duplicate these properties in entirety also duplicate the properties of chilling characteristics. Thus, it has been shown experimentally that the whole of the known characteristics of cold-blast irons can be completely duplicated. These results in part at any rate provide an answer to the question propounded by Sweetser "What is the 'it' in Charcoal Pig Iron."

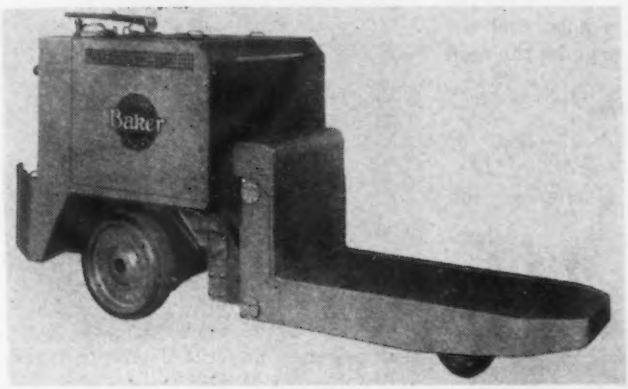
▼ ▼ ▼

New Equipment . . .

Material Handling

Some of the more recent developments in conveying equipment, cranes, electric trucks, carriers and other material handling apparatus are described and illustrated in the following pages.

THE Baker Industrial Truck Div. of the *Baker-Raulang Co.*, 2168 West 25th Street, Cleveland, announces a 4000 lb. capacity type E-2 low-lift truck. The alloy-steel trailing axle is firmly anchored to the frame



and the wheels steer on anti-friction bearings. The duplex compensating suspension eliminates all sliding contacts between the power axle and frame and an improved hydraulic lift system provides positive control of hoisting and lowering. The company has also developed a 3-ton Hy-lift truck, Type H-3, which may be used for both transporting and tiering skidded material.

Bar Stock Truck

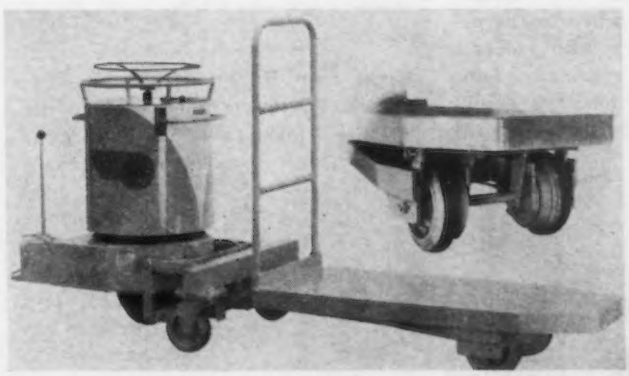
A TRUCK for handling bar stock has been announced by *Rose Mfg. Co.*, 12400 Strathmoor, Detroit. A balanced, four wheel type, it can be turned around in its own length like a turntable. It is furnished with two heavy duty swivel casters front and rear and heavy duty steel wheels, equipped with Hyatt roller bearings. A trailer coupling is on the front.

Wood Pallets

TWO types of wood pallets with steel reinforcement have been brought out by *Palmer-Shile Co.*, 784 South Harrington Avenue, Detroit. They are designed for use with either power or hand fork trucks. Both are of hardwood construction with replaceable obard. The single face model has metal bound ends with strong metal supports. The double face model is completely steel armored.

Turret Truck

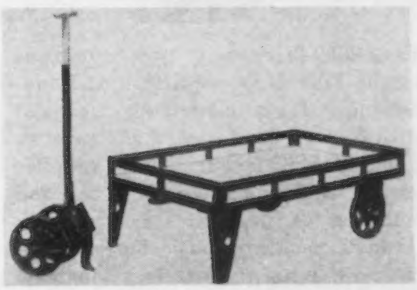
SEVEN new features have been added to the Salsbury lift type turret truck distributed by *Nutting Truck & Caster Co.*, Faribault, Minn. The hand-operated hydraulic lift lever is at the right of the driver's platform. At the left is the load-wheel brake pedal which actuates internal



expanding brakes on the two load wheels. The primary drive chain is fully enclosed. The lift platform has been tapered to permit oblique angle entrances to skids. This model is one of three, the other two models being platform and tractor types.

Wooden Deck Transport

A MODIFICATION of their wooden deck transport has been brought out by *Factory Service Co.*,



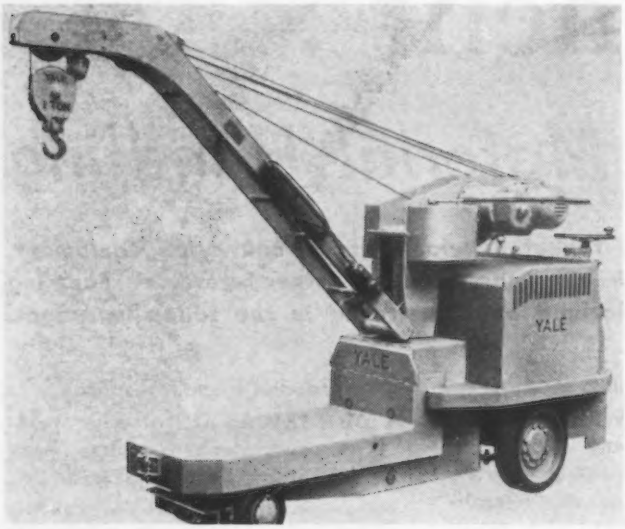
4615 N. 21st Street, Milwaukee, which can be moved in restricted spaces by means of a hand jimmy, power lift truck, crane, tractor or conveyor. A 4-in. railing is welded to the transport for retaining various size containers to be taken to departments for servicing machines. The transport is a unit of the Turner shop system.

Rolling Die Table

THE Multiduty die table put on the market by the *Barrett-Cravens Co.*, 3256 West 30th Street, Chicago, serves as a portable work bench, a die set separator and a lifting table for storing, moving and setting up dies, for supporting bars and sheets of steel for milling and for other jobs performed by lifting tables. Two models are offered. Style B-1 handles dies up to 40 in. long and has a table capacity of 3000 lb. Style B-2 will take dies up to 32 in. long with a table load of 2000 lb. Both models can be equipped with wheel brakes.

Two Unit Crane Truck

THE Model K23E-6C2T, 6000-lb. capacity low elevating platform truck has been combined with a Cable



King 2000-lb. capacity twin unit crane by the *Yale & Towne Mfg. Co.*, Philadelphia. It is electrically powered with four speeds forward and reverse. The Cable King winch unit supplies the hoisting and booming power and both can be operated simultaneously through separate push button type crane and hoist controls. Separate, independent motors and power units drive the truck for travel as well as hoist and boom the load.

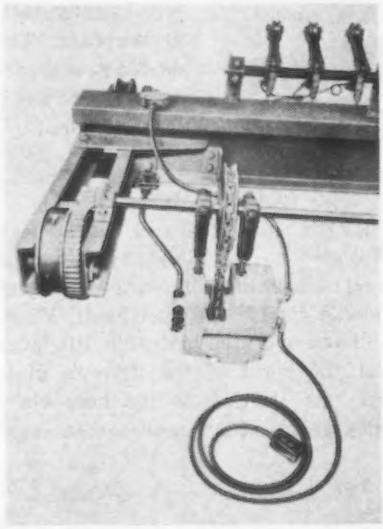
Backrest Extension for Lift Truck

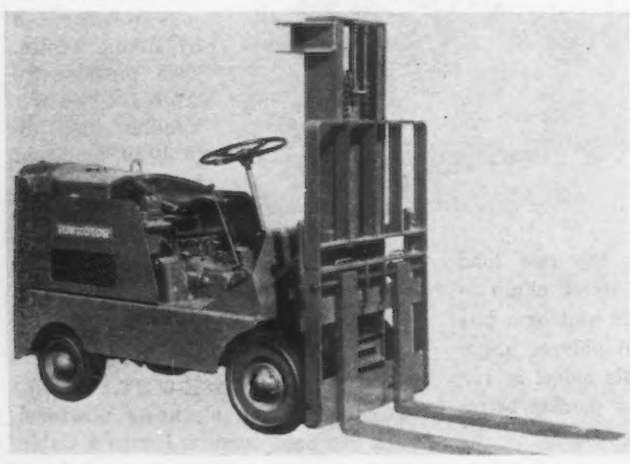
TO facilitate handling higher stacks of case goods, bags, drums, bales or other small-unit bulky loads which normally would extend above the tops of lifting carriage backrests on standard lift trucks, *Towmotor Corp.*, 1226 East 152nd Street, Cleveland, has developed a carriage backrest extension which provides increased support and minimizes the possibility of shifting while high loads are being lifted, moved and stacked. Pins permanently attached to the extension are inserted into sockets welded to the lifting carriage. Thus held securely in position, the extension increases the support area afforded by the lifting carriage's standard backrest and makes it practical to handle multi-unit loads of much greater height with normal stability and safety. Models which increase carriage backrest height from 48 to 72 in. above forks are available.

The company has also developed a drop bottom dump skid box which is unloaded by hooking the back of the box to the hoist and the lowering of the forks permits the load to skid out.

Crane Drive

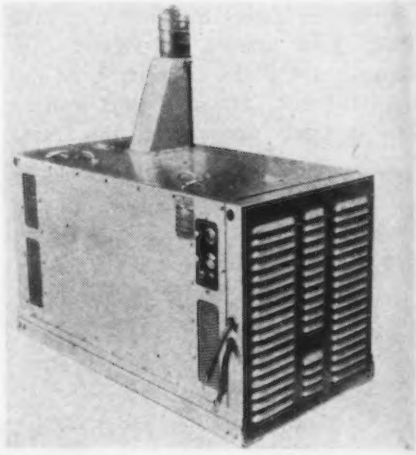
THE *Budgit Products Div. of Manning, Maxwell & Moore, Inc.*, Muskegon, Mich., is placing on the market the Budgit Bridge Drive, a complete, self-contained unit to convert the bridge travel motion of hand-operated cranes to electric drive. The only tool required to install it on a crane is a wrench. It is suitable to convert hand-operated cranes of either the single or double girder type of 10 tons or smaller capacity, provided the crane is of the geared type and operated by a chain wheel of 24 in. or smaller diameter.





Gas-electric Power Unit

THE heavy-duty Model J gas-electric power unit has been designed for 10 to 30-ton electrical industrial trucks by *Ready-Power Co.*, 3828 Grand River & Avery Street, Detroit. The unit consists of a gasoline engine closely coupled to a direct current generator complete with all accessories mounted in a steel housing for fastening to the truck chassis. Electric power is generated on the truck and delivered to the motors through standard electric truck control mechanism. Several sizes are manufactured for trucks of from 1 to 30 ton capacity.



Tractor Crane

A HYRAULICALLY operated and steered tractor crane is announced by *Hi-Way Service Corp.*, 3841 West Wisconsin Avenue, Milwaukee 8. Known as the Drott Go-Devil, the unit has a positive hydraulic up and down power that enables the boom to handle loads weighing up to 2000 lb. Outriggers prevent it from tipping over. All controls are within easy reach of the operator. The boom swings a full 360 deg., has an extension to 90 in. and reaches to a height

of 14 ft. 2 in. There is a 10½ ft. turning radius and traveling speeds up to seven miles per hr.

Stacking Box

A LIGHT weight shop box has been brought out by the *American Metal Works, Inc.*, 1517 Germantown

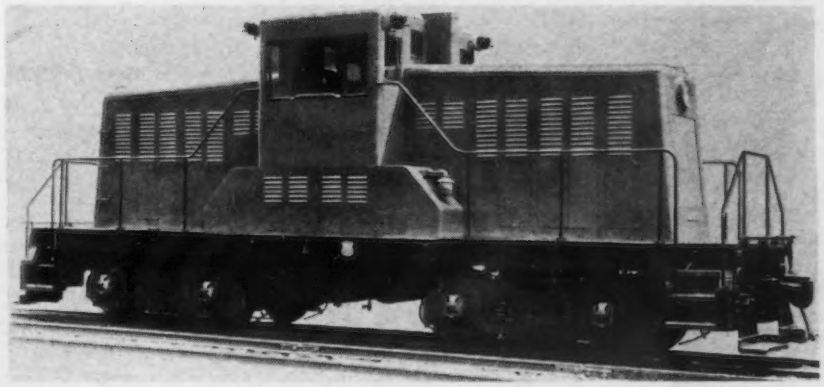
Avenue, Philadelphia 22. The open front makes contents accessible when boxes are stacked and label above opening permits easy identification. The finish is olive green enamel.

Crane Controller

A CONTROLLER for the operation of electric cranes on a.c. current has been developed by *Cutler-Hammer, Inc.*, 315 North 12th Street, Milwaukee. Direct current generating equipment or rectifiers need not be installed. The new control provides dynamic lowering over five stable speed points; accurate inching for spotting loads and timed acceleration in both directions from a standard 5-speed master switch.

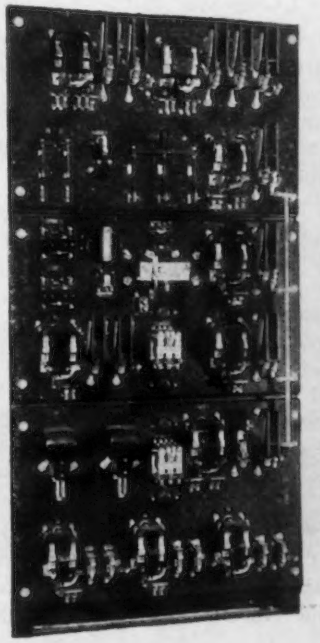
Electric Locomotive

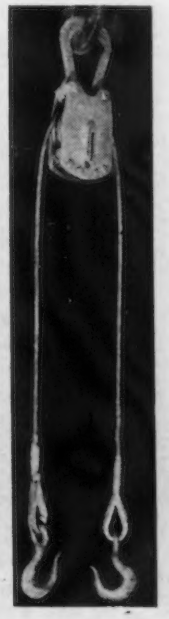
MANUFACTURE of 100-ton diesel electric switching engines with double power plants has been announced by *H. K. Porter Co., Inc.*, 48th and Harrison Streets, Pittsburgh. The locomotive can be used efficiently with only one engine operating. With half a load it can travel as fast with one engine as the two engines can travel with a full load. The single operating station is mounted high, giving superior visibility. Large safety platforms on each corner of the locomotive are provided for ground men.



Wire Rope Sling

A WIRE rope sling which will equalize itself automatically and lift a load level has been developed by *MacWhyte Co.*, Kenosha, Wis. Called the Caldwell "Level-Lift," the rope operates through a block mounted on the crane hook. The equalization feature consists of a floating sheave or drum having a braking action to arrest leg adjustment after the load is lifted. The crane is spotted over the approximate center of gravity of the load and as the power is applied, the legs of the sling automatically adjust themselves to the lengths necessary to lift the load level. The sling will handle loads up to 3 tons. Capacity of two units used together is 6 tons, figuring a safety factor of five.





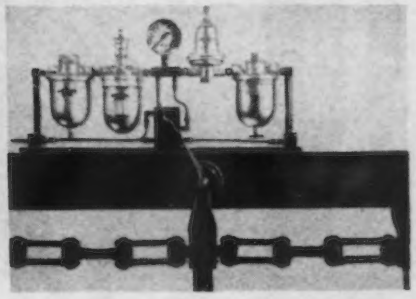
Hydraulic Elevating Table

LYON-RAYMOND CORP., 1235 Madison Street, Greene, N. Y., has put on the market an improved hydraulic elevating table for use in handling dies, locating work for welding, transferring heavy parts from one level to another, supporting over-

hanging work, bringing work to convenient heights for the operator or operations where easy foot-actuated elevation is advantageous. The unit is made with two stationary and two swivel casters, but it may be locked in one position.

Trolley Lubricator

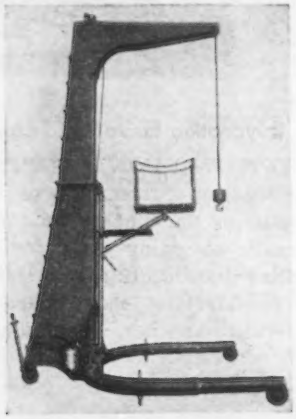
A TROLLEY lubricator which automatically lubricates each wheel bearing with oil saturated air has been developed by the *Bjerre Co.*, 1253 West Fulton St., Chicago. The jets follow the wheels, insuring positive



lubrication. The oil feed, air pressure and trigger contact are fully adjustable. One solid block contains all working parts of trigger mechanism.

Overhead Portable Crane

A PORTABLE hydraulic overhead hoist has been put on the market by *Federal Aircraft Works*, 3456 North Mississippi Drive, Minneapolis. Model PH-4002 has heavy duty ca-



pacity with a wide factor of safety; compactness with high range of lift and clear working area underneath the hook as well as around the entire structure; and ease of portability in and about crowded working areas. A beam lowering mechanism and quick attachment towing dollies are available as optional features.

Lightweight Hoist

A LIGHTWEIGHT cable hoist, the Cablemaster, developed by the *Master Electric Co.*, 126 Davis Avenue, Dayton 1, is equipped with hook

or trolley mounting and may be attached to monorail mounting or to special 4-ft. jib crane. The unit may be installed at each machine tool or bench, eliminating waiting for general overhead hoist. Three sizes are available in 250, 500 and 1000 lb. capacities.

Crane Stability Gage

WHEN a huge boom crane lifts a heavy sub-assembly for a warship in a shipyard, the weight may overturn the whole crane. To eliminate such danger, *General Electric Co.*, Schenectady, has developed a crane

stability gage which gives the operator a continuous picture of his margin of safety and automatically stops the crane if it takes on too heavy a load or if the boom moves too far out.

Improved Conveyor Belt

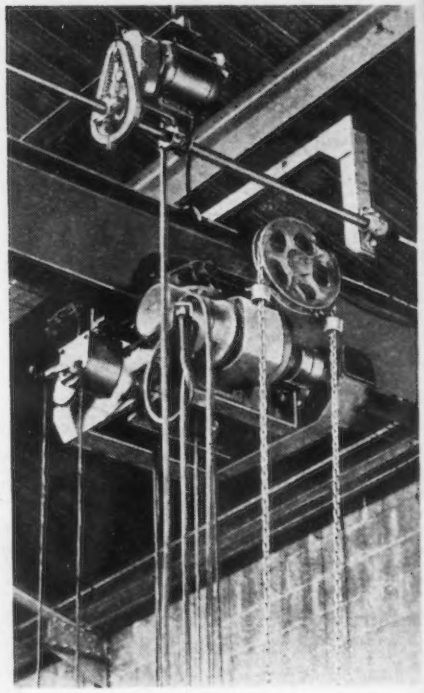
A PATENT has been granted on its Transcord breaker, used in constructing conveyor belting, it is announced by the *B. F. Goodrich Co.*, Akron. The breaker cords are placed across the belt width, rather than parallel with the cords of the belt itself, which provides much greater adhesion between cover and carcass than regular breaker construction. The construction tends to stop most cuts and gouges before they penetrate to the belt carcass. The breaker is usually placed a short distance above the top ply, leaving a protective layer of rubber between breaker and carcass.

Magnetic Separator

A MAGNETIC separator designed to operate on the principle of the Ball-Norton underfeed lift method has been built by *Stearns Magnetic Mfg. Co.*, 260 South 29th Street, Milwaukee. In this Type M, a patented magnetic field is mounted above the lower surface of the separating belt. The mixed material is distributed in an even layer by an automatic feeder to the feeder belt which carries the ore or other material into the magnetic field where the magnetic portion is lifted by the power of the magnet to the surface of the separating belt. The company has also announced complete line of round lifting magnets to supplement its magnetic separators, suspended magnets and rectangular lifting magnets. Sizes range from 20 to 65 in. with corresponding weights of 450 to 8900 lb.

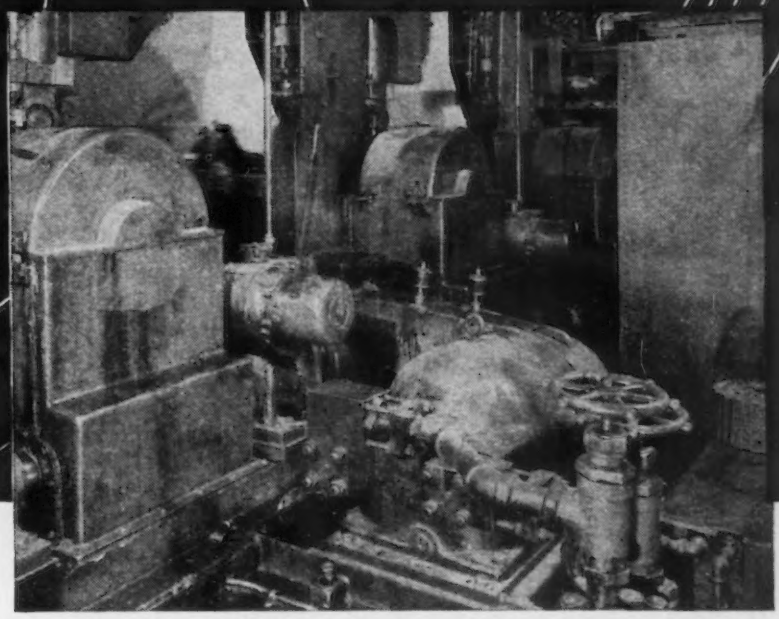
Motor Crane Drive

TO make a motor-traveled crane out of a hand-traveled crane without requiring any structural changes, the Travelator has been de-



veloped by the *Northern Engineering Works*, Atwater at Chene, Detroit. The unit is mounted on a channel iron in such a way that it drives the squaring shaft through a split sprocket. This is mounted on a split clamp, so the assembly is applied without removing the squaring shaft. The only part of the crane removed is the hand pull chain. Control is through the pendant cord push button, which may be arranged to follow the trolley. The unit may be mounted at any position on the squaring shaft and the motor may be placed at any angle.

No Jerk
No Jolt
No Jump



ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

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OILGEAR

An Oilgear Plus: Oilgear also enabled Neo Gravure to discover for the first time the correct pressure to use on their impression cylinders. Result: longer sustained quality, longer roller and cylinder life.

The Famed Oilgear *"Glide"* May Solve a Drive Problem for You

To print an entire magazine in 4 colors, on both sides of the paper, in one pass through a huge rotary press requires an unbelievable miracle of smoothness and synchronization. But the Neo Gravure Printing Company of New York and Chicago weren't getting the miracle. They got spoilage, waste and delay instead. So they turned, as many another company or machine designer in trouble has turned, to Oilgear Fluid Power. That was in 1934, then 1936, then 1937 and 1939. For they found that Oilgear accelerated their presses as "smooth as silk" from zero speed to maximum . . . synchronized all press units in lock-step . . . gave a new precision control, hundreds of feet more floor space, and a performance which became a new standard for the industry.

The famed Oilgear stepless acceleration is just one of the dozens of remarkable functions this remarkable system can bring to your machine design problem. Maybe you want tremendous power in small space . . . power around corners where belts and gears can't reach . . . a combination of rotary and linear motion. Maybe you need something you haven't thought of. Why don't you consult Oilgear engineers' broad experience and see what Oilgear versatility can do. Now is the time to write. . . . THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

OILGEAR

Fluid Power

Assembly Line . . . STANLEY H. BRAMS

• Auto parts companies look on aviation work as important share of postwar activity . . . Thompson's Crawford calls for humanized relations with labor . . . Detroit craft wages stabilized.

DETROIT—Last week's general meeting of the members of the Automotive and Aviation Parts Manufacturers, Inc., formerly the Auto Parts and Equipment Manufacturers Association, was notable for two reasons. As the first meeting in three years, it indicated aptly that the supplier companies feel the necessity of brushing up once more on their functioning in a civilian economy. Second, there was a notable address by Frederick C. Crawford, director of the association, and president of Thompson Products Co.

The change of name of the supplier group is backed up by some interesting statistics. A questionnaire circulated among members established that approximately 70 per cent of the companies are in aviation work today, against about 36 per cent before the war. Of the total membership canvassed, 62 per cent expect to be in aviation work after the war, approximately double the number in this field before the war. By and large this group comprises a good cross-section of the parts manufacturing industry, large and small plants alike.

Few of them indicate they expect aviation work to be a major factor in their operations through the medium term after peace, the general outlook being that aircraft production planning is a long-range proposition. As evidence of this, only 3 per cent of the companies expect postwar aviation work to be of first importance, 33 per cent of all those canvassed rate it as of second importance, and the same proportion assign it to third position. The balance do not expect to be in the field, or did not indicate the order of importance they attach to it.

Mr. Crawford, repeating an address he made in a closed meeting in the east some time ago, declared that management largely has fallen down on one of the most important phases of its job—acquainting its workers with the advantages of a capitalistic system built on a profit incentive. Comparatively few of the people living under this system in this country understand how it works, and if they are not taught to understand, Mr. Crawford maintained, capitalism is likely to fail.

Management by and large, he said, fails utterly to sell the capitalistic system to the workers in their plants. As a means of doing so he touched on the 15-year program in labor relations which has been carried on by Thompson Products Co. in its Cleveland plant. Essentially, the program is built around a plan of humanized labor relations, developed from the philosophy that a worker, as a typical American, is susceptible to emotional appeal, whether good or bad, and that simple common sense therefore calls for inculcating him with a sound emotional approach before he can sold an unsound one. Otherwise stated, good management leadership is looked upon by the Thompson people as an antidote to bad political and bad labor leadership. "The worker wants information," said Mr. Crawford. "He is confused today. He has no conception how industry creates wealth and a higher standard of living."

A SURVEY recently made by the company tended to confirm this viewpoint. Questionnaires were distributed to all employees, for anonymous answer, allowing free play of expression. Most answers dealing with good labor relationships stressed their human side, giving surprisingly little thought to pay or hours. Hardly an individual worker who answered the question saw the relationship of political rules and governmental controls to his job. Notable was the complete lack of comprehension of the effect of taxes, investment-hobbling legislation, federal labor policy and other basic ground rules of industrial operation today.

"Broadly, there is little evidence that the workers have any idea of the American productive process," Mr. Crawford emphasized again and again. Thompson Products has finished up its studies of this survey with one thought uppermost in its mind: The average worker, a good American, must understand why he works. On this understanding or lack of it, believe Thompson executives, may stand or fall the future of America.

THIS is a viewpoint worth thinking about. There is much smug and selfish and short-sighted management in America today, perhaps not as much as there is selfishness and short-sightedness in labor and in government, but enough so that the framework of blame has an approximation of a third leg to stand on. There is much food for thought in Mr. Thompson's remark that management pays the worker and has him under influence eight hours a day, while a labor leader takes money from the worker and holds him for but 10 minutes a day—that the advantage is quite obviously management's, yet management does not utilize it except in scattered plants like Thompson.

There may not be a world revolution going on in these times, but there is certainly a changed state of affairs. The Russian revolution may have started it; the labor governments of Britain were signs the chaotic overextension of the development in France caused that nation's downfall; and the rise of the labor movement in this country is another indicator. The social condition of the times is a factor in our national life today; it has been, and it likely will continue to be. Wise managements, like Thompson, will not make a futile effort to beat back the tide, but will learn instead how to swim with it. Only in selling the motives of the boss and the company to the worker will the capitalistic system be able to justify itself in the minds of the hourly-paid men who, startling as this statement may be, benefit the most from it.

Signs crop up here and there of a humanized approach to worker problems. One Chrysler unit, the Evansville Ordnance Plant, made a move recently which might be worth consideration by other firms facing layoffs because of arms contract cutbacks. This plant has had to cut its working force of several thousand men and women in half during the past three months.

First, general manager C. L. Jacob-

Ground Thread TAPS

These are Pratt & Whitney ground thread taps, each one a jewel of precision workmanship, metallurgy and heat treating. In 84 years we've made millions of taps. Mechanics in every civilized country in the world have used them — have come to know the long life and dependable performance which Pratt & Whitney ACCURACY assures. These taps are but one item in the complete line of quality small tools made by P&W.

We can deliver standard tools from stock, and give good service on special tools. Phone the P&W Branch Office nearest to you, for all that is top quality in small tools.

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WEST HARTFORD • CONNECTICUT

son wrote each laid-off employee a personal letter, explaining that accumulation of ample stocks of ammunition by the Army necessitated the cutback in production schedules. Further, departmental supervisors called each of these workers into their offices and personally outlined in detail the factors involved.

Meanwhile, other industries in Evansville and its environs were advised of the layoffs and invited to come to the Evansville Ordnance Plant personnel office and set up interviewing and hiring facilities there. As employees turned in their badges they could immediately talk with representatives of other concerns looking for help.

A TOTAL of 5785 interviews were thus handled. No figures on actual hirings were available, but certainly a fair proportion must have resulted in new jobs, with that amount of interest evident.

The first annual report of the NWLB Tool and Die Commission of Region 11, at Detroit, declares that labor pirating in the district among tool and die workers is all but extinct, and that practically complete wage stabilization has been achieved.

Pay raises between February and November, 1943, were reported held to a 2.9 percentage increase, against a 19.7 percentage gain between January, 1941, and February, 1943, when the commission was set up.

As of the start of this year the commission had processed 1981 cases, including 987 applications for approval of voluntary wage adjustments affecting 45,909 workers. In addition, 326 cases covering 10,172 persons were processed jointly with the regional WLB. Indicative of the quieting down of the wage problem in Detroit tool and die shops was the fact that the backlog of cases at the start of this year totaled but 85, against a peak of around 200.

Most violations uncovered and handled by the commission have been in alley shops, the report indicated.

One paragraph in this report is of broader significance than the statistics of past activities. It reads: "When the war is over there may be far too many tool and die workers in proportion to the demand. Many upgraders who have never served an apprenticeship but who have been holding down jobs at high wages during the war will be competing for a limited number of available jobs after the war with skilled journeymen of many years' experience."

Steel Corp. Shipments Amount to 1,730,787 Net Tons

• • • **Shipments** of finished steel products by subsidiary companies of United States Steel Corp. for the month of January amounted to 1,730,787 net tons.

The January shipments compare with 1,719,624 net tons in the preceding month, an increase of 11,163 net tons and with 1,685,993 net tons in the corresponding month of 1943, an increase of 44,794 net tons.

Industry Advisory Committees

The War Production Board today announced the formation of the following Industry Advisory Committees:

Magnesium Sand Casting

WPB government presiding officer: George A. Bilque. Committee members are: Wiser Brown, American Magnesium Corp., Cleveland; B. A. Nagelvoort, Renown Stove Co., Owosso, Mich.; Fred A. Foxall, Bendix Aviation Corp., Teterboro, N. J.; Henry M. Reed, Jr., American Radiator & Standard Sanitary Corp., Louisville, Ky.; J. R. Could, Springfield Bronze & Aluminum Co., Springfield, Mass.; Samuel J. Walker, Michigan Light Alloys Corp., Chicago; Leo B. Grant, Dow Chemical Co., Midland, Mich.; J. A. Weinman, Los Angeles Magnesium Castings Co., Los Angeles; Lewis Moore, Jr., Marshall Stove Co., Lewisburg, Tenn.

Manganese Sulfate

WPB government presiding officer: Morris R. Stanley. Committee members are: C. A. Massuchelli, Carus Chemical Company, La Salle, Ill.; Fred B. Porter, Tennessee Corp., Atlanta, Ga.; J. F. Wischhusen, The Harshaw Chemical Co., Cleveland.

Test Instrument

WPB government presiding officer: E. R. Crane. Committee members are: A. H. Hotopp, Jr., Technical Device Corp., Bloomfield, N. J.; David Newman, Davan Co., Newark, N. J.; Paul Jackson, Jackson Electrical Instrument Corp., Dayton, Ohio; E. G. Perkins, Supreme Instrument Co., Greenwood, Miss.; V. E. Jenkins, Weston Electrical Instrument Corp., Newark, N. J.; Milton Reiner, Radio City Products Co., New York; J. J. McCarthy, Triumph Mfg. Co., Chicago; A. J. Lush, Rawson Electrical Instrument Co., Cambridge, Mass.

General Metal Office Furniture

WPB government presiding officer: George M. Chandlee. Committee members are: George H. Alter, Invincible Metal Furniture Co., Manitowoc, Wis.; C. L. Elofson, Art Metal Construction Co., Jamestown, N. Y.; E. A. Purnell, General Fireproofing Co., Youngstown, Ohio; William M. St. John, Yawman & Erbe Mfg. Co., Rochester, N. Y.; J. S. Sprott, Globe-Wernicke Co., Cincinnati, and H. S. Walcott, Domore Chair Co., Inc., Elkhart, Ind.

Precision Mechanical Spring

WPB government presiding officer: O. F. Fancey. Committee members are: Fuller F. Barnes, Wallace Barnes Co., Bristol, Conn.; Albert Bitzer, Jr., Illinois Coil Spring, Chicago; Edward Byrnes, Wickwire Spencer Co., New York; Henry Frontroth, Cleveland Wire Spring Co., Cleveland; Jack Culbertson, III, Duer Spring Co., McKees Rocks, Pa.; E. W. Feldt, Raymond Mfg. Co., Corry, Pa.; Lawrence Humason, Humason Mfg. Co., Forestville, Conn.; Lee Johanson, Lee Spring Co., Brooklyn, N. Y.; Warren A. Peterson, Wm. D. Gibson Co., Chicago, and C. M. Young, L. A. Young Spring Co., Detroit.

Shipments of Metal Cans in 11 Months

Monthly Shipments by Manufacturers of All-Metal Cans, by Product to be Packed January-November, 1943. Source: WPB Containers Division

The statistics in the table below are compiled from the reports (WPB-2707) of 76 manufacturers of all-metal cans and are for all known manufacturers. "Captive" plant manufacturers are included. The cans are manufactured from steel allotted under CMP Code 629 and Conservation Order M-81. Keys and handles for these cans are not included in the table. Wire used in the production of these items amounted to 704 tons for the 11-month period.

The shipment data on WPB-2707 reported in terms of the "number of base boxes of metal consumed in the manufacture of cans" have been converted into tonnage equivalents.

A metal can is defined by WPB as "an unused container which is made wholly from tinplate, terneplate, blackplate or wasteplate and is used for packing various types of products as shown in the table below. Fluid milk shipping cans are not included."

(Tons of Steel)

Months 1943	Fruits, Vegetables and Unspecified Food Products	Dairy Products	Meats	Fish	Military Rations	Non-Food	Monthly Total for All Products
January	37,874	18,244	15,863	4,243	7,937	7,723	91,884
February	36,657	19,258	16,046	5,741	5,776	7,981	91,459
March	40,328	25,641	15,386	6,553	5,668	10,219	103,795
April	33,831	27,207	14,099	5,628	4,190	10,488	95,443
May	53,659	19,811	14,283	10,480	2,194	9,481	109,908
June	90,685	32,258	13,800	6,080	3,004	8,868	154,695
July	139,192	29,651	13,920	9,266	2,072	9,288	203,389
August	176,652	25,410	13,362	6,621	2,495	10,415	234,955
September	145,244	22,570	10,963	8,450	5,112	10,188	202,527
October	83,686	18,963	10,763	7,559	5,078	13,012	139,061
November	49,224	15,723	12,261	7,189	5,157	12,672	102,226
11 Months Total	887,032	254,736	150,746	77,810	48,683	110,335	1,529,342

How this DIAGRAM can help you . . .

Turn Idle Machine Time Into Extra Plant Output

If someone offered you a *tried and proved* method for selecting the right tool steel for each job—and told you how to simplify heat treatment and get better tools—you would probably hire him on the spot.

And that is just how the Carpenter Matched Set Method of selecting tool steel can be put to work in your plant.

In hundreds of plants, this tried and proved method is leading the way to tools that stay on their jobs longer, keeping machines operating more hours per month. It is reducing the number of times that tools must be reground, repaired and replaced. And simplified heat treating methods help you protect the hours that have gone into tool making.

To find out how you can put the Matched Set Method to work in your tool room, ask for your copy of the Carpenter Matched Tool Steel Manual shown here. It will point the way to better tools that can increase output from machines and presses. For your copy, drop us a line on your company letterhead.

The Carpenter Steel Company—121 W. Bern Street • Reading, Pa.

Here's your key to:

- **saving time and steel in the tool room**
- **getting better heat treating results**
- **increasing production per month per press**

In this 167-page *Matched Tool Steel Manual* you will find an alphabetical Tool Index and Steel Selector. At a glance, it quickly points the way to selecting the right tool steel for each job. Whether you need an oil-hardening, water-hardening or red-hard tool steel for the job, this Manual provides a definite system for arriving at the correct answer. And from there, it is a simple matter to follow the complete heat treating instructions.

The *Matched Tool Steel Manual* is offered free to tool steel users in the U. S. A., so for your copy write us a note on your company letterhead today.

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Immediate creation of an Office of Demobilization under the supervision of a joint Congressional committee, with full power when peace comes, urged by the George (Senate) Committee.

WASHINGTON — The George (Senate) Postwar Committee's report on industrial demobilization is more than a well-thought out blueprint for dealing with tomorrow's economics. It is a summons to America to return to the precepts of Constitutional government. It is a document of historical significance.

Aware of the dangers inherent in the exercise of legislative authority by the President during the war and cognizant of the necessity of the delegation of practically unlimited powers, the George Committee has called for reinvestment in Congress of all authority loaned.

The report recommends the immediate creation of an Office of Demobilization under the supervision of a joint Congressional committee, to be supreme in the field of demobilization after hostilities and to bow only to the authority to the Office of War Mobilization so long as the war lasts. This would clearly short circuit the War and Navy Department policy of prohibiting not only peace production planning, but limited beginnings as well.

New legislation called for by the report would empower the Office of Demobilization to begin "NOW" to collect the most complete information with reference to factories that will be affected by war contract cancellation, their manpower requirements as war industries and as peace industries, their inventory and machinery needs in both categories. The report insists that the Office of Demobilization should make plans wherever possible to have the requisite peacetime machinery and inventories available to manufacturers at the earliest moment after peace comes; should have inventories of not only the goods that the government has on hand but those in the hands of the war production factories so that it can have formulated in advance the necessary plans for the disposal of those inventories and can determine the necessity of continuing or relaxing price controls, rationing, and allocation of materials to keep the economy on an even keel.

THE George Committee is so incensed by attempts by War Mobilizer Byrnes to prevent legislation being introduced on demobilization problems, that some consideration was given to recommending that the power to appoint the Director of the Office of Demobilization be refused the President. As it is, the Committee in placing the appointive authority with the President, reserved in the Senate the right of confirmation.

The following are the Committee's recommendations:

Termination—Contracts should be merged, wherever possible, and separate settlements made with suppliers as well as with prime contractors. The use of the over-all company claim probably would result in not more than 10 per cent of as many claims being filed as would be filed under the present method.

Legislation would be necessary to cut across the traditional concept of the expenditure of appropriations whereby the Army would have to be authorized to use its funds in the settlement of Navy contracts and vice versa.

It would be necessary to cut across legal concepts of privity of contract. Some contractors might object to separate settlement by the government of suppliers contracts. The way the government might work this out is to offer to buy supliers' claims.

Legislation should be passed specifically authorizing negotiated settlements, but these settlements should be based upon records sufficiently complete to be susceptible of post-audit for fraud as prescribed by the Office of Demobilization.

CONVENTIONAL preaudits of claims are utterly impractical and the Comptroller General should be relieved of any responsibility for preaudits.

The statute of limitations should be extended and provision made for the recovery of triple damage paid as a result of fraud.

The government should be required to pay interest on that portion of the claim which is not paid within 60 days. The interest rate should be 3 per cent.

The new agency should prescribe a uniform cancellation clause for each type of contract embodying the principles set out in the report with formulas applicable alike to both prime and subcontractors, whichever contractor should be given the option to adopt in lieu of any termination clause that may now be in contracts. The agency should adopt uniform rules for the filing of claims and the evidence and records necessary to support claims, and work out with the various operating agencies the speediest method of handling claims.

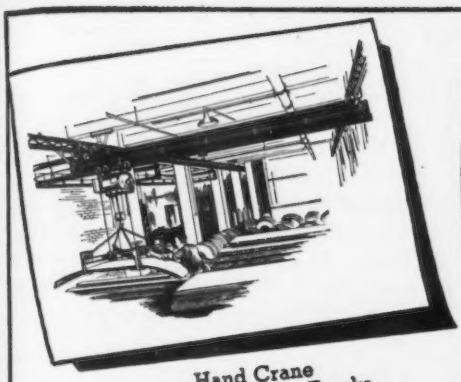
The training of contract termination personnel should be undertaken, and a regular reporting system designed.

Finance—The immediate payment of the contract price for all finished goods on hand and for 100 per cent of the direct cost of all inventories of raw materials and partly processed goods, and as large a percentage, up to 90 per cent of all other items in the claim as the contracting agency feels will afford the government reasonable protection.

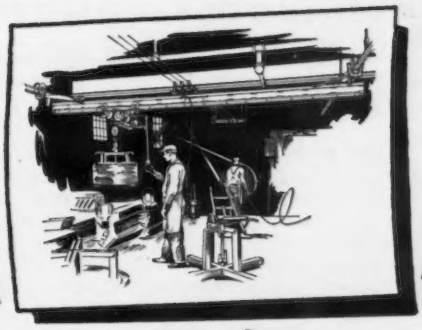
Where the detailed audit of the direct cost of inventories is apt to cause delay, the procuring agency should be authorized to make advance payments and partial payments up to 90 per cent of the estimated total amounts due on terminated contracts and to base the estimates on contractors' certificates, or other evidence.

The procuring agencies should also be authorized to make direct termination loans, guarantee loans, similar to the present "V" loans. RFC and SWPC would also be permitted to get into the finance field, to keep plants in operation. Financial need or ability to repay will not necessarily govern financing, as the Office of Demobilization should be authorized to make the rules it wishes.

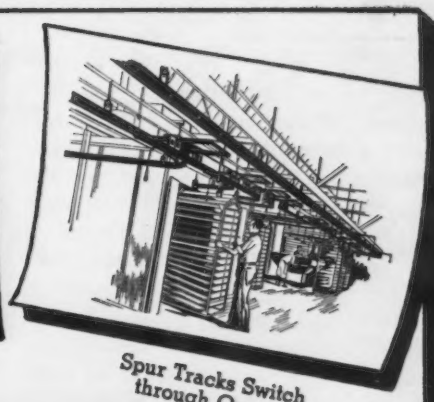
Plants—Government-owned property, machinery and equipment should be removed from the plants of manufacturers immediately. Inventories



Hand Crane
with Connecting Tracks



Stripper Crane
with Electric Hoist.



Spur Tracks Switch
through Ovens.

Ideas for Post-War PRODUCTION

One Unit Charges
Two Cupolas.

Here are several American MonoRail installations which have proven successful in low cost handling. Any plans for postwar production should include such handling methods.

Regardless of the size or type of application, American MonoRail Engineers can help. Their specialized experience often uncovers hidden possibilities for simple systems that bring immediate returns. Consultation with these men is available without obligation. Write for copy of Bulletin C-1 showing a wide range of installations.

THE AMERICAN MONORAIL CO.

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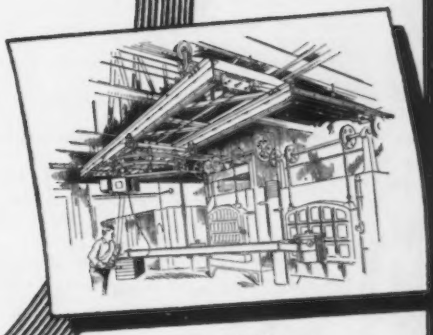
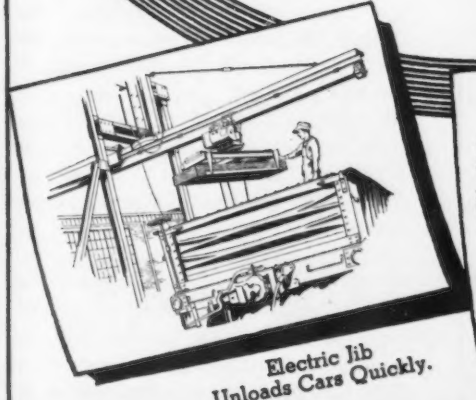
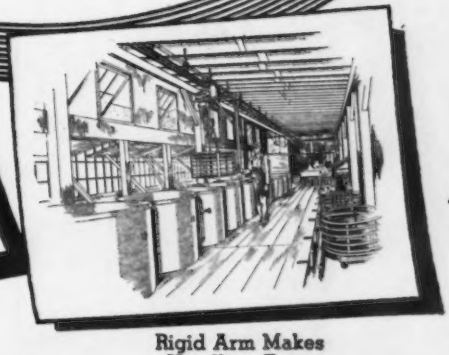


Special Crane
for Fast Quench.

Mono Tractor-Hoist
Moves Bar Stock.



Electric Jib
Unloads Cars Quickly.



Rigid Arm Makes
Handling Easy.

may be moved within 30 days and stored. Plans should be made to convert government-owned plants into warehouses for storage of surplus property the very instant war work ceases and manufacturers should be informed which government plants will store the government property.

Other government-owned plants should be maintained as standbys, or sold at reasonable prices, but no plant disposal policy should be permitted to "exert a preponderant influence on the future course of that industry." (In such a category are steel mills, airplane factories, rubber, aluminum and magnesium plants, shipyards and pipelines). No government-owned plant should be sold in a manner to create or foster monopoly, but the fostering and encouragement of competitive enterprise should be a prime consideration.

The use or disposal of the foregoing "basic" industry plans may well have to be correlated with the Nation's foreign policy and Congress should legislate further in regard to them.

All plants suitable for the production of peacetime goods and not needed for national defense should be sold where this can be done without causing ruinous overproduction in any industry. An industry should not be severely damaged through overproduction merely for the purpose of selling a government-owned plant, but a plant should be held off the market only where its operation would result in the production of more goods than the market could absorb at reasonable competitive prices. The leasing of plants for a period sufficiently long to determine their operation on their economy should be authorized.

No government-owned plants should be scrapped and no surplus property destroyed except in circumstances where their continued existence would have such a profoundly harmful effect upon the national economy that their destruction appears imperatively necessary.

Civilian Output Stable!

• • • **For those who love to play with figures and statistics, Lawrence A. Appley, deputy chairman and executive director of the War Manpower Commission, this past week released some startling ones. Speaking before the American Management Association conference on industrial relations at Chicago, he stated that non-war production from 1939 through 1943 was down only 8 per cent and civilian production was maintained at "approximately the same level throughout the last four years." If such claims are accurate, many Americans are wondering where they can buy some of this civilian production. Summed up, Mr. Appley made the following claims:**

Pre-War Vs. War Production

	War Production, Dollars	Non-War Production, Dollars
1939 ...	1,400,000,000	87,200,000,000
1943 ...	67,000,000,000	79,900,000,000*

*Based on 1939 prices.

Center of Steel Output Moving Westward

Chicago

• • • **Upon completion** of the current steelmaking expansion program, the geographical center of American steel production will be one mile north and west of the town of Bucyrus, Ohio, indicating a westward movement of 31 miles since 1940, according to the American Iron and Steel Institute.

The new geographical center, about 80 miles from the Massillon-Canton steel district, actually is located in an abandoned red brick schoolhouse. Local soothsayers say that this is pure coincidence, and has no relation to the possible fate of much of the expansion program.

The new geographical center is farther westward than at any time in the industry's history, and its location resumes a trend broken in 1936, when the center moved eastward, and in 1940, when it hopped north and slightly east. Until 1933, the trend had been almost due west from the Atlantic Seaboard, where the industry was born. In 1874, when first compilations were made, the center was in Juniata County in Central Pennsylvania. Later the movement reflected the development of Pittsburgh as a great steel center, and eventually the construction of large plants in Chicago and other midwestern areas. In 1933 the epicenter was north and west of the town of Crestline, Crawford County, Ohio. By 1936, installation of new capacity to the eastward had drawn the center 13 miles east and one mile south of the 1933 point. At the end of 1940, growth in eastern Ohio districts pulled the center four miles farther eastward and six miles farther north.

With the new compilation the original trend is resumed.

No accurate data is available as to the center of steel consumption but large tonnage requirements for West Coast shipyards plus heavy ordnance activity in the Chicago district would place this point several hundred miles west of the production center, it is believed.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Gagemakers GUARD Against Costly Scrap

and FACILITATE ACCURATE WORKMANSHIP

Visual Gage and precision grinder in a modern gagemaking plant.

Beside each precision grinder in many gagemaking plants, a Sheffield Visual Gage guards against costly scrap loss and helps operators turn out highly accurate work. *The Visual is the most widely used instrument by which gages are checked.* Sheffield appreciates this trust and is vigilantly mindful of the obligation it involves.

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DELIVERIES WITHIN TWO WEEKS can now be made on Sheffield Visual Gages of six different amplifications—500, 1000, 2000, 5000, 10,000, and 20,000 to one. WIRE OR WRITE.

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WEST COAST . . . OSGOOD MURDOCK

• Carson City conference of committees on interstate cooperation bares some interesting angles in regard to western steel situation . . . Californians favor giving Geneva plant to westerners, and establishing new local basing point.

CARSON CITY, NEVADA—The conference of the committees on interstate cooperation, meeting here late last week, bared some interesting angles in regard to the western steel situation.

For instance, it appeared at the hearing which grew into a conference on interstate cooperation from California, Utah and Nevada, with a lone delegate from Oregon, that attorney general Robert W. Kenny of California and Chad C. Calhoun, vice-president of the Kaiser Co., Inc., favor passing the Geneva steel plant as quickly as possible into private, independent hands, owned and controlled by Westerners, putting the sale of its finished steel products, principally flat rolled, on a new local basing point.

Dr. J. H. Mahoney, director of the bureau of economics at the University of Utah, declared before the assembled official state representatives, principally from Utah and California, that pig iron will be made at Geneva cheaper than at Birmingham or Sparrows Point, and from $2 to $3 a ton cheaper than at Pittsburgh or Gary. Furthermore he declared for the first time publicly that a new area of coking coal has been proved in Utah, increasing by 300,000,000 tons the known reserves and available supply, so that Geneva need not be handicapped for coke or ore, which is now loaded on cars at the mine for less than $1.00 entire mining cost.

For this conference of the committees on interstate cooperation of Utah, California and Nevada a delegation of over 25 state senators, members of the assembly and department heads in the executive branch motored over the snow-deep Sierras from California. An equally large delegation was present from Utah, seriously concerned with disquieting rumors that have threatened the life and future of the Geneva plant. A lone Oregonian represented the Pacific Northwest, which region's pleas for industrial independence and freedom from the sundry yokes of California, Utah and the East may be expected next, as present war installations get producing and settle down for the long pull.

Two observers and listeners from the U. S. Steel Corp. management, one from Washington and one from Geneva, were present.

UTAH had held the floor for several hours. In the course of the presentation, particularly by H. W. Prickett, Salt Lake traffic counsel on freight rates, data and evidence had been introduced. Mr. Prickett forecasts a revised rail freight rate on structural shapes, plates and bars, from Fontana to Los Angeles, San Francisco, Portland or Seattle, of $5.31 per net ton, consistent with the present rate of $4.95 per gross ton on pig iron. If pig iron and finished steel can be made at Geneva below present eastern basing point costs, and with this freight rate less than half the old water rate inter-coastal, and less than a quarter the present all-rail rate from Chicago, then, indeed, the West Coast will be buying the cheapest steel it has ever been offered, at least officially and openly.

When Mr. Prickett finally introduced "Exhibit C," tabulating net final rate advantages per ton of Geneva over Fontana in marketing pig iron on the Pacific Coast of 52c., $3.11, $4.80 and $4.80 respectively at Los Angeles, San Francisco, Portland and Seattle, it evidently was just too much for Chad Calhoun of Kaiser Co. Asking the privilege of the floor he addressed himself something as follows:

"Our company entered the steel business on the West Coast for the double purpose of making plates for shipbuilding during the war, and postwar to produce and sell steel products in our geographical area at lower rates than the Pittsburgh-plus basis. We were in production 14 months after securing our authorization, whereas the Geneva plant is taking from 29 to 30 months. The war has made both these plants possible, so the West should cooperate in planning to build its industrial future around them both. One should complement the other."

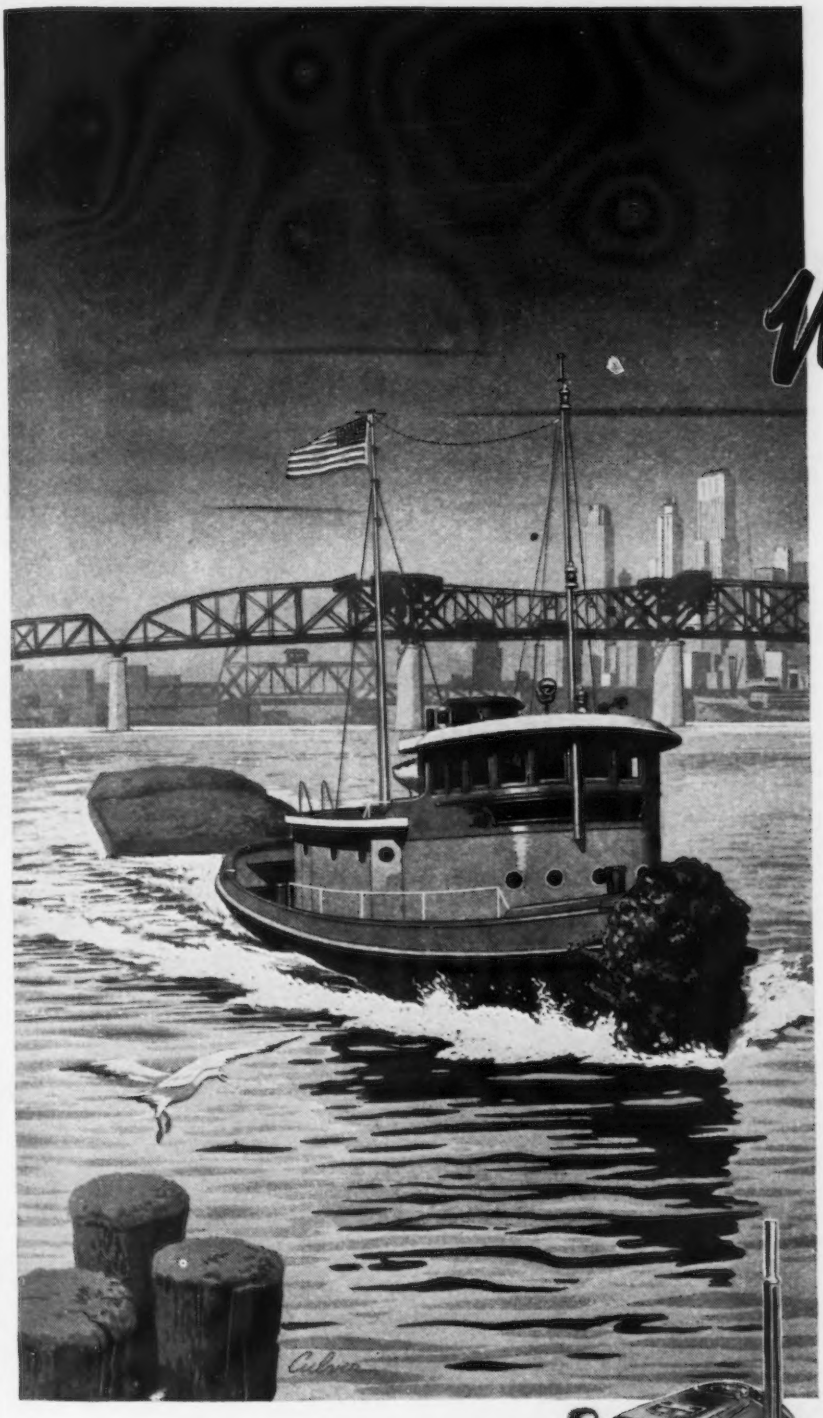
Mr. Calhoun asserted Geneva is the only steel expansion project under direct Government subsidy. He and his company are apprehensive about the future management and its policy, he indicated. "What kind of a deal will the Government make after the War?" he asked. "What will be the management? How much money is it going to cost to convert it to peacetime production?"

THESE are questions that others might pay $64 to have answered, but most steel men will question his implication that the "industrial maturity" (to use Dr. Mahoney's pat phrase) of the far West will be safer and more assured if Geneva is promptly turned over to some native independent westerners to own and manage, with no connections with the East, or with national operating steel corporate enterprise. It was by the Californians that the interest and management of the U. S. Steel Corp. and its subsidiaries in Geneva was suspect. The men from Utah seemed more apprehensive of strangulation by WPB or DPC or some Government decision.

In its resolutions the conference is asking for a representative from the far West on the steel industry advisory committee to WPB, for a new basing point at Geneva that will eliminate the "Pittsburgh-plus" formula for steel buyers on the West Coast, and for a statement from the Government agencies involved declaring their postwar intentions and assuring the far West that the Geneva plant will continue in operation, whether in public or private, Corporation or independent hands, so that other postwar planning involving jobs for increased population and utilization of wartime facilities and electric power may be primarily based on abundant, cheap, home-made steel.

On the second day of the conference, just before adjournment, Senator McCarran eloquently voiced suspicion of the WPB, as well as "monopoly, big business and eastern interests" in furthering the industrial development of the region west of the Rocky Mountains.

Senator McCarran asserted that



Work Horses OF THE WATERWAYS

Tow boats, ferries and barges may lack glamour, but the important jobs they do make the world's waterways much more useful than they would be otherwise. Our transportation system would be seriously disrupted if modern work-boat equipment were unable to absorb a great deal of punishment.

Among the power links developed by the Twin Disc Clutch Company in the past quarter-century is the Twin Disc Marine Gear. To work-boat operation, this Marine Gear brings the same high degree of stamina, reliability and efficiency characterizing Twin Disc's solution to so many other industrial power linkage problems. Enabling work-boats to do a better job, the skill and experience represented by this Twin Disc product thus takes all of us a step further along the road to better living.

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Twin Disc Marine Reverse and Reduction Gears provide boat operators with the wider margin of safety which positive control and increased maneuverability assure. Their rugged construction, smooth operation and long wear life give unexcelled reliability.

only through pressure from the West and Congressional action could there be a "change in policy in the WPB."

He declared that Federal officials had tried to take over hundreds of thousands of square miles of the public domain of the West through "misuse" of the National Public Monuments Act. He intimated that Secretary of the Interior Ickes "wants to set aside the mining laws of the Western States."

Referring to the Fontana and Geneva plants, the Senator insisted that there was room for both plants. He said it was estimated that $20,000,000 in priority materials and machinery for the structural mill at Geneva were at the site but never had been unloaded.

Delegates to the conference were told that WPB has stopped work, at least temporarily, on the structural steel mill at the $180,000,000 government-owned Geneva works.

Attorney General Kenney of California asserted that 2,000,000 newcomers into industry in Western war plants "will be forced into a deflationary period by the older sections of the United States if the West is asked to fold up its industries and find some other way of supporting itself in the postwar period."

Also, just before adjournment, the following telegram from President B. F. Fairless of U. S. Steel Corp. was read and placed into the record:

"A representative of the Kaiser Steel interests is reported to have stated yesterday that the Geneva project was deliberately delayed by United States Steel. This is absolutely without foundation. Construction of this plant has been controlled from the start by priorities and scheduling of WPB and has been completed as expeditiously as government limitations would permit.

"I am forwarding copies of telegrams and correspondence of WPB and the Defense Plant Corporation urging higher priorities and elimination of delays due to giving other projects priority over Geneva. In addition we have had representatives in Washington and at plants of manufacturers holding orders for Geneva equipment, urging earlier deliveries.

"No such accusation has ever been made by WPB or DPC, the interested governmental agencies who at all times were fully advised of the construction progress of this plant."

Within a few minutes after this message had been read to the conference by the chairman, Calhoun issued the following statement over his signature:

"The Geneva plant was authorized in September, 1941. At all times it has had a higher priority than Fontana. In June, 1943, WPB reviewed all emergency steel projects and established urgency ratings for the seven most important and placed Geneva ahead of Fontana. The Fontana plant has been producing steel plate since August, 1943, even though handicapped by the priority preference accorded U. S. Steel on Geneva. Geneva, with its higher priority, has not produced any steel plate yet."

Informal and unofficial spokesmen from Utah who should be in a position to know, stated that there have been times when Fontana had AA1 rating and Geneva A3, and that on the preference list of emergency steel projects Fontana stood third and Geneva twenty-third.

In the opinion of some persons attending the conference, "it is possible that neither all facts nor all fists have yet been banged on the table."

The first open hearth at the Geneva plant started operations early this month, to be followed by additional units quickly. This plant is operated for the United States Government by Geneva Steel Co., U. S. Steel Corp. subsidiary. In addition to the open hearths which will be started, it is expected that another battery of 63 by-products coke ovens will be started during this month. Some of the rolling mill facilities, designed to supply ship plates for West Coast shipbuilders, are scheduled to be ready for operation late in March.

Columbia Steel Co., West Coast subsidiary of U. S. Steel, began construction of the fully integrated Geneva works in April, 1942, for the Defense Plant Corp.

The Kaiser plant was started in early 1942 and blew in its first blast furnace in December, 1942. First steel was made in May, 1943. Plate production began in August, 1943. Kaiser financed the plant by borrowing from the Reconstruction Finance Corp. against the earnings of his shipyards. As indicated in last week's West Coast column, page 88, Kaiser is attempting to reduce his costs in the expectation that keen competition will be experienced on the Pacific Coast. Also in last week's issue, pages 100 and 101, appeared statistics on western steel capacities and a discussion of postwar trends.

Kaiser Purchases Fee Title for Mine

San Francisco

• • • Kaiser has purchased from the Southern Pacific Land Co. fee title to the Eagle Mountain Iron Chief ore deposit in Riverside County for the reported sum of approximately one million dollars. Harlan H. Bradt has purchased contract for ore on installment basis for a number of years. Thus, Kaiser it appears is not free to mine or use the ore except by purchase from Bradt.

Flat Rolled Steel Makers Form New Trade Association

Pittsburgh

• • • **Flat rolled steel** makers recently formed an association here to be known as the Steel Manufacturers Association. The forerunner of this group which was dissolved last year and was known as the National Association of Flat Rolled Steel Manufacturers.

The new association which has offices at 1711 Oliver Bldg., Pittsburgh, will carry on activities similar to those endeavors of the one which was discontinued. Harry H. Burris, who was associated with the old outfit, has been made secretary-treasurer of the newly formed association.

Purposes of the organization include: Preservation of quality standards, cooperation with the Department of Commerce in establishing simplification of standards, collection and dissemination of information concerning flat rolled steel products and new uses for steel items.

. . . Cited for Awards . . .

• • • **The following companies** have received the Army-Navy E award for excellence in war production:

Ace Mfg. Corp., Philadelphia (star).
Brown Instrument Co., Philadelphia (star).
A. F. Holden Co., New Haven, Conn.
Cochrane Corp., Philadelphia.
Worthington Pump and Machinery Corp., Harrison Works, Harrison, N. J. (third star).
Worthington Pump and Machinery Corp., Moore Steam Turbine Division, Wellsville, N. Y. (second star).
Blagen Lumber Co., Toyon Plant, Toyon, Cal., and White Pines Operations, Calaveras County, White Pines, Cal.
Cameo Curtain Mfg. Corp., Yonkers, N. Y.
John Nooter Boiler Works Co., St. Louis.
Sylvania Electric Products, Inc., Boston Street Plant, and Loring Avenue Plant, Salem, Mass., and Danvers Plant, Danvers, Mass.

Helping to "BRING 'EM BACK ALIVE"

Nothing in this war is more heartening than the large number of pilots and plane crews who come back alive from missions of extreme hazard.

Case after case has occurred where planes suffered terrific punishment, yet the pilots managed to bring them home. It is a tribute to the splendid skill of our pilots and the remarkable quality of our planes.

Vickers Hydromotive Controls are an important factor in the exceptional quality of many American combat planes. These high pressure oil hydraulic controls are dependable, accurate, easy to operate, easily adjusted, insensitive to shock and vibration . . . reliable no matter how tough the going.

Vickers Hydraulic Equipment is also used to advantage for the control of many types of production machines . . . machines that are helping win the war . . . machines that will help win the peace.

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Engineers and Builders of Oil Hydraulic Equipment Since 1921

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PERSONALS

• **Bennett S. Chapple, Jr.**, formerly assistant manager of sales for Carnegie-Illinois Steel Corp. in the New York district, has been appointed assistant to president L. Gerald Firth of Firth-Sterling Steel Co., McKeesport, Pa. Mr. Chapple's previous associations were with the Insulated Steel Construction Co., Middletown, O., and American Rolling Mill Co.

• **Alex Krueger** has been appointed manager of the Corpus Christi operations of San Antonio Machine & Supply Co., San Antonio, Tex. He has been associated with the company for 25 years, having been in charge of all engineering sales until his recent appointment.

• **Donald A. Sutherland** has been appointed field engineer in charge of sales and sales promotion activities for McCulloch Engineering Corp., Milwaukee. Before coming to McCulloch, Mr. Sutherland spent ten years with Fairbanks-Morse in St. Paul.

• **H. H. Barnes** has been made director of the proving ground section of General Motors at Milford, Mich. Mr. Barnes succeeds **Ernest E. Wilson** who died recently.

• **Herschel J. Wood** has been appointed southwestern representative of the Lebanon Steel Foundry, Lebanon, Pa. He will be in charge of this company's new office at Houston, Texas. Mr. Wood was formerly associated with the Elastic Stop Nut Corp. of America.

• **Raymond C. Franklin** has joined the sales force of the Continental Screw Co., New Bedford, Mass.

• **J. S. F. Carter** has been appointed engineer in charge of design and engineering service for the process division of S. D. Hicks & Son Co., Inc., Boston. Mr. Carter had been chief design engineer of the Cherokee Ordnance Works and was previously associated with the Lummus Co. & DuPont.

• **Lee W. Ralston** has been named supervisor of industrial relations for the manufacturing and repair department, Westinghouse Electric and Mfg. Co., Pacific Coast District, with headquarters at Emeryville, Cal.

• **C. B. Langstroth** is resigning from his position as welding consultant after 12 years with American Locomotive Co., New York. Previously he was vice-president of the Detachable Bit Co. of America and also with A. O. Smith Corp., Milwaukee.

• **Gordon F. Ives** has been appointed advertising manager of Walter Kidde & Company, Inc., Bloomfield, N. J., replacing **C. E. Gischel** who has been appointed director of product development, in charge of postwar planning.

• **Francis S. Norton** has been made general traffic director for the Fisher Body Division, Detroit, succeeding **C. A. Sullivan**, retired.

• **George H. Meilinger**, former Westinghouse refrigeration sales development manager, has been appointed manager of the company's household refrigeration department to direct postwar plans for the refrigerator production program of the Westinghouse Electric Appliance Division.

• **Albert J. Berdis** has been appointed assistant to general superintendent of Carnegie-Illinois Corp.'s Irwin Works. He was formerly chief engineer at Irvin Works. Succeeding him as chief engineer at Irvin is **Klauss Egge**, who had been tin mill engineer in the company's general office.

• **DeWitt McKinley** has taken over the management of the McKinley Iron Works, Fort Worth, Texas, upon the retirement of his father, **E. H. McKinley**.

• **R. N. Shields**, formerly general supervisor of the eastern district, U. S. Steel Corp. subsidiaries, has been appointed assistant traffic manager eastern district. **R. F. Holtz** has been made assistant to traffic manager, eastern district and **R. J. Dods**, general supervisor, traffic department.

• **G. H. Tobelman** has joined the Wolverine Tube division of Calumet & Hecla Consolidated Copper Co., Detroit, as manager of the eastern territory with offices in New York City. For the past 11 years he has been connected with the Bridgeport Brass Co.

• **William A. Patterson**, president of United Air Lines, Inc., has been elected a member of the board of directors of Stewart-Warner Corp., filling the place left vacant on the directorate by the death of **Frank A. Ross**, senior vice-president.

• **Kreston T. Sorensen**, has joined the staff of William Sellers & Co., Inc., as assistant to the president.

• **Harry A. Spieth** is new general superintendent of the Oregon Steel Foundry Co. at Portland. For 19 years he has been manager of the Western Steel Casting Co.

• **Harold Metzendorf** has been appointed advertising manager of Southern States Iron Roofing Co., Savannah, Ga. Mr. Metzendorf has had more than 17 years of advertising, sales promotion and market research experience.

• **Roland Sheriff**, works manager and **G. Briggs Weaver**, chief design engineer, have been made directors of the Indian Motorcycle Co., Springfield, Mass.

ADAM J. HAZLETT and WILLIAM J. CREIGHTON, left to right, have been elected general manager of sales and executive vice-president respectively of Jones & Laughlin Steel Corp., Pittsburgh, as announced in the Feb. 10 issue, page 84.

• **A. J. Tigges** has been appointed manager of consulting engineering for all divisions and subsidiaries of the Baldwin Locomotive Works, Philadelphia, including locomotive and ordnance. In addition, Mr. Tigges will have charge of engineering of new products and new applications relating to postwar plans.

• **John W. Humphrey**, formerly superintendent of Carnegie-Illinois Steel Corp.'s Vandergrift, Pa., plant, has been appointed assistant to general superintendent of the company's Youngstown district. **Arno L. Billeter**, previously assistant to general superintendent of the Irvin Works, is successor to Mr. Humphrey's former position.

• **William O. Wilson** of Evanston, Ill., has been appointed a commercial vice-president of Worthington Pump & Machinery Corp. In his new capacity, Mr. Wilson will be responsible for general supervision and direction of all of Worthington's commercial activities in the Chicago, St. Louis, Kansas City, and St. Paul district office territories, with his headquarters at the Chicago district office.

• **Harry K. Werst** has been made vice-president in charge of manufacturing for Elastic Stop Nut Corp. of America, with plants in Union, N. J., and Lincoln, Nebr. Mr. Werst, a partner in Booz, Allen & Hamilton, has had extensive experience in manufacturing operations, and will be in complete charge of manufacturing processes in all of ESNA's operations.

• **D. M. Morewood** has been appointed assistant to E. G. Plowman, vice-president in charge of traffic, U. S. Steel Corp. of Delaware, Pittsburgh. Mr. Morewood was formerly assistant traffic manager for the eastern district of U. S. Steel Corp. subsidiaries. He was first employed by Carnegie Steel Co. in 1914, and transferred to U. S. Steel subsidiaries at the time of the consolidation of traffic departments.

• **Karl L. Konnerth**, formerly chief engineer of H. C. Frick Coke Co., has been appointed assistant to the president in charge of engineering of this and associated U. S. Steel subsidiary companies. He has been with the company since 1926. **George M. Thursby**, now assistant secretary of the company was also appointed director of industrial relations for the U. S. Steel subsidiary companies. He has been assistant secretary of the Frick company since 1939. **August J. Breitenstein**, formerly assistant chief engineer, has been named chief engineer, to succeed Mr. Konnerth. He has been with the Frick Co. since 1941.

• **William E. Harrison** has been appointed assistant fuel engineer for Lukens Steel Co., Coatesville, Pa., and its subsidiaries, By-Products Steel Corp. A graduate of the University of Pennsylvania, Mr. Harrison joined Lukens in 1934.

• **Robert H. Clymer** has been elected vice-president of Luria Brothers & Co., Inc., Philadelphia, in charge of yard and plant operations. Mr. Clymer started with Luria Brothers in 1905 and has since occupied various executive positions with the firm.

HARRY K. WERST, vice-president in charge of manufacturing, Elastic Stop Nut Corp. of America.

ROBERT H. CLYMER, vice-president, Luria Brothers & Co.

OBITUARY...

• **William B. Mayo**, formerly chief engineer of Ford Motor Co., died recently in Detroit. Mr. Mayo was in charge of the building of the River Rouge works.

• **Alfred G. Suelflow**, president of the Felins Tying Machine Co., died Jan. 29 in a Milwaukee hospital at the age of 63 after a short illness.

• **Herman C. Haehle**, former plant manager for the Harnischfeger Corp., Milwaukee, and a director of Ampco Metals, Inc., died at his home in Milwaukee after a short illness. He was 78 years of age.

• **William O. Vilter**, president of the Vilter Mfg. Co., Milwaukee, died Jan. 31 in a Milwaukee hospital after a short illness. He had been active in the business for 62 years until last November.

• **Alva L. Grinnell**, senior employee of the sales department of the Rustless Iron & Steel Corp., died on Feb. 3. He had been ill for several years.

• **Robert W. Thomas**, director and treasurer of Thomas Machine Mfg. Co., Pittsburgh, died Feb. 6, at his home in Glenshaw, Pa., after an illness of several months.

• **Andreas Hartel, Jr.**, senior member of the firm of Hartel Brothers & Co., South Boston, steel merchants, died Feb. 4. He was 75 years old.

• **Louis Caputo**, Builders' Iron Works, East Boston, died recently. He was connected with the iron industry the past half century.

• **George A. Burman**, 76, vice-president of Wolverine Foundry Supply Co., Detroit, died recently.

• **Harry N. Omer**, 83, assistant sales manager of Great Lakes Steel Corp., Detroit, died recently. Mr. Omer had been with the company for nearly 20 years.

• **William J. Filbert**, 78, a director of U. S. Steel Corp. and a member of its finance committee and formerly chairman of the finance committee, died Feb. 4 at his home in New York, after a brief illness as announced in the Feb. 10 issue, page 84.

• **Andrew J. Dietrich**, president of Dietrich Brothers, Inc., Baltimore, died recently.

Fatigue Cracks . . .

BY A. H. DIX

Williams, 1; Oliver, 0

• • • Ole K. Olsen started it by asking, "Why the left-hand twist drill in the Dec. 9 'Bull of the Woods' cartoon?" H. L. Blood replied, "It is no L.H. twist drill; it's a spiral type reamer."

Our technical editor, Frank Oliver, said the helix angle is too acute for a reamer. But a reamer it is. Hark to the voice of authority:

> May I administer a gentle rebuke to your Technical Editor, Frank Joseph Oliver, in his implied criticism of my good friend J. R. Williams. In substantiation of the technical point involved in his criticism of the reamer's helix angle, I give you below the actual picture of a helical taper pin reamer which will prove Mr. Williams' picturization correct.

> We can identify this as a Pratt & Whitney Helical Taper Pin Reamer, List No. 458 No. 9.
>
> —*E. C. Shultz, Advertising Manager, Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn.*

The "Bull of the Woods" creator has never been known to blow a technical blue note, and we will never swerve again from the straight Williams party line. If he draws a curved drill for boring curved holes it will be gospel to us.

Mop Up

> I seize this fleeting moment to smite the neck so naively protruded. There is a quick spiral taper pin reamer . . .
>
> —*Deac*

Now, he tells us.

Weathers Note

• • • Deac, who gripes about the trend toward sticking esses on words that used to be singular (freedoms, skills, equipments, etc.), will pay no visits to New England until he can paste his A book in his scrapbook, for the New Haven Railroad has pluralized the weather. Slogan: "Dependable in all weathers."

First Prize to Jeremiah

• • • If our "whodunit first" file had been up to date we could have saved ourselves a lot of trouble in answering the question about the father of the machine cut nail. For the entire history is in the November, 1943, issue of the American Iron & Steel Institute's "Steel Facts."

Jeremiah Wilkinson, of Cumberland, R. I., was the first of several Yankees to toll the bell for an ancient handcraft. He invented his machine in 1777. The record is conspicuously silent as to outlanders' contributions. To satisfy our curiosity, will the English member of this page's loyal army of eighteen readers please knock off all other work for a week and mosey around the Kensington Museum in an attempt to account for his forebears' failure to help push the ball along? Were the hand nailmakers' unions or manufacturers' associations that strong?

> *Wire nails came much later. In* 1851 *John Hassall, of Brooklyn, N. Y., invented the first machine in this country. He founded John Hassall, Inc., whose advertisements you see in your favorite family journal.*

Before we bid farewell to nails, just one more fact—the average American dwelling contains about $14 worth. The hand wrought kind cost so much that when American settlers moved from one place to another they would burn down their cabins to salvage the nails.

Help Wanted Ad, War Style

• • • Chet Ober, one of your favorite family journal's advertising ambassadors, clipped from the Stamford, Conn. "Advocate" the most compelling help wanted ad we have seen in a long time.

It consists mainly of a large photograph showing a completely equipped workroom, bare of people. The caption begins:

> These empty benches and chairs at The Yale & Towne Mfg. Co. must be filled . . . We need women war workers . . . to produce a vital new electrical device for the American Air Forces . . .

No Moses to Lead Us

• • • What we miss these days is a business prophet with the impressive, ex cathedra manner of say a late '20s Babson. In those days the future was always an open book. It was all scientifically worked out. By adding carloadings, brokers' loans, kilowatt output, and furnaces in blast, with just a dash of lumber output in board feet, the seers knew exactly what stage of the business cycle we were in.

Armed with only a composite index figure you could steer your ship through any sea. It was all very exact and highly comforting. But the sun that set on business prognosticating late in October 1929 never rose again.

The absence of an authentic Moses has created a bull market in the home-made economic conviction business. Convictions, the sound kind anyway, are based on information, and inasmuch as your favorite family journal's sole reason for existence is the gathering and dissemination of information, we are much interested in current fashions in conviction-forming.

We observe that the passion formerly lavished on index figures has given way to a yearning for advance or early advice on changes in trade trends. This is our meat. We have no prognosticators on the payroll, but we do have a sharp-eared listener at every strategic point throughout the country. What these human seismographs pick up is teletyped to the brain center at the other end of the aisle. Every Tuesday afternoon Don James, our news chief, sits himself down at his Remington and writes a distillation of what the seismographs detect.

This distillation meets your eye each week under the title "This Industrial Week" (see page 100). It is expertly done, as proved by the fact that whenever we put our reader interest pyrometer on it the needle does a Gundar Hagg to the right.

Stoppers

When "Camouflage wool" comes back to the kitchen —*American Steel & Wire Co.*

So the U.S.S.R. came to Lewis—*Lewis Foundry & Machine, Division of Blaw-Knox Co.*

Puzzles

The hands on last week's chronometer will be in exact coincidence at no time other than at 12:00:00 o'clock. They will be closest to coincidence at 8:43:43.64394 and 3:16:16-.35606. At these instants the second hand will be in coincidence with the hour hand, and the minute hand will be zero degrees, 30 min., 02.736 sec. (of arc) away. So they miss coinciding by 1/12th of a dial-division at the points of closest-to-coincidence.

"If," says H. L. Blood, "you get an answer to this within 15 seconds it's wrong."

A metallurgist has a number of cube-shaped specimens. He wishes to identify them and hits upon the idea of grinding some sides and leaving others unground. How many cubes can be distinguished by this method?

"FAIRBANKS-MORSE SCALES—ARBITERS OF BUSINESS"

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Scales

Dear Editor:

DOG EAT DOG

Sir:

I am one of the multitude of foremen caught on the fence between management and labor as represented by unions, highly respected by both for our technical knowledge and ability and utterly disregarded by both as a group of individuals with equal rights and desires. Of late, there is a nation-wide movement of foremen to organize, too, for self-protection. The large unions, this time a step ahead of business, are greeting this dissatisfied group with open arms. All groups, though, are forgetting the investors. Government is conscious of them only as a tax income group because they have not organized into a joint pressure group. All groups have their respective places in the sun and, in our democratic way of life, with a dog eat dog attitude, inherent in all of us, government is the proper arbiter of all inter-group differences in either wartime or peace.

Therefore, I say that in its editorial policy THE IRON AGE should strive always for greater cooperation between all these groups for the good of themselves and their country.

F.R.A.
Haddon Heights, N. J.

PLASTIC SEAL

Sir:

Will you please send us a clipping of the article, "Sealing Tube Ends With Plastic," in your Nov. 4 issue.

R. H. STEINBRINK,
Chief Inspector
Cooper-Bessemer Corp.,
Mt. Vernon, Ohio

WAGE INCENTIVES

Sir:

This office is faced with a problem of assembling data on wage incentives. Will you please send clippings of these articles: "Practical Wage Incentive Plan," Sullivan Machinery Co., THE IRON AGE issue of Dec. 4, 1941; "Lincoln Electric Co. Wage Incentive Plan," issue of June 25, 1942, and "Workers Trade Ideas for Money," issue of Oct. 22, 1942.

STANLEY W. A. INGRAM,
Consultant, Technical Advisory Service
Smaller War Plants Corp.,
1031 South Broadway,
Los Angeles 15

HYDRAULIC SYSTEMS

Sir:

Will you please advise me of any text book or similar printed material covering the operation, maintenance and repair of hydraulic systems on machine tools that could be used for the instruction of machine repairmen.

KNOX A. POWELL,
Research Engineer
Minneapolis-Moline Power Implement Co.,
Minneapolis

● Articles on machine applications of hydraulic systems have appeared in the technical press from time to time, but the only book we know of on the subject is, "High Pressure Oil Hydraulics," published by the North American Press, Milwaukee. This small book (160 pages), deals particularly with pumps and ram equipment, but some of the fundamental principles would apply as well to machine tools.—Ed.

MACHINE DEBURRING

Sir:

In a recent "News Front" there appeared a few lines stating that machine deburring is rapidly replacing hand deburring. Can you supply us with the name and address of a concern that can give me further information?

JAMES N. McLAUGHLIN,
Production Supt.
Robert Mitchell Co., Ltd.,
750 Belair Ave.,
Montreal

● Write to G. O. Rowland, Osborn Mfg. Co., Cleveland, Ohio.—Ed.

HYDROGEN PRESSURE

Sir:

In one of your 1943 issues you stated:

> "An experiment is recorded in which a steel bar was bored to provide a hollow cylinder that could be fitted with a pressure gage. Hydrogen was evolved from the other surface of the tube by electrolysis and after a short time the pressure rose on the inside to 4300 lb. per sq. in., the limit of the gage."

Kindly let me know where the above experiment is to be found.

RALPH TARSHIS
2215 Mermaid Ave.,
Brooklyn

● In the 2-part article, "Effect of Moisture in Blast Air," by R. J. Cowan, in The Iron Age issues of Nov. 12 and 19, 1942.—Ed.

NE STEEL CHART

Sir:

We have found your NE Steel-Standard Steel Chart very useful in the substitution of critical alloys. Will you kindly send us three more copies?

FRED J. McFARLAND,
Raw Material Supervisor
Boeing Aircraft of Canada, Ltd.,
Vancouver, B. C.

UNION DEMANDS

Sir:

Will you please send us clippings of these articles in your Dec. 9 issue, "Unions Expected to Demand 40-Hour Week (page 102) and "Steel Union's Demands Include Post-War Provisions" (page 101).

H. BRUDNEY,
Director, Industrial Relations
Conmar Products Corp.,
140 Thomas St.,
Newark, N. J.

ENEMY PATENTS

Sir:

Will you please advise how we may secure foreign patent descriptions as mentioned on page 118 of the Jan. 27 issue. You state this information is in the Nov. 4 issue on page 95 but we are unable to locate this copy.

J. W. BOWMAN,
Director of Purchases
Northwestern Steel & Wire Co.,
Sterling, Ill.

● Copies may be obtained for 10c each from the Commissioner of Patents, Washington 25, D. C. Don't send stamps. Thumbnail descriptions of the patents themselves are being published serially in The Iron Age. A 26-page booklet, reprinting all the lists published in The Iron Age up to and including the issue of Jan. 20, may be obtained by sending 24c (stamps accepted) to The Iron Age, 100 E. 42nd St., New York 17.—Ed.

POSTWAR KITCHEN

Sir:

I am astonished by Mr. Segeler's revelation, that an inquiry from England for data on modern kitchens was turned over to the Modern Kitchen Bureau of the Edison Electric Institute.

Certainly you know that gas is the accepted fuel in this country as well as in England, and I am curious to know what prompted you to turn the question over to the Electric Institute.

VICTOR STARZENSKI,
Vice President
Hudson Valley Fuel Corp.,
Troy, N. Y.

● Slighting gas, the pre-eminent kitchen fuel both here and in England, was furthest from our minds. We were thinking of electric fruit squeezers, mixers, toasters, etc.—Ed.

FLAME HARDENING

Sir:

I understand you have reprinted a 5-part series of articles on "Flame Hardening." If this is available I would greatly appreciate a copy.

J. J. LAUDIG,
Research Engineer
Delaware, Lackawanna & Western
Railroad Co.,
Scranton, Pa.

● We have no copies left. You might be able to get one from the author, A. L. Hartley, R. K. LeBlond Machine Tool Co., Cincinnati.—Ed.

ISOTHERMAL QUENCH BATHS

Do you have reprints of Harold J. Babcock's two-part article, "Isothermal Quench Baths Applied to Commercial Practice," in your Feb. 3 and 10 issues?

W. H. McCORMICK,
Metallurgist
Crucible Steel Co., of America,
Park Works, Pittsburgh

● Reprints have not been made, but clippings are being sent you.—Ed.

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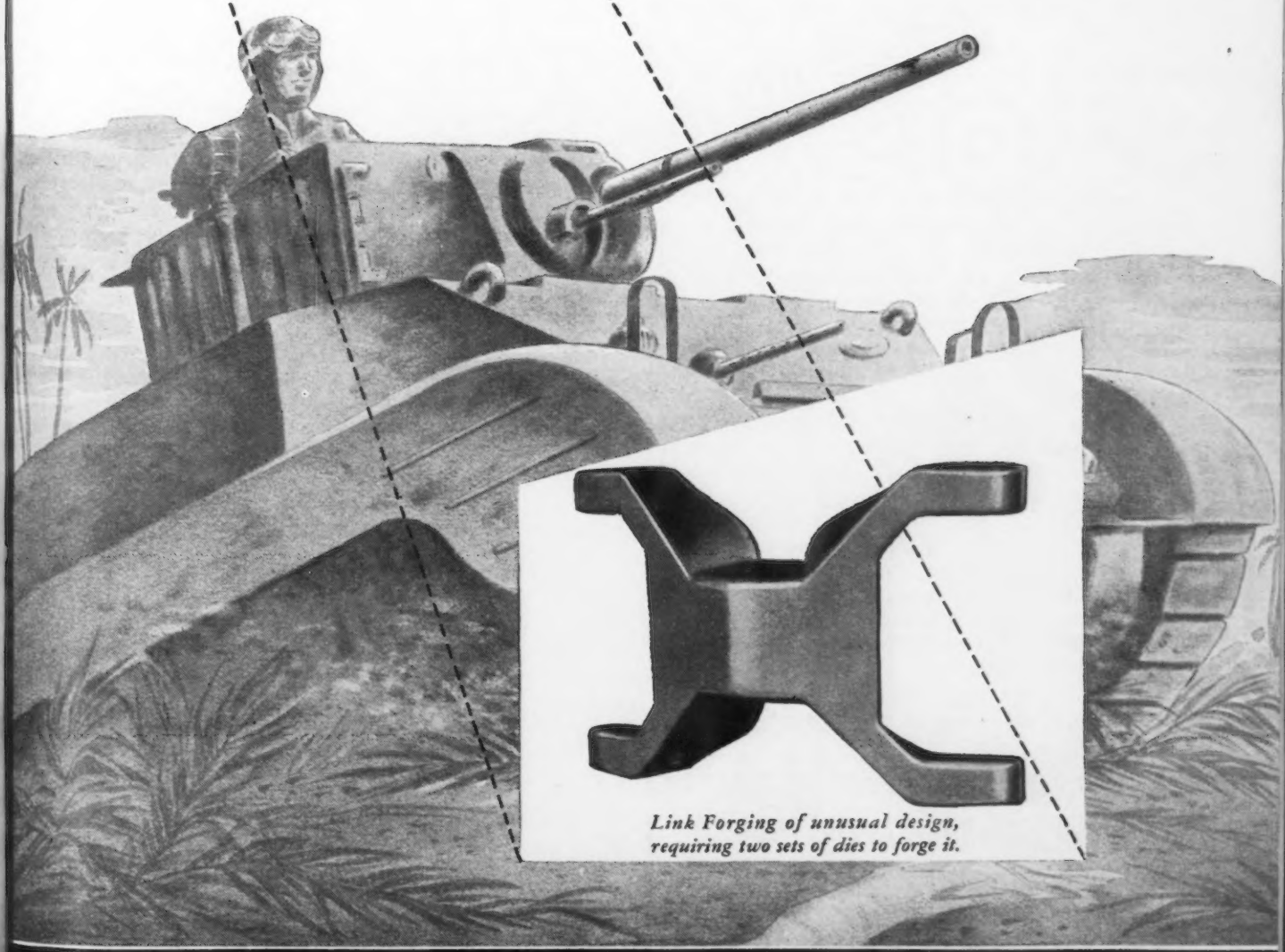
usually cost less at the point of assembly

Plus or minus a few minutes of time may be as vital a factor in meeting post-war competitive conditions as it is today a vital factor in the production of war equipment. Plus or minus a few minutes of time at each stage of operation in producing and finishing a forging can make an important difference in the time it takes to get the forging to the assembly line, and an even more serious difference in the cost of the forging at the point of assembly. T & W Forgings formed to close tolerances, usually require less machining and finishing—*a fact which makes them cost less at the point of assembly.* Ask a T & W forging engineer for suggestions which may help you meet post-war conditions.



Link Forging of unusual design, requiring two sets of dies to forge it.

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This Industrial Week . . .

- ***Small Business Gets Big Doses of Sympathy from Officials***
- ***Steel Industry Experiencing Another Period of Heavy Ordering***
- ***DPC's Search for a Yardstick Proves Irksome to Industrialists***

ONE of the noteworthy changeovers of the war has been the apparent switch in thinking at Washington on the subject of small business. The trend toward all-out assistance began assuming significance in Congress several months ago and was emphasized during the past week by separate statements of several officials.

According to Donald M. Nelson, the first opportunity to reconvert must be accorded the nation's small enterprises. This was followed by the declaration of Jesse Jones that small businesses and returning veterans should be given precedence in the purchase of surplus materials, perhaps aided by Reconstruction Finance Corp. which within the past week also revealed that it is prepared to loan manufacturers money to cover reconversion costs.

Will all this talk about small business amount to anything? Observers at Washington feel that some good will be accomplished. On the sidelines, small businessmen were not cheering too loudly at this early stage, perhaps because several exhibitions of resolution over recent years at Washington proved to be of little worth.

The steel industry itself was interested in the small business topic this week because of WPB's removal of production directives of the very smallest non-integrated steel producers. While freeing the smaller firms of the necessity for producing specified products under strict controls, the move heightens the problems of non-integrated mills in regard to their raw material.

MEANWHILE, the steel industry is experiencing heavy buying reminiscent of former peak periods during this war. Backlogs at most companies definitely are higher than they were a month ago, led by flat rolled orders, structural steel awards, and pipe bookings. Added demand for alloy bars also appears likely to materialize soon as a result of a new ammunition project.

The placing of large tonnages by farm equipment makers is a feature of the current steel markets, while Maritime and Navy orders remain brisk and include sizable requirements for Navy pontoons for 1945.

A little relief in the hectic flat rolled steel picture is afforded by the start of operations at the new Granite City sheet mill, which increases capacity by about 25,000 tons per month. The new plate mill in Texas also is believed ready to start operations.

In Nevada last week an interesting conference on the western steel situation was held by commissions on cooperation between the western states. Differences of opinion between U. S. Steel Corp. and the Kaiser Co. came to light and Senator McCarran attacked the WPB. The decentralization argument also involved Jesse Jones at Washington when he was asked for his views on steel mills and closed aluminum plants.

JONES' testimony reflected indecision on most counts. This has been a subject of comment in industry. For instance, detecting reluctance by the Defense Plant Corp. to make prompt decisions regarding the sale of some of its properties, a number of industrialists are beginning to look askance at the agency's apparent search for a yardstick which it seems to want to apply universally. It is pointed out that a common denominator governing sales will be impossible to attain since the projects were built under different conditions, in different areas and for varying purposes. The viewpoint of the industrialists is that the agency might better establish precedents and keep its plants in useful production in this nation than to wait in vain for a policy to be laid down. Like a pilot with a load of live bombs, the DPC, about which little is known by the public, may have to make quick decisions.

In the machine tool industry, where there has been much heavy thinking since orders began to drop months ago, a ray of hope is now discerned by some executives in the modernization needs of American industry. It is pointed out that in 1939 the nation's factories owned a huge total of machines 10 years or older and that since that time many of these machines along with some of the newer ones have been rendered unfit through high speed war production. Many of the 800,000 machine tools made during the war for use in this country can be utilized under properly planned modernization programs.

Other highlights of the week include clarification by Carmen Blough of WPB's role in tax amortization, introduction of the Murray-George "Omnibus Termination Bill" in Congress, and an indication that Donald M. Nelson has decided to oppose cartels.

BEARING out previous forecasts that war contract cutbacks would be heavy this quarter, individual announcements during the past week in-

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dicated plans for the closing in whole or part of numerous plants making munitions and other items. In some cases, retooling was inaugurated and in others sales of plants were under consideration. Apparently no work so far has been on the releasing of material for civilian production for the widely-heralded experiment to aid small plants in three cities.

Contract cutbacks and terminations now amount to approximately $14,000,000,000 by the War Department alone and another $2,000,000,000 has been canceled to date by the Navy.

Civilian allotments for carbon steel for second quarter have been cut 7 per cent below requests, but represent a modest gain of 55,000 tons over the first quarter.

The past week brought several important changes in government controls covering the distribution and use of metals. An amendment to CMP regulations permits a firm to use surplus materials to fill another authorized production schedule if he changes the original allotment account. Modifications were announced in the scheduling order, M-293. A new form WPB 1319 was announced to save much paper work and there were other changes aimed at simplified procedures. It was learned that automatic extension of controlled materials allotments may be enlarged to include large consumers as well as small producers.

In spite of recent claims of surplus aluminum, Philip D. Wilson, director of the WPB Aluminum and Magnesium Division, last week warned that aluminum sheet production must be stepped up if 1944 aircraft requirements are to be met.

This week's national steel ingot rate is off one point to 96.5 per cent of revised capacity from 97.5 per cent last week. Pittsburgh operations are set at 95 per cent, equivalent to a one point drop. Also down one point is Chicago's rate of 102 per cent. Other declines this week occurred in Philadelphia, down half a point to 91 per cent; Cleveland, down two and a half to 96.5; Wheeling, down three to 95; and Cincinnati down two to 94 per cent. District gains include Youngstown, up one point to 97; Buffalo, up one to 103; St. Louis, up four to 101.5; and the Eastern District, up one to 90 per cent.

As of Jan. 1, 1944, the total capacity of the nation's blast furnaces stood at 67,391,270 tons, nearly 3,000,000 tons above the level of July 1, 1943. Annual steelmaking capacity was increased by 2,771,000 tons during the last half of 1943 and was rated at 93,652,290 tons per year as of the beginning of 1944.

Capacity of open hearth steel furnaces is now rated at 82,223,610 tons per year; that of electric furnaces at 5,350,880 tons; and that of bessemer unchanged at 6,074,000 tons per year. Crucible steel furnace capacity of 3800 tons annually likewise showed no change during the period.

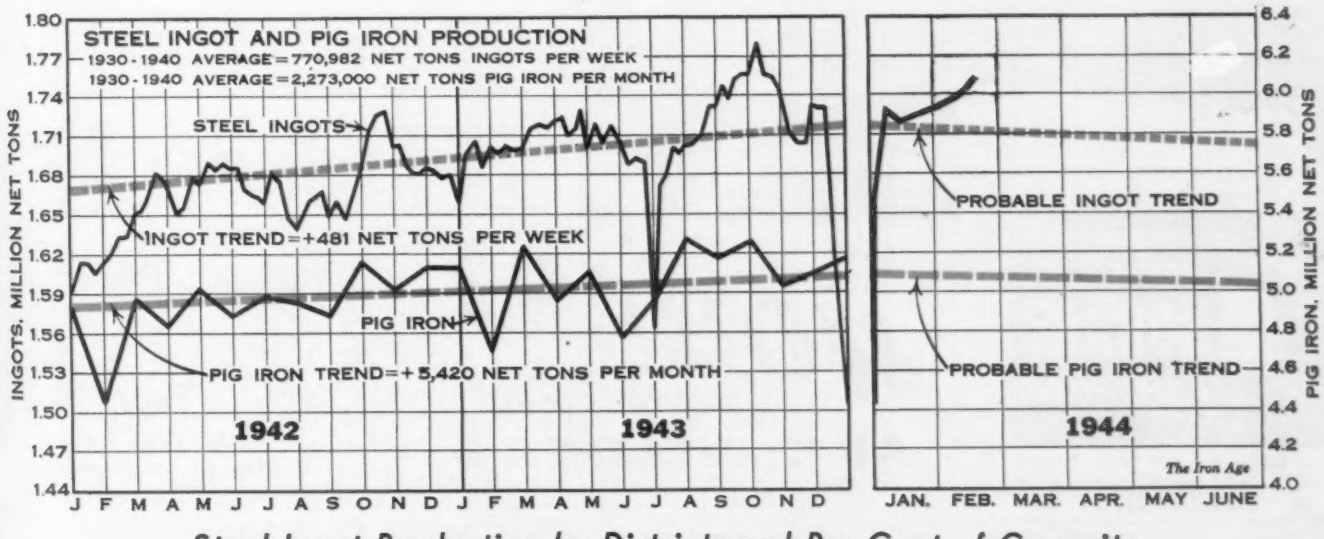
Carbon Steel Cost Study Nears End

Washington

• • • OPA officials expect to complete compilation of carbon steel costs by the end of the present week. They will then meet with the Steel Mill Products Advisory Committee, tell it what the figures show and discuss what action should be taken with regard to price adjustments. Action on carbon steel costs probably will be announced before OPA acts on the alloy steel price study which will parallel that made respecting carbon steel products.

A meeting was held Monday with the Alloy Steel Advisory Committee to get details necessary to begin the alloy steel survey. OPA Administrator Chester Bowles has said that the alloy survey and analysis will not be completed before March.

In response to inquiries OPA has sent out letters saying that the steel costs will not be made public unless the industry agrees to their publication. The figures are confidential and the price law prohibits OPA from making such information public without the consent of the affected industries.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 10	101.5	103.0	96.0	91.5	99.0	102.0	98.0	99.0	91.5*	95.0	96.0	97.5	89.0	97.5†
February 17	95.0†	102.0	97.0	91.0	96.5	103.0	95.0	99.0	96.5	95.0	94.0	101.5	90.0	96.5†

* Revised
† Based on revised capacity

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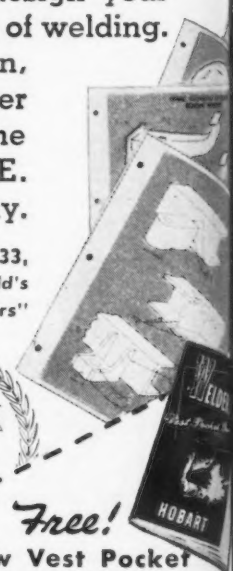

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BACK THE ATTACK! BUY MORE BONDS!

Bright Ray is Believed Sighted in Modernization Needs by Machine Tool Leaders

o o o

By DONALD C. MAC DONALD
Cleveland Regional Editor

o o o

• • • **After much heavy** thinking about saturation of markets and the damaging effects of renegotiation, some machine tool executives have found their thoughts converging recently upon what they believe are basically sound plans for the future.

The current aims of the industry are to modernize the tooling of American industry and quicken the flow of essential tools to manufacturers who will be converted to essential civilian production when military planning has transcended some of its hurdles, the most important of which appears to be the coming invasion.

To point out the need for industrial modernization one observer cites a survey which listed 945,000 machines which were over 10 years old in 1939 and which probably have been used excessively since that date.

Regarding the disposition of the vast number of machine tools produced since 1940, suggestions are being developed which are designed to regulate and ease the movement of these tools into useful and strategic places and which will also foster the best planning of industry in general for solving the economic conditions, soon to be created by reduced war contracts and post-war dislocations, through increased production and employment.

A recent study of the machine tool industry's production in the 1940-43 period-of-urgency indicates that approximately 800,000 tools were built and absorbed by this country and that about 200,000 more went abroad. Those machines which were exported are considered permanently out of this nation's future planning and more than half of the domestic supply are tentatively dispositioned according to various factors.

According to some of the best advised thinking in the industry, about 500,000 machine tools of the original 800,000 built in the war emergency period will be thrown onto the market as idle and excess equipment. Not all of this equipment will come out at once because contract cutbacks and cancellations will provide a slow movement of some portion of these machines during the balance of the war period and continued activity after the war will again suppress a certain percentage from immediate availability on the market.

The services are expected to retain or absorb about 10 per cent of the total in modernizing and refitting arsenals and other strategic production facilities. At least 80,000 of the machines are estimated to be of too highly specialized a nature to find a place in the post-war civilian market. These, if of military preparedness value, are expected to be stored for up to 20 years as a preparedness measure. Trade and technical schools are seen absorbing perhaps 10,000 machines. Russia is expected to require up to 150,000 machines and China and other war torn nations some unestimated small amounts. Estimates of the remaining pool of used but modern machines after these possible outlets have been satisfied run between 480,000 and 500,000 machines left to the American market.

As more than 945,000 machines were 10 years old or older in 1939 it can be seen that any sizable modernization program by industry could readily absorb the bulk of the excess machine tools in the above estimate.

No overloaded market, rife with speculators and bargain prices, is foreseen in that the flow of these machines is expected to occur by degrees. With each progressive stage of the war it is hoped that the military will release unrequired tools for absorption by industry elsewhere. It is also expected that as victory approaches more firms will be permitted to return to civilian production and thereby be in a position to buy equipment and create employment and useful production.

By the slow releasing of military facilities and balancing return to civilian production the gradual movement of equipment could be consum-

o o o

SMOKE STUDIES: *A column of smoke (top) testifies to the work of U. S. Marine demolition units on Kwajalein Atoll. At bottom, a Marine corporal toasts a Jap building on Namur with a flame thrower.*

o o o

mated. Cartridge and shell machinery is expected to be the first available and since this takes in a wide variety this first offering to the market should not be hard to move.

The policy which the machine tool industry seems to favor with regard to the pricing of this resale equipment would be to set prices approximating half the list value to encourage quick sales. It has been pointed out that while this appears to represent a heavy book loss to the government, that loss would be quickly offset to the American people by immediate useful production and employment. These machines could under those conditions be absorbed by civilian producing industries and be put to producing material and wages . . . instead of lying idle and in effect opening the door to unemployment and government relief.

Financing of the equipment is favored as a job for the private bank where idle capital and the desire for investment in free enterprise is said now to await only the day of opportunity.

One of the most insistent demands of the industry is that no matter what other provisions are made, the consummation of machine sales must be simple, direct and without limiting "strings" or justification being required to permit purchase. The thought is that anyone who will buy these machines and return to the government that prorated share of its investment should be permitted to do so. The machines though representing book losses to the government are judged to be better sold and in production than total losses and storage problems if held at high and unattractive prices by the government.

It is also projected that machine tool builders might be given a 10 per cent discount from established government prices for the sale of tools to permit purchase for reconditioning and resale through their own organizations. Such a scheme would allow a modest advantage over other purchasers which would permit rebuilding and resale at slightly higher than

(CONTINUED ON PAGE 166)

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Beehive Coke Output Being Curtailed

Pittsburgh

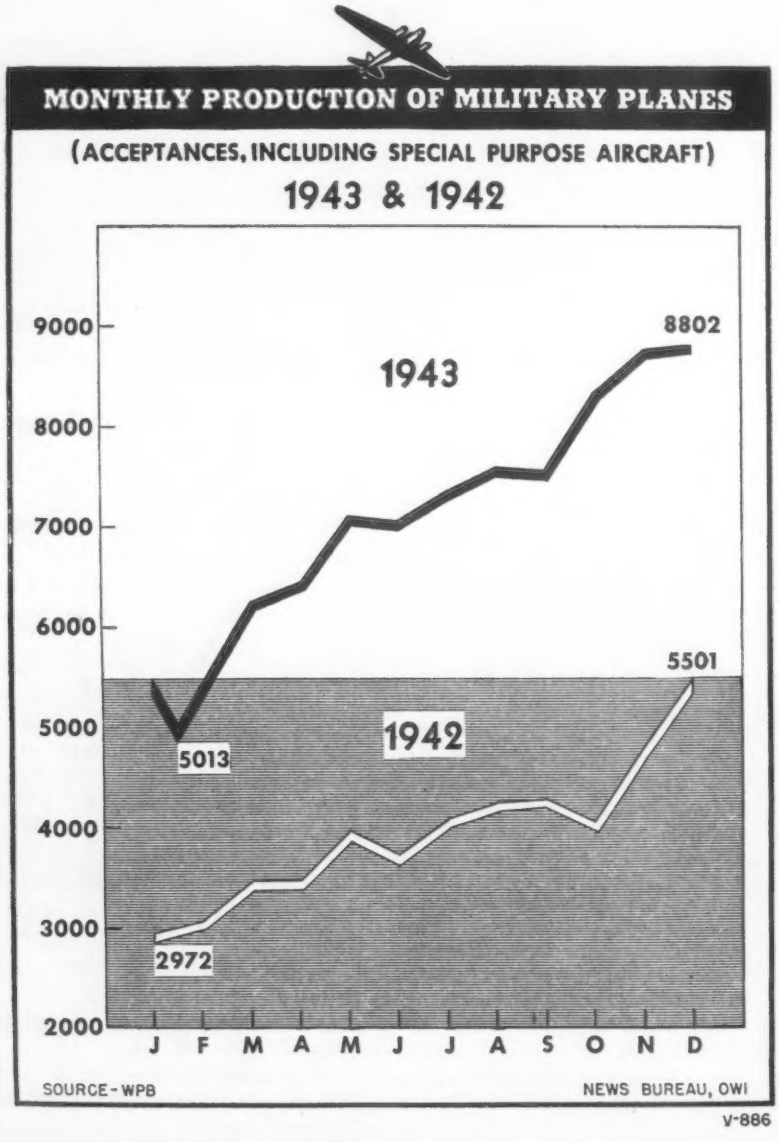
• • • **A falling off** in demand as well as increased production costs, coupled with consumer insistence on better quality, is rapidly resulting in a considerable number of beehive coke plant shutdowns in Western Pennsylvania.

Since the first of the year, it is estimated that about a thousand ovens have been taken out of operation, and hundreds of others have increased their coking time. The H. C. Frick Coke Co., it is understood, has drastically curtailed operations at four of its coke plants, and the number of oven shutdowns at those plants is believed to be in excess of 500.

Early in January, about 480 independent coke ovens had been taken out of operation, and this week about 90 more are slated to go down. High costs engendered by the recent increase in wages, as well as other items, have forced many hand drawn plants out of operation, despite the recent upward adjustments in the price ceiling. Lack of demand, however, has been the major factor in the present trend.

Some coke operators have been hanging on because of demands from the East for heating coke. This outlet, however, will disappear as soon as warmer weather materializes. The fact that many DPC blast furnaces are not operating, and the blowing out of some privately owned stacks for repairs, plus the substantial step-up in by-product coke production, permits the easiest condition in beehive furnace coke since the war began.

There are some observers who believe that within the next several months a considerable number of additional beehive ovens will go out of production, especially those to which coal has been trucked over a relatively long distance. Obviously, those plants, which have been forced to make coke with less desirable coal, will find it difficult, if not impossible, to distribute their coke.



Jesse Jones Gives Views on Decentralization and Stockpiling

By EUGENE J. HARDY
Washington Staff

• • • **Secretary of Commerce** Jesse Jones who came up to Capitol Hill Monday to discuss HR 3873, a bill to give RFC authority to dispose of government surpluses, found himself in the middle of a red-hot argument on the decentralization of America's basic industries, including steel. Mr. Jones, appearing before the House Banking and Currency Committee, talked on stockpiling, government plants and property, industrial decentralization and small business.

The discussion of decentralization of industry began mid-way through the morning session when Representative Rolph, Republican of California, asked Secretary Jones for his views on aluminum plants which had already been shut down because of an oversupply of the metal. Mr. Jones said that he thought these plants should be locked up and kept intact until the war's end and then disposition made of them.

Representative Patman, Democrat of Texas, sponsor of HR 3873, and an ardent advocate of a steel mill in every backyard, asked Mr. Jones what disposal would be made of Republic Steel Co.'s plant at South Chicago, Ill., and the Geneva Steel Co. plant in Utah, and from this point on the hearing centered upon industrial decentralization. Mr. Jones gave no direct answer to Representative Patman's question but did say that "if we could decentralize industry the country would be better off." This would indicate that Mr. Jones speaking for his half dozen bureaus, favored completing and operating the above-mentioned facilities as well as any others which would step up raw materials capacity. Mr. Patman said that steel people in Utah could save $10 to $15 a ton for West Coast users on freight rates alone.

The opposition to dislocating industry was led by Representative Jesse P. Wolcott, Republican of Michigan, who was disturbed by an earlier discussion of a point in subsection (c), Section 205 of the bill, which reads as follows:

"So far as practicable, the sale or lease of such (surplus) property should take into consideration the need for facilitating and encouraging the establishment in the various communities in the several states by members of the armed forces of the United States upon their discharge or release from active duty, as well as by others, of small business enterprises and with a view to strengthening small business enterprises."

A discussion of this section between Secretary Jones and Representative Patman led the Committee to believe that this bill would give the Government the power to move any of its facilities to any section of the country if a buyer could be found. The implication was also made that if buyers could not be found the government would operate these plants to achieve the purpose of making each section of the country self-sufficient in time of war.

At this point Mr. Wolcott said he was tired of a "managed economy" and that he was behind the bill until he saw that under the provisions it might be possible for the government to manipulate American industry as it desired. He asked whether the Federal government would be given authority to manipulate the location of industrial plants in the provisions of the bill. Mr. Patman replied that if there was no market for the plant in the area in which it stands, then someone in another area should be given the right to buy.

Mr. Wolcott was particularly displeased with the language "so far as practicable." He said he was tired of Congress enacting such vaguely worded legislation and then leaving the "practicability" up to some government bureau. He said that too much leeway was given under this type of legislation, citing OPA as an example. Mr. Patman countered this by saying inelastic legislation was too restrictive.

The Michigan representative said that power to move the steel industry from Pittsburgh to Utah would not only mean a movement of plants, but of people and would cause general disruption. He said that he thought it would be more economically sound to scrap excess factories, rather than move them all over the country. Secretary Jones had previously said that he favored moving such government-owned plants, if they were economically undesirable where they were located. Mr. Wolcott, addressing Mr. Patman, said he thought the bill was to dispose of surplus goods, eliminate speculators, etc.

At this point Representative Ford, Republican of California, in one of his dramatic renditions said that the Pacific Coast was dependent on a Pittsburgh-managed steel economy and that the "United States Steel Co." has managed the steel economy of the United States. He concluded by saying: "We've got steel plants and now we're going to keep them." This statement was greeted by a round of applause from a serviceman in the audience, to whom Mr. Wolcott replied the power to move a plant into a state would also be power to move another plant out of the state into which the first plant is being moved.

In closing this discussion Mr. Rolph commended Mr. Jones on his opinion that the Geneva Steel Co. facilities be completed.

Price Differentials Set on Rail Scrap

Washington

• • • Specific dollars and cents differentials that may be applied to the maximum price for No. 1 railroad heavy melting steel scrap by railroads, car manufacturers, and switching companies to determine their ceilings for 35 listed grades of railroad scrap were established this week by OPA in an amendment to revise price schedule No. 4.

The formula method of pricing grades other than No. 1 heavy melting, under which ceiling prices were the highest prices individual sellers charged during the base period of Sept. 1, 1941, are replaced.

The differential pricing method supplies sellers with specific additions and deductions that may be applied to the ceiling for No. 1 scrap in 29 basing point cities. The differentials set ceiling ranging from $6 a ton over the base to $6 below the base price, according to grade.

Also an increase in dealer's fee for preparing heavy breakable cast iron scrap for foundry sizes from $2.50 to $3.50 per gross ton was announced. There was also an increase of $1 per gross ton in dealer's fee for in-transit preparation.

Because the new price ceilings were not received in time to adjust the price schedule on the following page, such changes will be made in the issue of Feb. 24.

Briefly Told—

Cancellation Makes 4600 Tons of Steel Available at Detroit

• Approximately 4600 tons of shell steel has been made available at Detroit through the WPB Materials Redistribution branch as a result of a contract cancellation. The steel is in 3¾ in. rounds from 15 to 22 ft. in length. Analysis is 0.50-0.59 C; 0.69-0.98 Mn; 0.055 P; 0.06 S; 0.15-0.35 Si.

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• Companies interested in obtaining surplus materials and equipment being offered for sale by the Army Air Forces and who are desirous of being placed on the active bidders' list, should write to the Army Air Forces, Material Command, Midcentral Procurement District, 111 West Jackson Blvd., Chicago 4, Attention of Redistribution and Salvage Section, according to an announcement by the section.

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• *C. D. Howe, Minister of Munitions and Supply, stated that Canadian shipyards are to enter upon the construction of a number of large steel landing barges, the first of this type of craft to be built in Canada although smaller craft of this nature have been produced in hundreds. Orders for the large steel landing barges have been placed with Yarrows Ltd., Victoria, B. C.; Davie Shipbuilding & Repairing Co. Ltd., Lauzon, Que., and Canadian Vickers Ltd., Montreal.*

•

• Leo T. Crowley says his alien property office has seized control of property valued at $375 million plus 41,000 patents and patent applications.

Business enterprises taken over by the custodian totaled 318 and about 200 of them, principally trading companies, banks and insurance companies, are being liquidated. Approximately 100 are being continued as going concerns and will be sold to private interests through competitive bids.

•

• *Canadian control boards are lifting restrictions on the use of iron, steel, metals and other materials to enable larger production of civilian goods. Wartime Prices and Trade Board has taken action to make available certain metals for the manufacture of builders' finishing hardware, cabinet locks and padlocks. Releases of nickel, silver, ingot brass, secondary aluminum and secondary zinc from the restrictions will permit the manufacture of some items previously prohibited.*

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• The Missouri Supreme Court has held that the 2 per cent sales tax does not apply to interstate retail sales in three test cases, one by the American Bridge Co., the other two by the Binkley Coal Co. The ruling, which declared invalid the attempts of State Auditor Forrest Smith to levy the tax on interstate sales, applied directly to about $500,000 in sales taxes impounded in court at Jefferson City, Mo.

•

• Stainless steel will remain the principal structural material in railroad passenger cars constructed by Edward G. Budd Mfg. Co. in the postwar period despite increased availability of aluminum, company officials say. Aluminum will be utilized for interior trim, car seat components, and other non-structural accessories because of its light weight, but basic structural members, including the "skin," will still be of stainless steel construction.

•

• *As a result of increased demand for electric fence controllers, the industry will have in the 12 months ending June 30, 1944, produced a substantially greater quantity of these devices than in any previous year, according to WPB. These devices, which permit slight electric impulses to be transmitted through fence wire at determinal intervals, aid stockmen to confine cattle to enclosed areas.*

•

• The American Hot Dip Galvanizers' Association will hold its annual meeting at the Blackstone Hotel, Chicago, on Feb. 24 and 25. Attendance will be by invitation. Representatives of the Zinc Division, WPB, and the Conservation Division, WPB, will be among the speakers. E. V. Gent, Zinc Institute, F. W. R. Pride, of the Navy Price Adjustment Board, and A. T. Baldwin, of the Hanson-Van Winkle-Munning Co., are also slated to talk. Stuart J. Swensson, American Bank Building, Pittsburgh, is secretary of the Association.

• *Iron ore production in the United States in December totaled 3,656,268 net tons, while stocks at the end of December were 34 per cent greater than at the end of November, according to the Bureau of Mines.*

•

• The Gray-Mills Co., manufacturers of portable coolant systems for metalworking industries, has moved from 215 W. Ontario Street, Chicago, to a new plant at 1948-52 Ridge Avenue, Evanston, Ill. The new plant, a two-story structure containing 50,000 sq. ft. of floor space, more than doubles space formerly used for manufacturing, warehousing and by the engineering and office personnel.

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• *The Lockheed Aircraft Corp. last week disclosed the invention of a new machine designed to set from 33,600 to 75,000 rivets an hour.*

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• A manual of preparation for war contract termination was issued Feb. 12 by the National Association of Manufacturers, New York, for the guidance of its members. Meanwhile, in Washington, the U. S. Army (Readjustment Division of the Army Service Forces) is reported to be rushing to complete a manual on the problems of contract termination.

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• *The American Brake Shoe Co. has issued the third of its good-will books. This one is entitled, "Your Son and Ten Fighting Generals." It is written by Donald Wilhelm. The theme is that "the fate of your boy, mine and millions of others, is directly in the hands of ten men—Gen. Marshall and the nine other generals in command of our war theatres and armies."*

•

• Through inventories set up in the WPB regional offices, 12,728 items of used construction equipment were supplied for construction jobs in 1943. These items are valued at $64,000,000 and represent a saving of approximately 126,000 tons of raw materials, since they were used in place of new equipment, 90 per cent of which is said to be needed overseas.

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• *In December, 1943, when he resigned as chairman of the board of the Pittsburgh Steel Co., Henry A. Roemer, according to a SEC report of recent issue, disposed of all of his stock holdings in that company by the sale of 20,222 common shares. He increased by 4700 his former total of 4683 shares of common stock of Sharon Steel Corp., it was disclosed, to a total of 9383 shares, and his ownership of Sharon Steel preferred to a total of 1,065 shares.*

(CONTINUED ON PAGE 130)

Labor Plays Key Role in Output Of Foundries Affecting Merchant Iron

New York

• • • **The continued high** production of merchant pig iron throughout the eastern and midwestern parts of the nation seems to hinge primarily on the ability of foundries to produce up to their order books.

Labor in the foundries is the present hampering factor to casting production and is becoming continually more serious. Gossip in the trade has it at present that draft boards in the western Pennsylvania-eastern Ohio areas are trying to get molders, pourers, and other skilled foundry help on a preferred list so that the drain on manpower in this industry will subside. Newcomers into the field are few, mainly because of the dirty, backbreaking work at not too high a pay rate. Orders are and have been well ahead of iron foundry output.

Following the cessation of allocation of pig iron, orders through the first quarter of 1944 took a sudden spurt upward. However, one of the difficulties of going from a free-commercial to a government regulated and back to a free-commercial method of doing business became immediately apparent following the cessation of allocation of iron. While iron was allocated, consumers ordered on a monthly basis and, if the allocation was approved, received specified tonnages each month. However, the normal method of doing business in merchant iron was to order on a quarterly basis, specifying monthly shipments. Consequently, during the first quarter, iron producers continually had to keep in touch with consumers to determine what individual monthly shipments were desired. With the limited types of merchant blast furnace products available, this may be an indication of what can be expected when there is a wholesale changeover on other lines of production.

Merchant furnaces probably will start opening order books for second quarter bookings within the next two weeks, but furnaces are generally sold out through the first quarter.

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Founders Advised to Adjust Certain Operating Policies

Chicago

• • • **Provided** certain operating policies are overhauled, a brilliant future lies ahead of the foundry industry through technological advances, John H. Van Deventer, president and editor of THE IRON AGE, told the Chicago Chapter of American Foundrymen's Association last week.

Development of alloy irons and of heat treatment indicate that disadvantages of gray iron, because of lesser strength and shock resistance than competing materials, are being overcome. Certain progress in centrifugal casting, development of the use of permanent molds, particularly for non-ferrous centrifugal castings, and other precision casting processes rapidly developed during the war were credited with greatly advancing the industry.

Foundries were urged to follow the lead of the steel industry and shape merchandising and production in accordance with customer needs, particularly with metallurgically tailored castings. This step, Mr. Van Deventer said, would enable foundries to break the shackles of limited sales territories caused by freight rate considerations. An expanded market and technical research program will be necessary to push forward this specialization, he declared.

Refinement of cost accounting systems was said to be a basic necessity in order to put many foundries on their feet financially, and thus enable them to serve their customers efficiently.

"Cooperative research utilizing the wonderful laboratory facilities and personnel of our great universities is essentially practical for your industry," Mr. Van Deventer said.

As a corollary, he urged the foundries to actively recruit new engineering and technological talent, lack of which he classified as a current "vitamin deficiency" for the industry.

Malleable Casting Output at New High

• • • **For the second time during 1943, malleable iron casting production passed the 75,000 net ton mark in December, when 75,188 tons were produced. This made the year's output 849,764 net tons a new annual production record for malleable iron castings. Issued by the U. S. Department of Commerce, statistics on malleable iron castings for 1943 and for the last four months of 1942 were compiled from returns of 103 manufacturers with 113 plants.**

	MALLEABLE IRON CASTING PRODUCTION, NET TONS				
	December, 1943	November, 1943	1943	1942	1941
PRODUCTION, TOTAL	75,188	72,077	849,764	768,496	843,038
For sale to outside trades	57,744	54,640	654,524	607,610	630,800
For use by own company, or that of an affiliate, subsidiary, or parent company	17,444	17,437	195,240	160,886	212,238
SHIPMENTS, TOTAL	76,832	72,838	844,639	746,008	832,173
To outside trades	58,475	55,351	653,884	590,804	619,365
For consumption by own company, or by an affiliate, subsidiary, or parent company	18,357	17,487	190,755	155,204	212,808
ORDERS BOOKED, LESS CANCELLATIONS, TOTAL	81,978	93,370	1,054,224	859,102	884,881
For outside trades	60,420	71,153	826,422	703,167	663,688
For consumption by own company, or by an affiliate, subsidiary, or parent company	21,558	22,217	227,802	155,935	221,193
Monthly index of production *	187.1	179.4	176.2	159.4	174.8

*Based on average monthly production (40,181 tons) for the five year period 1935-1939.

Hanna Shuts Down Furnace

Buffalo

• • • **Attributing the** situation to a decline in general foundry demand for merchant iron, Hanna Furnace Corp., Buffalo, shut down a 500-ton blast furnace Feb. 10. Three furnaces remain in production.

USWA Inaugurates Its Own "Mustering Out" Pay System

Pittsburgh

• • • **Cognizant of the** actual and potential weight of opinion which the armed forces hold with respect to events along the home front, the United Steel Workers of America-CIO has proposed that if steel labor is granted a wage increase the workers shall contribute $20 per person and the steel companies a like amount, for a joint fund which will be paid out to steel workers in the armed forces when they are mustered out.

The resolution enacted upon by the union's national wage and policy conference, held in Pittsburgh Feb. 11th, authorizes the union to submit to the WLB, as part of the case which it now has before the board, in the form of wage requests, etc., the following proposal:

1—In case of a wage increase, steel workers to contribute out of this $20 per worker.

2—Steel companies to be directed by WLB to match employee contributions.

3—Contributions to be pooled into a single joint fund which shall be paid out to steel workers in the armed services when they are honorably discharged, or to dependents of those killed in service. The pro-ration to be on the basis which will allow a certain amount to each soldier, depending on his length of service both in this country and overseas.

4—The program to be under the supervision of trustees to be named by steel companies and the union.

With the union claiming about 700,000 members, and if a wage increase were granted, and if all these employees contributed $20 and if the steel companies matched this contribution, the pool of money for distribution to men in the armed services would approximate $28,000,000, or an average of about $140 for each steel worker in the services. No comment from steel sources on this program was available here, and it is now in the lap of the WLB.

Labor Shortage Eases

• • • A decrease in absenteeism with an easing in the critical labor situation and a generally better production outlook is reported from New England manufacturing centers other than the Boston area. One reason is that thousands of women workers who were chronic absentees have dropped out of industry, having found that keeping abreast of both home and war work is impracticable.

Allister R. Tullock of the Employers Association of Western Massachusetts says industrial plants in the Springfield area have reached a peak of employment, although there are some that still need help, particularly common labor.

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Boston Placed on 48-Hour Week

Boston

• • • **With virtually** all essential industries operating on a 48-hr. weekly basis, the Boston area was officially placed on that basis by the War Manpower Commission and War Production Board. Business admits any benefit will not result immediately; that it will take time to squeeze labor out of small into big plants; and perhaps the ultimate result of the action will hurt business in general in the long run.

A voluntary suspension of hiring by all non-essential and not locally needed business in the Boston area will probably be asked. It is hinted that if this suggestion is made and not followed, Washington will slap the 48-hr. week on all industry and business.

The largest essential Boston war industries are firing rather than hiring help. Their help wanted advertising has been cut or abandoned, and those few essential industries advertising for help are either comparatively small or want women and girl workers only. Investigation shows that 80 per cent of help wanted newspaper advertising is by non-essential firms calling for a class of help hardly suitable for war work.

Boston essential war industry women workers comprised 30 per cent of all employees, but in the past six months have dropped to about 26 per cent. This fact, coupled with the estimated 15,000 men to be inducted between Jan. 1, last, and next June 30, is intimated to have been considered by the WMC before making its Boston area 48-hr. week decision.

VILLAGE SMITHY GOES TO WAR: *Process of fabricating parts of phantom or magic decks in the shop and installing them atop merchant cargo vessels and tankers has resulted in Greenwich Village blacksmith shop expansion, with 10 plants and storeyards now in use. Idea enables safe transport of planes, whole railroads, invasion barges in sections and PT boats. School children watch 68-year-old Joseph Yellen at his work.*

Pittsburgh Establishes "Manpower Budget Plan" to Combat Labor Shortages

Pittsburgh

• • • **On March 1** a male employee job rationing plan said to be composed of the good points of plans now in effect throughout the country, will become effective in the Pittsburgh area. This plan is to forestall the imposition of a mandatory 48-hr. week and the placement of Pittsburgh in the Group 1 Critical Labor status.

According to the WMC here, hiring of women will remain unrestricted except that those in essential activities cannot shift jobs without first obtaining a statement of availability.

The rationing program, to be known as the Pittsburgh Manpower Budget Plan, was adopted by a unanimous vote of the Labor-Management Committee, and imposes drastic control over employment activities not considered essential or locally needed. Employers in the Pittsburgh area will be divided into three classifications:

Group 1—Those with direct Army, Navy or Maritime contracts will be permitted to hire men for both replacement and expansion needs.

Group 2—All other employers whose activities are considered essential or locally needed will be allowed to hire men for replacement only.

Group 3—Non-essential employers who will be permitted to hire only women, veterans, boys under 18, part time workers available for no more than 30 hours of work in any seven day period, and 1-A draft registrants awaiting induction. Other than that, employers in this group, which includes department stores, restaurants, taverns, etc., will be permitted to hire only through the U. S. Employment Service.

Groups 1 and 2 employers will be able to do private hiring in accordance with the regular rules covering "releases" under the employment stabilization plan. The WMC area director here, Patrick T. Fagan, has by letter warned Pittsburgh area employers that numerous instances of violations in hiring employees, without fullfilling the proper terms under which statements of availability are granted, have come to his attention.

A committee representing agencies such as the WMC, WPB, the Army, etc., has been named, and will rate employers on a priority basis for the purpose of filling vacancies as well as establishing employment ceilings. It is expected that half of the industry in the Pittsburgh area will come under either Group 1 or Group 2. Steel companies, it is believed, for the most part will come under Group 2, unless a portion of the plant or a plant is working specifically on direct contracts from the Army, Navy, or Maritime. Shipbuilders here will be Group 1.

Labor observers here have noticed that non-essential activity appears to have had little difficulty in obtaining new employees, while certain jobs in essential industries have gone begging. While the Pittsburgh area does not appear to have a "numerical" labor shortage, there is a severe shortage of men for certain jobs in essential industries or a shortage of employees willing to take these jobs.

With non-essential activities being forced to clear their employment needs through the USES, except when women, young boys, or veterans are hired, it is believed that a better control over available labor will result.

The Pittsburgh area for which the plan will become effective applies to Allegheny and Beaver Counties, New Kensington, Vandergrift and Monessen districts of Westmoreland County, the Charleroi sector of Washington County, and the town of Belle Vernon in Fayette County.

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Frazer Buys Warren Plant

Cleveland

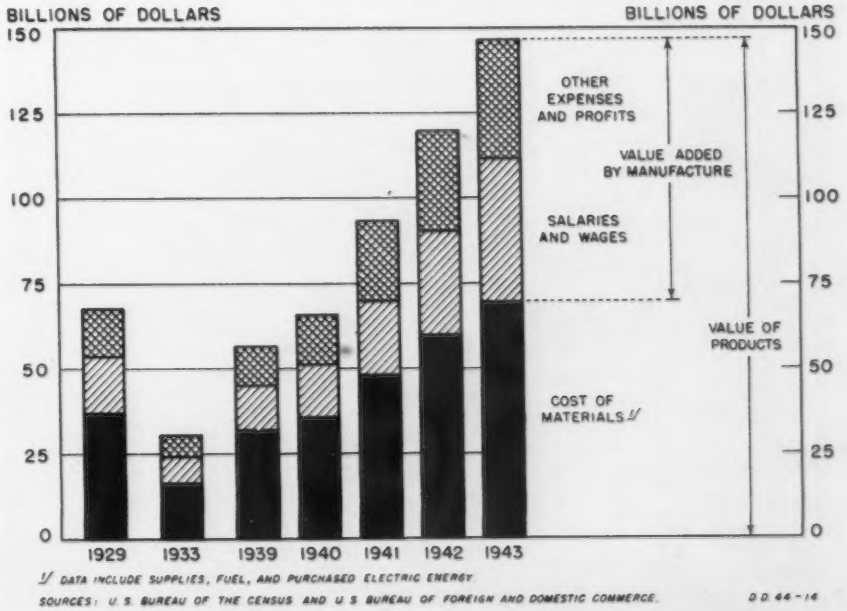
• • • **Joseph W. Frazer,** former president of the Willys-Overland Corp. and executive of the Chrysler Corp., announced to THE IRON AGE on Feb. 15 the completion of the transaction transferring certain assets of the Warren City Tank & Boiler Co., of Warren, Ohio, on Feb. 13, to his newly organized Warren City Mfg. Co. The plant will continue to produce for the Navy as it has in the past and will employ 1500.

Officers of the new company are: Frazer, president; W. A. MacDonald, vice-president and field manager; Raymond J. Fitness, vice-president in charge of manufacturing; Marvin J. Ales, vice-president and treasurer; Erwin Ilg, assistant secretary.

The assets purchased in the transaction include accounts receivable, inventory and certain fixtures. About $10,000,000 is reported to be on the books of the company, according to Frazer. The plant will continue to make landing barges, boilers, diesel engine crankcases, reduction gear cases for ships, and other products for the Navy Bureau of Ships.

Rear Admiral C. L. Brand, U. S. N., chief of the shipbuilding division of the Bureau of Ships, said, "We are confident that under Mr. Frazer's management the Warren City plant will continue to improve its production record."

VALUE OF PRODUCTS OF MANUFACTURING INDUSTRIES



Manufacturer Responsible for Delivery under New Scheduling Method

Washington

• • • **Scheduling procedures** designed to bring about greater utilization of available productive facilities, have been adopted by WPB. During the past year, scheduling controls have been implemented by WPB under rigid rules, requiring manufacturers to file detailed order sequence reports with the various WPB Industry Divisions. As a result of this experience, it is now possible to center controls in the hands of the manufacturers themselves.

Major purpose of the shift in scheduling controls is to center responsibility for meeting delivery requirements of specific components and parts in the hands of manufacturers as far as possible. Items affected are those common to more than one (in some instances, many) war production programs. The new scheduling procedures are spelled out in General Scheduling Order M-293, as amended Feb. 10, 1944. This order (1) modifies procedures in connection with Class X products, (2) includes specific provisions with respect to undesignated products, and (3) eliminates the Class Z product designation and rules which have governed scheduling of them.

Manufacturers of Class X products must continue to file delivery schedules with WPB unless specifically exempted from doing so. In all practicable cases, manufacturers will be excused. Only cases where delivery schedules are consistently out of line with actual delivery needs or where considerable adjustment of schedules is necessary due to changing requirements will be viewed by WPB as requiring continued WPB supervision. In either case, the Class X product manufacturer's schedule will be frozen.

This will give most manufacturers of Class X products the authority to freeze their own delivery schedules as of a specific date each month in line with general WPB rules. This date will vary from manufacturer to manufacturer, and will be indicated in the letters sent from WPB excusing them from filing reports of their delivery schedules. Delivery schedules of those manufacturers who will be required to continue filing will be frozen as of the date the schedules are mailed to the WPB.

Frozen delivery schedules are those which may not be interfered with unless on specific authorization of the WPB. This means that the delivery sequence may not be upset and that production necessary to meet that sequence may not be interrupted to meet deliveries for other products.

Class Y product scheduling procedure has not been modified although the number of such items will be reduced. Persons desiring to purchase Class Y products are still required to obtain a specific authorization from WPB to purchase them as well as authorization for manufacturers to accept their orders. Delivery schedules for Class Y products become frozen schedules as of the time orders for them are accepted by the manufacturer.

Undesignated products are those on which delivery schedules must be filed by specific manufacturers at the direction of WPB. This procedure has been in use for some time.

Individual manufacturers of undesignated products will be instructed by WPB that they must file delivery schedules. However, other manufacturers of these products may file the appropriate forms which will now be specified in order M-293, although the schedules will not be frozen until WPB so directs.

WPB has reserved to the War Department, Navy Department, Maritime Commission, Office of War Utilities, and the Petroleum Administration for War and the Canadian Division for similar programs the right to require statements of delivery requirements in connection with the products which are affected insofar as the principal war production programs are concerned.

"WASP WAGON"—*Packing four .50 cal. machine guns mounted on the top, this half-track is the Army's newest mobile weapon, according to the Cleveland Ordnance District. Capt. T. O. Girdler, son of Republic Steel Corp.'s board chairman, mans the unit.*

Railroad Gages Standardized

Washington

• • • **To provide for** the standardization and simplification of railroad gages which are specially designed and manufactured for use on locomotives and railway rolling stock, WPB issued Schedule 8 to Order L-272. This action represents a further step in the program of standardization of industrial type measuring instruments that has been conducted over a period of several months by the issuance of various schedules under the existing order.

Order M-21-g Clarified

Washington

• • • **To clarify** an anomalous situation in connection with the materials control provisions covering the manufacture of conveying machinery and mechanical power transmission equipment which arose through the revocation of Order M-21-g, WPB issued an amendment to L-193. The amendment permits producers of such equipment to use alloy steel or iron in chains and sprockets of conveyors and elevators.

CMP Revision Permits Use of Surplus Stocks in Other Schedules

Washington

• • • **WPB has clarified rules** governing the use of controlled materials after they are received by a manufacturer. The clarification was made by an amendment to CMP Regulation No. 1, which deals with basic CMP allotment procedure.

The amended regulation permits a manufacturer to use surplus material to fill another authorized production schedule than the one for which the material was originally acquired, if he changes the original allotment account. Formerly, a manufacturer could only use such material to fill another authorized production schedule if the other schedule was identified by the same claimant agency letter symbol.

The amended regulation states that a consumer of controlled materials may keep such materials and Class A products received in a common inventory. In withdrawing from this inventory, he does not have to charge these products or materials against his allotment account.

Manufacturers operating under several production schedules do not have to maintain separate records for each schedule, if their usual records indicate that the production on each schedule is substantially in proportion to the amount of the allotments received for each schedule and that their aggregate production of any product does not exceed the aggregate of the production schedules authorized.

Consumers of controlled materials must charge their allotment accounts with materials acquired under Priorities Regulation 13, unless that regulation indicates that such a charge is unnecessary. In certain instances, WPB regional offices are permitted to allow the allotment purchase of controlled materials, under provisions of Priorities Regulation 13.

The modified CMP Regulation No. 1 requires that consumers check on allotments the first of each month, and if they have been allotted more controlled materials than needed, returns of the excess must be made by the tenth of the same month. At the end of each calendar quarter, a consumer must determine whether he has used his entire allotment by placing authorized controlled material orders or making allotments to secondary consumers, and, if he has any excess, regardless of how small it is, he must return it by the tenth day after the close of the quarter. Minor changes are made in the symbols designating claimant agencies. In addition, the list designating controlled materials has been spelled out in greater detail, indicating more specifically what materials are in the different categories.

Bearing Users Acceptances Restricted until Sept. 30

• • • **WPB ordered** that users of anti-friction bearings may not accept deliveries in excess of specified amounts during any one month of the 2nd and 3rd quarters of 1944 without specific approval. This action was taken in a move to relate the actual needs for such bearings to the supply, and to assure that statements of delivery requirements are realistic.

Direction No. 1 to table 12 to order M-293 provides that without specific WPB authorization no persons shall accept from either a manufacturer or a distributor, during any one month between April 1 and September 30, 1944, any anti-friction bearings in excess of: 1—Fifteen hundred bearings of any one size where they are being purchased for incorporation in an end-product or for reshipment with the end-product as concurrent spare bearings. 2—Five hundred bearings of any one size where they are being purchased for reshipment to the Army, Navy, Maritime Commission, or the War Shipping Administration subsequent to delivery of the end-product. For example, this would include bearings bought for the purpose of filling contracts for "second year replenishment" bearings and for similar supplemental spare bearing requirements ordered by the procuring service.

Bearings of one size used during a month in amounts less than those specified need not be reported. These restrictions on acceptance of bearings apply on a plant basis, and if one producer has more than one plant, the limits apply to deliveries to each plant.

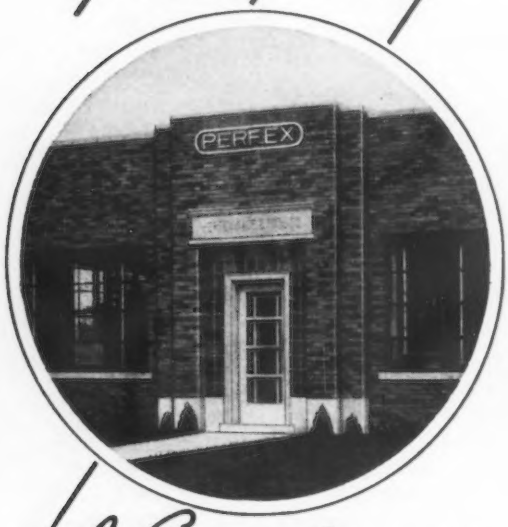
Approval to purchase anti-friction bearings may be obtained by filing WPB Form 3333. This form should be filed before March 1, indicating bearing requirements for the two succeeding calendar quarters.

In filing Form 3333, users shall (1) state delivery requirements, for those bearings used in sufficient amounts to require reporting, from April through September, 1944, inclusive, and (2) finished product schedules for April through December, 1944, inclusive.

Some users were requested in a letter dated Jan. 7, 1944, to indicate delivery requirements from March through August, 1944. They will continue to make applications to receive anti-friction bearing deliveries as were instructed in the letter. However, persons who submitted requirements for anti-friction bearings on the original WPB Form 3333 of Oct. 22, 1943, according to WPB's telegram of Oct. 28, 1943, will be required to follow the new procedure.

NOT FOR SCRAP DRIVE: *This badly damaged Lancaster is being reconditioned at a British aircraft factory. Repairs are made quickly so that the bombing of German cities continues on an uninterrupted schedule.*

The Home of Accuracy



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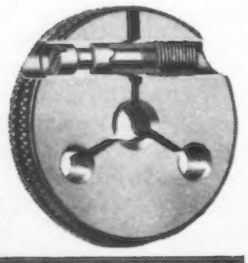

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Warren T. Kable....Pittsburgh, Pa.
Joseph Carlin.....Bala Cynwyd, Pa.

WPB Administers Tax Amortization

Washington

• • • **Carmen Blough,** head of the WPB Facility Amortization Division, said that there has been a great deal of misunderstanding of the Executive order of Dec. 17 transferring the administration of tax amortization laws to WPB.

Many industries have interpreted the order as an invitation to once again apply for certificates of necessity at a comparable rate which they did when the government first adopted the policy of encouraging the private financing of defense plants.

Mr. Blough said that the contrary is true, and that all applications for certificates are being reviewed in the light of the requirements that (1) facilities to be constructed or acquired are clearly necessary for the war effort and (2) that it is to the advantage of the government that such additional facilities be privately financed.

Consequently, under current policy, certificates are being granted in a minority of cases, inasmuch as the government war construction program is largely completed and many facilities are in existence which are available for most war needs, it was pointed out.

The advantage tax amortization gives, Mr. Blough said, nearly amounts to a government grant of the facility since the five year privilege on the average equals 91 per cent of the value of most plants built under certificates of necessity. Certificates of necessity to value of $5,500,000,000 have been issued according to the latest War Department tabulations.

Republic Issues Steel Manual For Latin American Countries

• • • **A 98-page book,** "The Story of Republic Steel," is being distributed to buyers and users of steel in all Latin American countries. It is available in English, Spanish and Portuguese editions. In addition to telling the story of how steel is made, it offers much technical information on many different types of steel, steel products and steel applications for the guidance of purchasers and fabricators outside the United States.

One chapter deals with the forms, finishes and sizes of well-known specialty products in steel. Definitions of iron and steel terms are collected for Latin Americans in another part of the book.

PRODUCTION UP COSTS DOWN

with Titan Hot Pressed Parts

Intricate shapes, thin sections, dimensional accuracy. No sandpits, blowholes or sand particles to impair machining or cause failure under stress or strain. Easy machinability with minimum scrap keeps cost of finished parts down. Titan's faultless machining delivers finished parts all ready for your assembly, or you can do your own machining if you wish. Advanced metallurgy, engineering skill, craftsmanship in manufacturer, personalized service, promptness—all are available from Titan. Experts in non-ferrous metals for over a quarter of a century.

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Titan

METAL MANUFACTURING COMPANY
BELLEFONTE, PA.

Quality Alloys by Brass Specialists

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THE ROSS CARRIER COMPANY, BENTON HARBOR, MICHIGAN

ROSS

HEAVY DUTY MATERIALS-HANDLING EQUIPMENT

BENTON HARBOR • MICHIGAN

Priority Changes

L-42—Sched. VIII eliminates simplification and standardization requirements in the manufacture of radiator supply valves, low pressure thermostatic radiator traps, combination float and thermostatic traps and boiler return traps. (2-8-44)

L-106—Order restricting use of copper for certain automobile parts has been revoked. Other copper orders (L-158 and M-9-c) remain in force. (2-12-44)

L-193—Amended order permits conveying machinery and mechanical power transmission equipment producers to use alloy steel or iron in chains and sprockets. (2-11-44)

L-248 amendment permits use of iron and steel frames in luggage for civilian use, as well as the use of iron and steel slide fasteners. Also packing trucks are added to luggage permitted made for civilian use.

L-269—Amended order relieves mining equipment manufacturers from filing monthly reports on schedules for 40 items of equipment. Required to submit report at any time, should such report be deemed necessary. (2-7-44)

L-292—Sched. VI and VII set percentages covering the gross tonnages of controlled materials manufacturers may use in production of meat canning, processing and packing machinery and equipment, and quota percentages covering the production of flour, grain, and feed milling and processing machinery equipment. (2-11-44)

L-303—Amdt. 1 rules that preference ratings of AA-3 or less on civilian purchase orders for steel insect screen cloth be disregarded, to provide equitable distribution of this product for civilian use. Such orders are now to be treated as unrated orders. (2-11-44)

L-318—Standards for manufacture of spot welding electrodes revoked. (2-7-44)

M-6-c—Report forms for nickel scrap and secondary nickel have been revoked. (2-9-44)

M-9—Amended order removes flake type bronze powder from definition of copper and copper-base alloy powders for which it has heretofore been necessary to obtain authorization to receive deliveries. (2-11-44)

M-9-c—Amended order provides that insect screening not purchased by Metals Reserve Co. or Copper Recovery Corp., except when rejected as not meeting specifications, will be subject to prohibition of delivery cutting or installation of the material. (2-12-44)

M-21—Amended order excepts cast iron soil pipe and fittings from prohibition on delivery of iron products except on rating of A-10 or better. (2-7-44)

M-293—Dir. 1 to Table 12 provides that users of anti-friction bearings may not accept deliveries in excess of specified amounts during any one month of the second and third calendar quarters of 1944 without specific approval. (2-9-44)

M-369—Amended order gives producers of tungsten, molybdenum, and their alloys opportunity to unify production schedule. (2-8-44)

P-55-c—Order provides simplified procedure eliminating filing of material lists for privately financed housing construction and permits use of additional materials to conserve lumber and fuel. Order effective March 1. (2-12-44)

Dir. 7 to PR 3 governs replacement of defective material or material lost, stolen, destroyed or damaged in transit when rated orders were placed for it. (2-8-44)

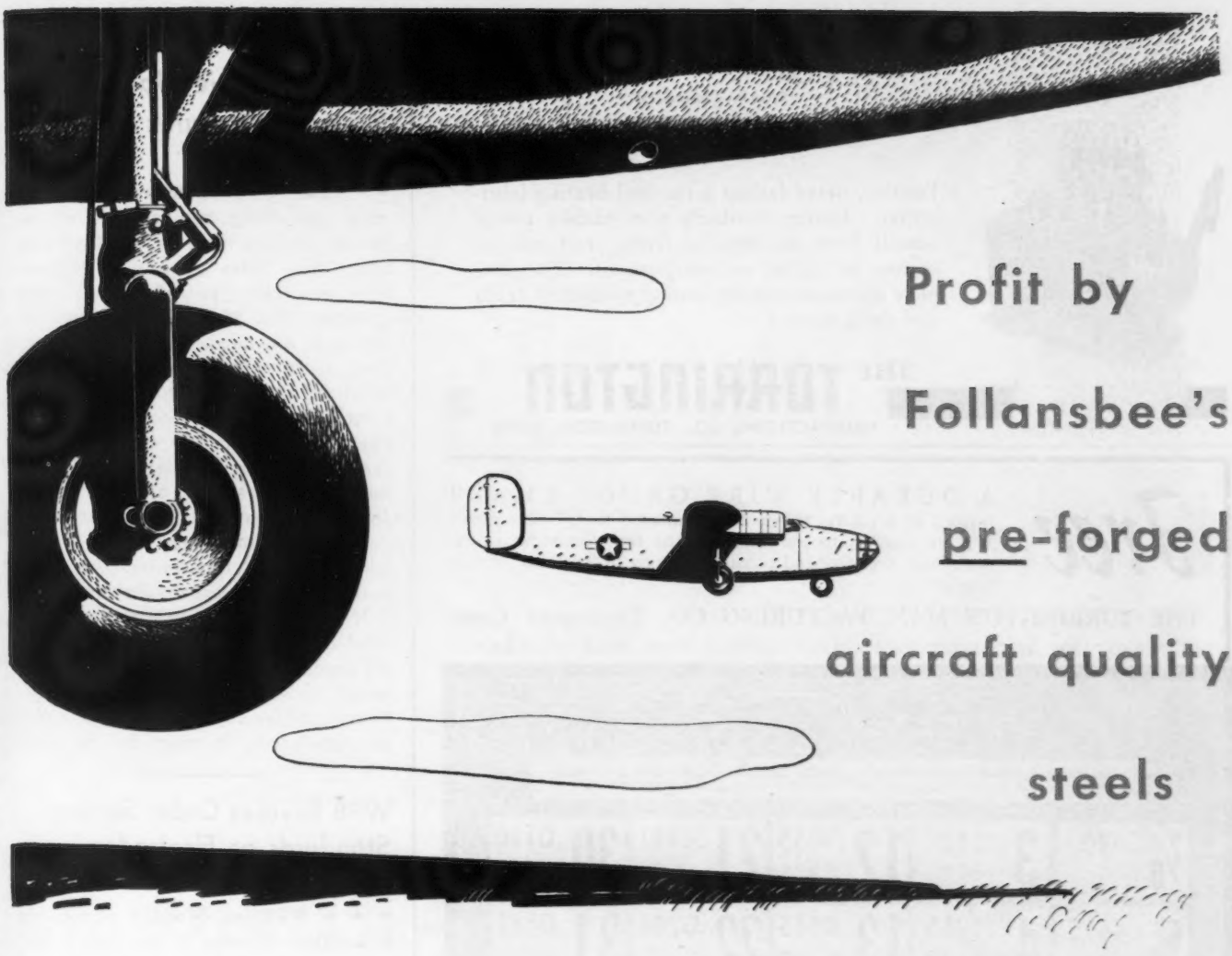
Dir. 1 to PR 11B provides procedure under which manufacturers of one product, part of the output of which are Class B products and the rest of which are unclassified products, may file a single CMP-4B application to cover the entire production of the item. (2-11-44)

CMP Developments

● Dir. 2 to Reg. 6 indicates that rules previously governing housing construction no longer apply inasmuch as Limited Preference Order P-55-c now governs. (Release No. WPB-4973)

●

● Sched. III to Reg. 1, amended to include the time for placement of authorized controlled material orders for copper and aluminum. (Release No. WPB-4930)



Profit by Follansbee's pre-forged aircraft quality steels

An important aircraft equipment manufacturer says, "Our tests show your steel to be the highest quality for aircraft service . . . we are approving your basic open hearth steel, aircraft quality, as an alternate for standard electric furnace steel of aircraft quality."

Follansbee alloy steels are winning such recognition through the exclusive PRE-Forging process—the pressing of ingots into blooms or billets, resulting in a more homogeneous structure than rolling can impart. Small basic open hearth furnaces under close, skillful control is another important factor.

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Force Feed Mechanical
LUBRICATOR

Positive, never-failing force-feed bearing lubrication. Design flexibility also enables power takeoff from machine to front, rear, side or bottom by ratchet or rotary means. For complete information write, stating number of feeds and drive desired.

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A DURABLE WIRE GAUGE CHART printed in 4 colors, 16" x 22", laminated to ¼" fibre board. We are anxious to put into use the few remaining in our stockroom. Sent free and prepaid promptly upon receipt of your request.

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6/0 .4615 .5800	4 .2253 .2043	13 .0915 .0720	22 .0286 .0253	31 .0132 .0089
5/0 .4305 .5165	5 .207 .1819	14 .080 .0641	23 .0258 .0226	32 .0128 .0080
4/0 .3938 .4600	6 .192 .1620	15 .072 .0571	24 .0230 .0201	33 .0118 .0071
3/0 .3625 .4096	7 .177 .1443	16 .0625 .0508	25 .0204 .0179	34 .0104 .0063
2/0 .331 .3648	8 .162 .1285	17 .054 .0453	26 .0181 .0159	35 .0095 .0056
1/0 .3065 .3249	9 .1483 .1144	18 .0475 .0403	27 .0173 .0142	36 .0090 .0050
1 .283 .2893	10 .135 .1019	19 .0410 .0359	28 .0162 .0126	37 .0085 .0045
2 .2625 .2576	11 .1205 .0907	20 .0348 .0320	29 .0150 .0113	38 .0080 .0040

The TORRINGTON

Stainless Rejection Rules Modified

Washington

• • • **The WPB announced** amended rules governing replacement of rejected stainless steel so that they conform with rules governing replacement of other types of steel. Under Direction No. 16 to CMP Regulation No. 1, as amended, Feb. 1, this means that with certain exceptions when stainless steel is rejected by a customer because of non-conformity with specifications or for other reasons, the producer must make the replacement in preference to all other orders for similar material. However, WPB or the customer may give specific instructions to the contrary, without seeking an additional allotment.

If any portion of rejected stainless steel can be used by the producer to fill another authorized controlled material order or for permissible delivery under any other WPB order or regulation, it may be so used.

WPB Revokes Order Setting Standards on Electrodes

Washington

• • • **WPB on Monday** announced revocation of order L-318, which had set standards for the manufacture of all spot welding electrodes. Upon investigation, WPB said, it was found that the standards prescribed under the order were not readily adaptable to the types of resistance welding equipment used in most aircraft construction. Manufacturers of electrodes are now free to produce any types required by their purchasers but will continue to function under the applicable CMP regulations covering their industry.

Cast Iron Soil Pipe Freed Of WPB Delivery Restrictions

Washington

• • • **By amending** general preference order M-21, WPB announced that cast iron soil pipe and its fittings had been freed from all restrictions formerly imposed by the order. Under the original order, the delivery of iron products is prohibited except on ratings of A-10 or better. The amendment excepts cast iron soil pipe and its fittings from this prohibition. Cast iron soil pipe remains subject to L-79, which controls the distribution of plumbing, cooking and heating equipment.

Why PERMITE PARTS IS A BETTER NAME --

HERE at Permite we think of ourselves as making PARTS —not just "castings."

To Permite customers this means reduced machining, because of the high degree of accuracy to which Permite Aluminum and Magnesium Castings are produced.

It means castings of superior physical and dimensional quality, insured by advanced foundry technique, careful specification adherence and critical supervision and inspection. Standardization of technique and thorough laboratory control, supported by X-ray inspection and spectographic analysis to insure physical qualities, are further factors contributing to the uniformly high quality of the finished parts.

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war requirements take most of our production. But when Victory is won, Permite advanced technique in making cast parts of superior quality will be fully available for those better products of a better postwar world.

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Thomas Strip

COLD ROLLED STRIP STEEL

Stimulates Production Economies

One single cold rolled strip steel quality developed for you by Thomas engineers might easily result in furthering your production economy. Or, perhaps it will require a combination of Thomastrip features to provide the steel which is "just right." But, regardless of whether it requires one or a combination of the following features—accurate gauges, finishes for painting and plating, uniform tempers ranging from dead soft to hard, special edges, non-scalloping deep drawing qualities, low and high carbon content, fine grain for special requirements, and variety of non-ferrous and lacquer finishes—Thomas has the facilities to provide them for you. Therefore, call in Thomas engineers to check with you on your problem.

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS

THE THOMAS STEEL CO. • WARREN, OHIO

Sen. George Urges New Reconversion Plan

Washington

• • • **To deal with** all postwar economic problems including contract cancellation, plant reconversion, and disposal of surplus property, the George (Senate) Postwar Committee on Tuesday recommended that legislation be enacted to divorce all agencies of the government, except the Office of War Mobilization, from authority over reconversion through creation of an Office of Demobilization.

The recommendations are seen as an attempt to withdraw from the War and Navy Departments any authority they have asserted over when civilian production should start. Also, it is seen as a direct effort to make all postwar planning the province of Congress and not of the President and his advisers. The report says that in the Office of Demobilization there should be created a fulltime board appointed by the director and composed of the ablest men whose services can be obtained

Russian Sailor: Nina Lickochova, 4th Mate on the Russian icebreaker that docked at Seattle for repairs, was the only woman officer aboard. She's proficient with rifle and some of the large guns.

CHICAGO MOUNTED WHEELS—The first small wheels ever mounted on stationary shanks, they have maintained their supremacy through the years. Over 300 sizes, styles and grains—one to suit every job. They're tough, long lived, dependable.

CHICAGO GRINDING WHEELS—To break production bottlenecks due to the crying need for small wheels, we gave up making all larger sizes for the duration—with full WPB approval—and now specialize on sizes 3" in diameter and under.

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Yes, all the wheels in our line are small, but powerful and *swift tools of war* doing their stuff day in and day out — making it possible to speed through everything that requires precision internal or external grinding, polishing and burring — bombsights, planes, tanks, guns, intricate instruments, etc.

PROMPT DELIVERY—Come to America's Headquarters for Small Wheels, custom built to your order. No waiting for shipments now, and after the war a reliable source of supply. Our central location is another asset—cuts shipping time to most plants.

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TEST WHEEL FREE—

So that you will know what Chicago Wheels can do, we'll gladly send one without charge. Tell us material you want to grind and size wheel you'd like.

Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry.

Send catalog. Interested in ☐ Mounted Wheels ☐ Grinding Wheels ☐ Send Test Wheel. Size.....

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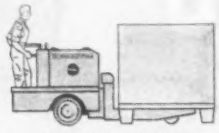
NEW Baker Truck Catalog

GIVES THE ANSWERS TO YOUR MATERIAL HANDLING PROBLEMS

Here's real help for any plant or warehouse faced with transportation problems. The Baker Electric Truck Catalog No. 52 is a handbook of information on material handling, designed to facilitate selection of the proper equipment for any set of requirements. In addition to describing the 47 standard Baker Electric Trucks, it covers many special models designed for unusual handling operations.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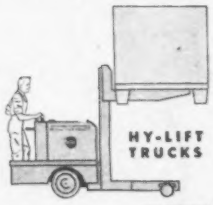
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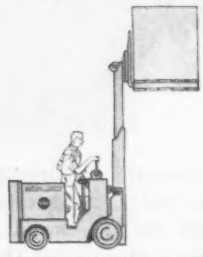
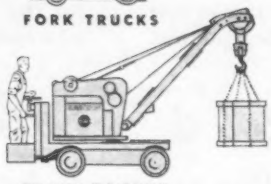

FORK TRUCKS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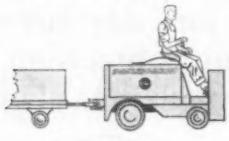
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Many actual case histories show Baker Trucks speeding production, saving time and money and conserving man-power in a wide variety of installations. You are almost sure to find problems comparable to those in your plant, and you can profit from the experience of others in solving them.

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Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find this book a valuable source of information. Write for your copy today.

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Baker INDUSTRIAL TRUCKS

upon whom the director can call constantly for advice and assistance.

The report says that the Office of Demobilization should not be an operating agency but that policies and regulations should be carried out by agencies already established.

"In outlining its duties and powers it should be made plain that upon it rests the responsibility for having formulated complete plans for industrial reconversion to peace and for the coordination of all such plans, and that its power to issue orders to other agencies of the government with reference to industrial reconversion plans and policies is absolute, subject only to control of the Office of War Mobilization until hostilities cease," says the report.

The committee remarked that the economic life of this nation must not be permitted to become dependent upon Washington directives as it has been for war and also that the paramount consideration in the handling of all demobilization problems should be the preservation and strengthening of the American system of free competitive enterprise. All war plants and war surpluses should be handled by the demobilization agency in such a manner to promote such enterprise, said the report.

Nelson Reports Munitions Output in December Steady

• • • In his latest monthly report on munitions production, issued Jan. 25, Donald M. Nelson, chairman of the WPB, said output of munitions in December was at the same level as in November. The maintenance of the November production level was accounted for primarily by the fact that airplanes were up 5 per cent by weight (a total of 8802 planes).

Munitions production for all of 1943 was up more than 80 per cent above the 1942 total.

By major categories, December munitions production showed these percentage changes over November:

Aircraft, up 5 per cent.
Ships (value of construction work done on Navy, Army and Maritime vessels, including repairs and maintenance, down 2 per cent (preliminary estimate).
Guns and fire-control equipment, down 2 per cent.
Ammunition, down 7 per cent.
Combat and motor vehicles, down 1 per cent.
Communication, electronic equipment, up 4 per cent.

For December, the WPB over-all index of munitions production (based on November, 1941, at 100) was up 1 point, to 662 (preliminary).

SELF-LUBRICATING BRONZE BEARINGS at 37 POINTS*...

AND PRECISION, PRELOADED BALL BEARING HEADSTOCK

*Arrows indicate location and number of self-lubricating bearings in Logan Quick Change Gear Lathe. All Logan Lathes are similarly protected.

The day you install a Logan Lathe you end your worries about the constant oiling of vital parts. Take, for example, the Logan Quick Change Gear Lathe shown above. At 37 points where plain, oil-thirsty bearings are ordinarily furnished, this lathe gives you *self-lubricating bronze bearings*. Here is a feature of Logan advanced design which automatically eliminates a prime cause of breakdowns. Furthermore, the spindle on this and all Logan Lathes turns on precision, preloaded ball bearings that never need lubrication. This Logan combination of self-lubricating bronze bearings with precision, preloaded ball bearing spindle mounting forms another important reason why Logan Lathes are setting remarkable records for sustained accuracy . . . high speed, low cost production . . . longer machine life. Write today for the new catalog that gives you complete information on the advanced design features of all models of Logan Lathes.

Brief Specifications: **. . . Swing over bed, 10½" . . . Between centers, 24" . . . Bed length, 43⅛" . . . Spindle hole, 25/32" . . . Precision ground ways: 2 prismatic V-ways; 2 flat ways . . . 12 spindle speeds, 30 to 1450 r.p.m.**

Logan No. 200 Back Geared Screw Cutting Lathe with Self-Lubricating Bronze Bearings at 23 Points

Logan No. 850 Manufacturing Turret Lathe with Self-Lubricating Bronze Bearings at 19 Points

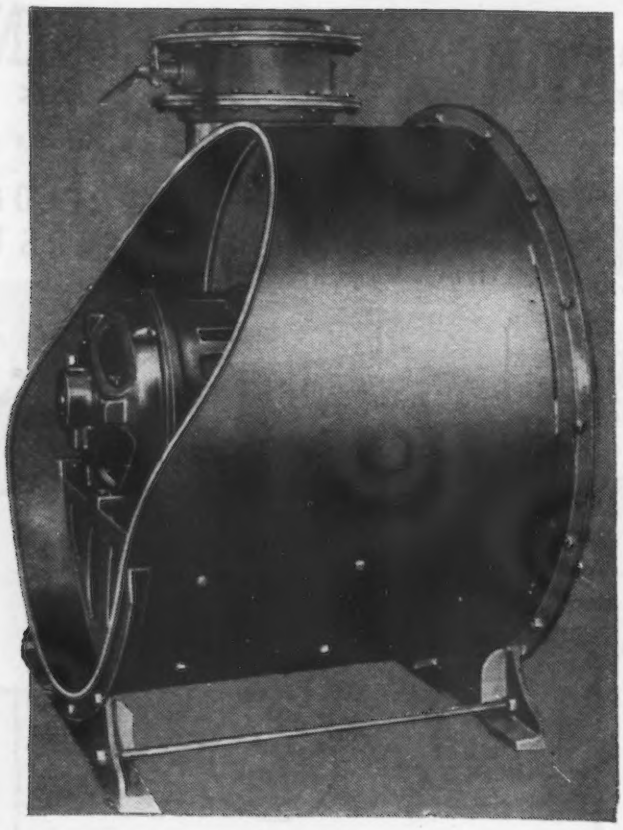
Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

LOGAN ENGINEERING CO.

Chicago 30, Illinois

One of a series describing the finer features of Logan Lathes . . . Look for the next of the series



Here's How — and Why The Spencer Turbo-Compressor

A familiar sight—but do you know how it works and why it is the preference of leading gas and oil-fired equipment manufacturers? Here are a few of the answers:

1. *Constant pressure automatic* with varying loads.
2. *Power* used in proportion to amount of air delivered.
3. High efficiency at all loads.
4. *Quiet*, with no vibration. Long life and no special foundations required.
5. *Simple* as an electric fan, yet built like a bridge.
6. Low peripheral speeds—large ball bearings, wide clearances. They last a lifetime.

The inside story of Spencer Turbo-Compressors is given in our bulletins and the Turbo - Compressor Data - Book, sent on request.

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HARTFORD 6, CONNECTICUT

257-A

TURBO-COMPRESSORS

Critical Metals Use Urged in Aircraft

Washington

• • • **Recent favorable** changes in the supply-requirements position of copper, zinc, aluminum, magnesium, ferro-alloys, and alloy steel necessitate re-examination of aircraft conservation policies, according to the Operating Committee on Aircraft Materials Conservation, Aircraft Production Board. These changes resulted from cutbacks in the programs of the services, better control over distribution and use, past conservation measures, and other factors, and will result in wider use of these metals in aircraft construction.

Copper as a metal is in a fairly satisfactory supply condition, and APB recommended that all previous uses for which substitutes to some previously less critical material was made be reviewed with the idea of reverting to copper.

Copper base alloy sheet and strip has been most substantially relieved by cutbacks in the small arms ammunitions program. The presently available strip capacity, however, is not pound for pound in accordance with the reduction in ammunitions requirements. Military requirements for copper base alloy rod are somewhat increased. Capacity, however, exists in brass mills to handle some additional volume.

Copper base alloy tubing capacity exists for sizes under 4-in. except for alloys that are extruded. Brass mill copper products capacity is available with the exception of copper tubing over 4-in. and small size thin wall tubing. Capacity is available for copper wire and cable with the exception of cords and cable involving fine wire and stranding. Casting capacity is available, but there is a limited supply of scrap of the proper grade to produce higher copper content castings of 80 per cent or higher copper. Yellow brass castings are in relatively easy supply.

Supply and requirements of zinc have been in close balance, but recent cutbacks in small arms ammunition will create surpluses. Reconversion to and new uses for zinc for sound military purposes are encouraged. Its use in place of cadmium must be increased.

The improvement in the availability of aluminum obviates the need for further substitution of other materials, and new uses of some aluminum products for military use are encouraged. The use of secondary instead

2 ARCOS PLANTS Producing Stainless and Alloy Electrodes Exclusively.

38 DIFFERENT ANALYSES of Arcos Stainless Electrodes in all usual sizes.

31 ARCOS DISTRIBUTORS Serving every Industrial Area in the Country.

366 DAYS IN '44 Producing Quality Weld Metal Easily Deposited.*

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401 NORTH BROAD ST., PHILADELPHIA, PA.

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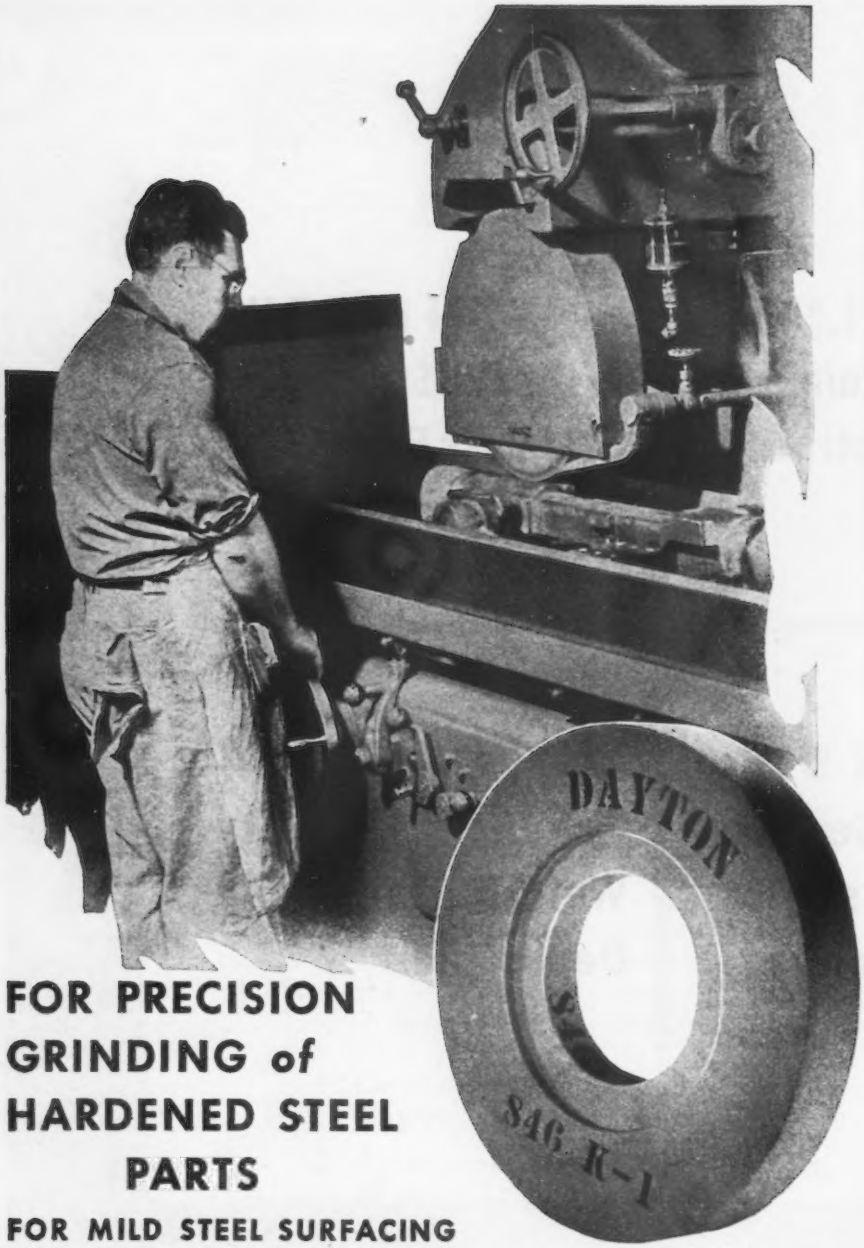
"QUALITY WELD METAL EASILY DEPOSITED"



FOR PRECISION GRINDING of HARDENED STEEL PARTS

FOR MILD STEEL SURFACING

Almost daily this 846-K-1 Dayton wheel makes new friends. Not every wheel can make and support that statement.

Some find the 846-K-1 Dayton particularly effective when surfacing mild steel—maximum removal of stock with little wear on the wheel.

Others find it equally suitable for precision grinding operations—excellent finish—high production.

Still others use it, not to surface some one material only, but to process a variety of materials—high production and long wear the invariable result.

It may be that you are puzzled over some surface grinding problem. It may be that a Dayton 846-K-1 would solve that problem. Why not find out? Outline that problem by letter, wire, or phone. A Dayton 846-K-1, or some other Dayton wheel perhaps, may solve it for you.

Dayton Wheels in all types and sizes for all grinding requirements.

SIMONDS WORDEN WHITE COMPANY, 711 NEGLEY PLACE, DAYTON, OHIO

DAYTON GRINDING WHEELS

of primary aluminum in castings and powders where consistent with required performance must be continued. New uses for permanent mold casting products are discouraged. Consideration for new uses will be given to the following: Aluminum sheet, strip, plate, foil, rod, bar, wire, cable, rolled and extruded tubing and shapes, rivets, and sand and die castings.

New uses of magnesium for forgings are discouraged, but the following forms are currently available: Extruded shapes, rods, bars, and tubing; sheet, strip and plate; and castings, particularly permanent mold and die castings.

All common ferro-alloys are in ample supply. Columbium is very limited. Alloy steel is in ample supply excepting where facilities for sheet, plates, and seamless tubing are involved. Tool steel supply exceeds current demands.

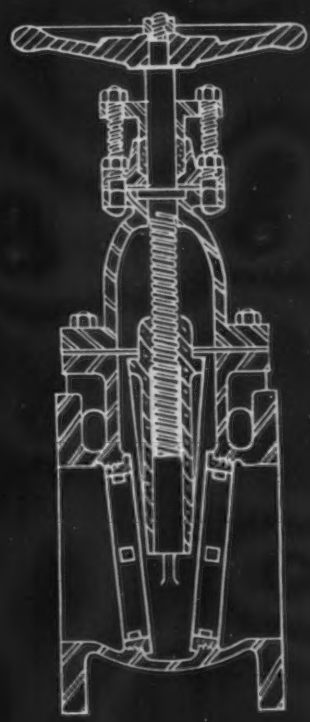
Beryllium-copper supplies are adequate to meet essential aircraft requirements, and it is expected that it will be possible to furnish this material to all consumers who require its use and who are authorized to receive it under WPB and CMP regulations. While aircraft use restrictions may be eased, the material should be procured in forms that will generate the least scrap in processing.

WEAPON INVENTOR? *Dr. Vladimir K. Zworykin, associated with the Radio Corp. of America research department at Camden and Princeton, N. J., is believed to be the "Zworykin" credited by Swedish scientists on Jan. 4 as the inventor of the device that permits RAF bombers to bomb Germany accurately through the clouds.*

Press Association, Inc., Photo

Need any Help *Combating* HEAT AND CORROSION?

Ask RUSTLESS



Temperatures as high as 1000° F, pressures as great as 1500 lbs. per square inch, corrosive conditions capable of quickly destroying most materials — these are the exacting conditions under which Rustless Stainless Steels are used in the vital production of high octane gasoline by the catalytic cracking process.

Gate valves, for example, with Rustless Stainless Steel wedges, seats, stems and other important parts operate under such conditions. Thus, Rustless Stainless Steels are constantly proving their unusual properties and uniform high quality.

Are these conditions unusually severe? Not at all. They are typical of many industries where heat and corrosion are necessary process factors.

If your product must combat heat or corrosion, call on Rustless to furnish technical experience and uniform high quality Stainless Steels. Contact our nearest local office.

When You Want To Know About Stainless

Ask RUSTLESS

Now available for additional wartime applications. STAINLESS STEELS provide means of improving the performance of our fighting equipment.

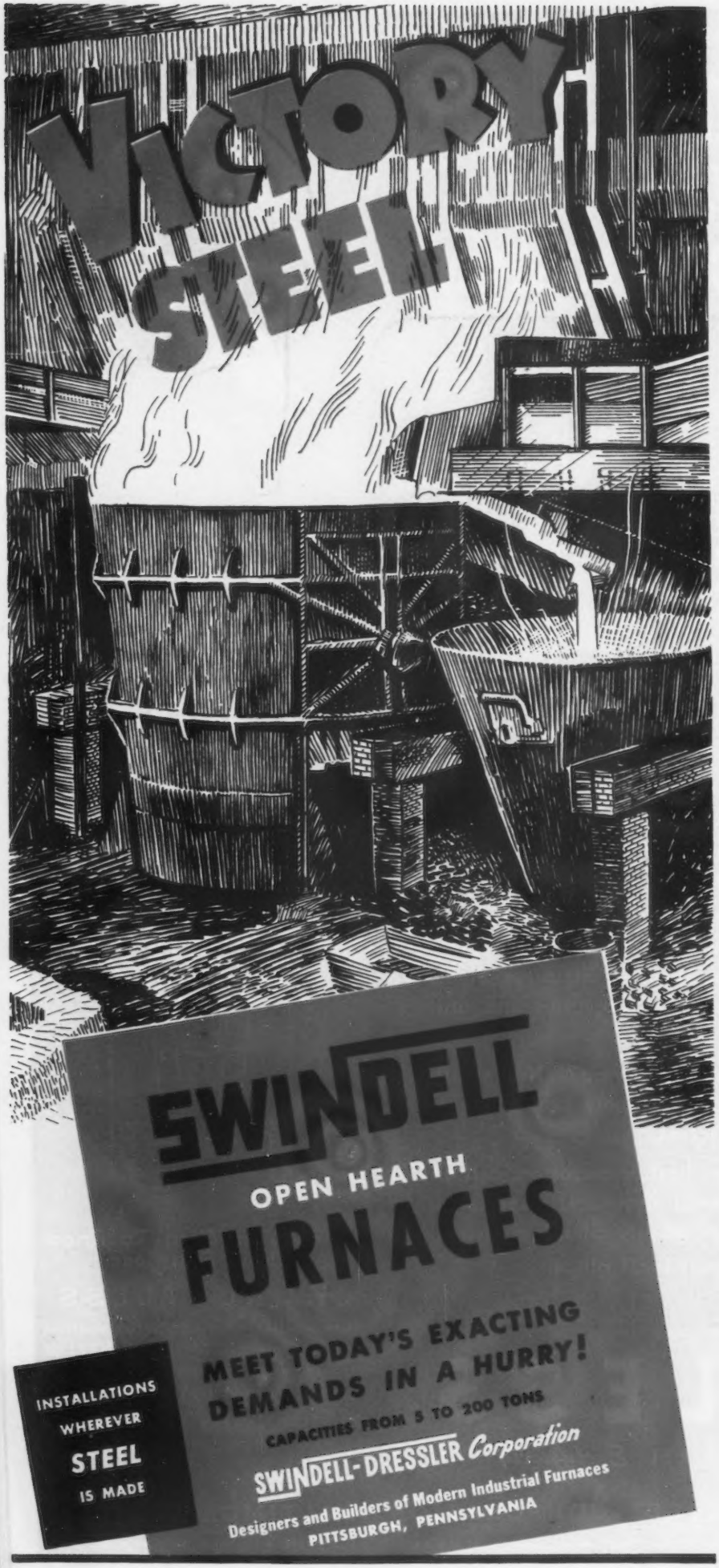
RUSTLESS will be glad to help you select the proper grade.

RUSTLESS

Producing STAINLESS STEEL *Exclusively*

RUSTLESS IRON AND STEEL CORPORATION, BALTIMORE 13, MD.

SALES OFFICES BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEW YORK • PHILADELPHIA • DISTRIBUTORS IN PRINCIPAL CITIES



Ex-Foundrymen Called

Cleveland

• • • **An urgent call for retired foundry workers too old for physical labor but who can instruct others in foundry work, has been issued by the Cleveland War Manpower Commission office. Older workers experienced as core makers, bench, floor or machine molders, are needed as instructors in a Michigan foundry, while foundries in Ohio, Michigan, and Kentucky are in urgent need of foundry labor. Applicants for instructor jobs or for foundry labor jobs should apply at the nearest U.S.E.S. office.**

Furnace Builders Begin to Catch Up on Order Backlogs

• • • **Makers of heat** treating furnaces are catching up on their backlog, which are now equivalent to about four months' output, according to recent WPB date. Current monthly shipments are only 50 per cent of the peak level of late 1942 and early 1943, the WPB says. New orders, which totaled close to $23,000,000 in early 1942, are reported to be down to four or five million dollars' worth of business per month. The downward trend has ended and stabilization can be expected, says WPB.

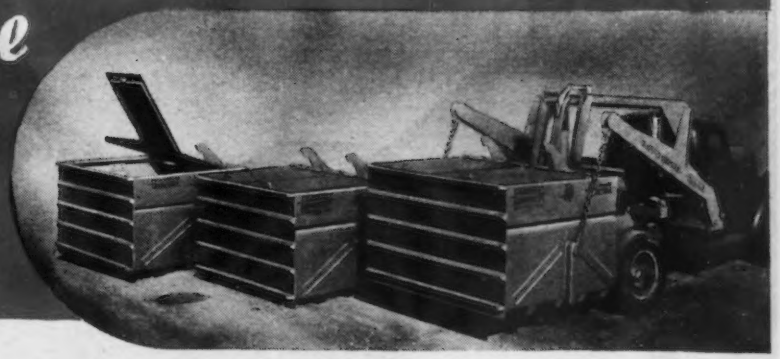
Heat Treating Furnaces

Monthly Shipments and New and Unfilled Orders, 1942-1943

Heat Treating Furnaces ($000)

Date	Shipments	Orders Received (Gross)	Unfilled Orders
1942			
January	5,346	11,477	40,452
February	6,777	19,817	52,081
March	7,149	22,974	66,453
April	8,080	21,497	79,050
May	10,632	17,192	89,106
June	9,044	21,598	100,150
July	10,179	18,137	106,606
August	9,739	10,534	106,411
September	9,600	11,299	105,272
October	10,850	7,474	88,345
November	11,581	7,509	83,012
December	11,453	4,668	74,972
1943			
January	11,709	5,536	74,859
February	10,846	4,870	71,193
March	13,469	5,750	62,980
April	12,109	4,633	55,916
May	10,904	4,687	48,405
June	12,000	3,868	40,173
July	9,743	4,280	36,029
August	9,689	3,948	30,148
September	7,476	4,581	26,990
October	6,010	4,864	25,463

They spot them throughout the plant



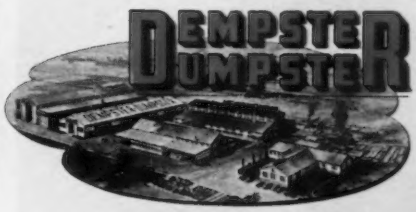
Another Dempster Development For Industrial Materials Handling

★ Another typical example of how the Dempster-Dumpster is saving time, manpower, trucks, tires, and gas in leading industrial plants of almost every classification.

In this case, twenty standard Dempster-Dumpster drop-bottom bodies of 6 cu. yd. capacity each, equipped with special twin, self-balancing, spring hinged tops, are spotted throughout one of America's most vital war factories. A few are placed in convenient spots for receiving waste and rubbish. Others are placed at strategic points for recovering metal shavings. As each body is filled, forked truck conveys loaded body to convenient point where truck, equipped with the Dempster-Dumpster Hoisting unit, hoists load to carrying position, and dumps it at delivery point, all under full control from driver's seat. When empty body is returned, another loaded one, perhaps with a different type of material, is there for hauling and dumping . . . an uninterrupted cycle of materials handling using twenty bodies but with only one truck.

In dozens of other plants, various types of bodies are in use handling materials of almost every description from dust to liquid . . . light to heavy up to 7½ tons pay load . . . finished and unfinished products . . . hot materials up to 1500 degrees F . . . and in every operation with one truck serving from 6 to 50 bodies.

The chances are that the advantages of the Dempster-Dumpster can and should be adapted to your plant. Let our engineers cooperate with you. Write for our complete operating manual No. 242 now.



Illustrations on this page tell the operating story of the Dempster-Dumpster.

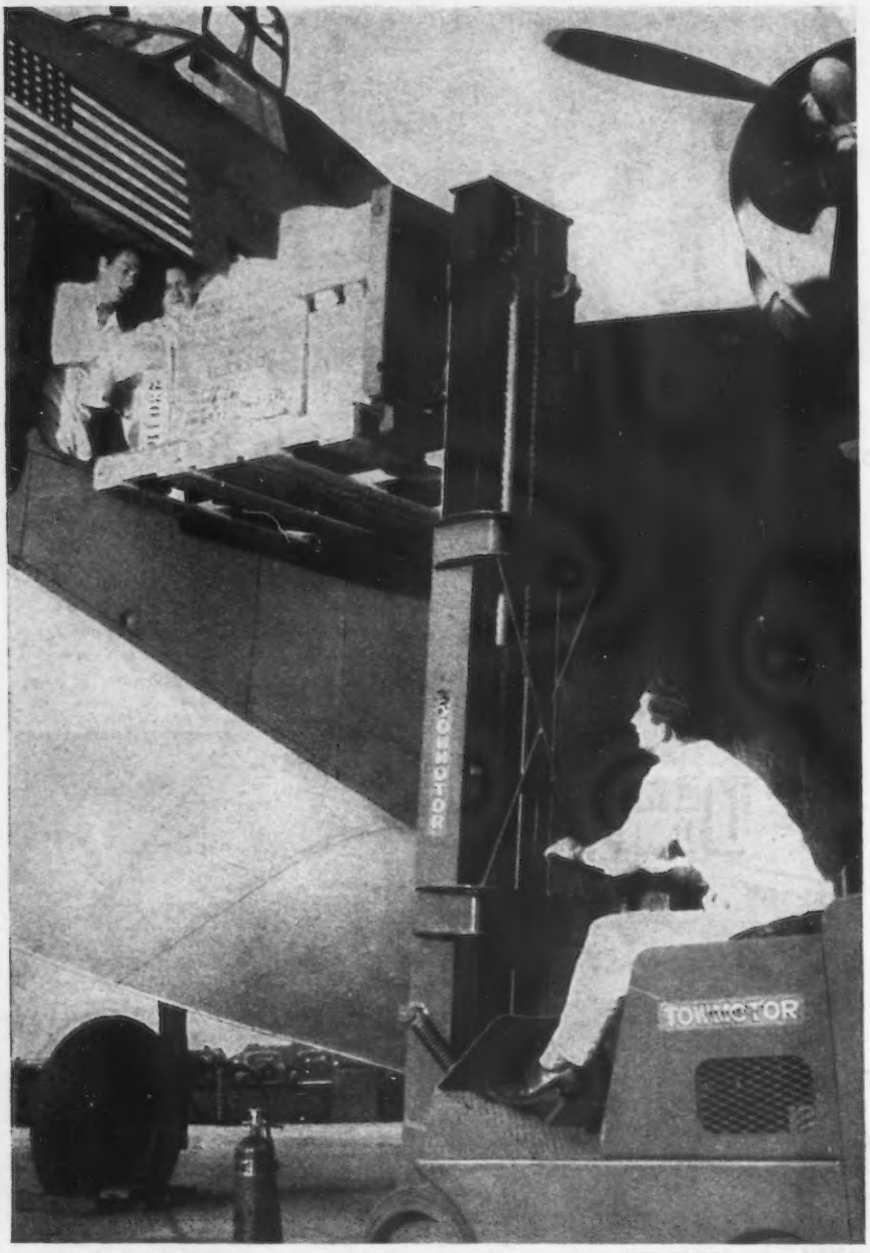
Top right shows a loaded body ready for hoisting. Shown also in this photo is the special twin, self-balancing, spring hinged tops on this particular body.

Center Photo shows loaded body in carrying position.

Bottom Photo illustrates instant, or controlled, dumping method of the Dempster-Dumpster bottom-dumping type of body.

Types of bodies available are unlimited. Your requirements determine the design. Cooperation of our engineers with those of the customer has corrected hundreds of materials handling problems and at tremendous savings.

Dempster Brothers, Inc., 824 Springdale, Knoxville 17, Tennessee



PHOTO—AMERICAN EXPORT AIRLINES

To efficiently load and unload modern transportation equipment, equally modern materials handling equipment is required. What's the answer? Flexible, easy-to-maneuver, time and money saving **TOWMOTOR**

THE 24-HOUR ONE-MAN-GANG

TOWMOTOR CORPORATION • 1230 E. 152ND STREET, CLEVELAND 10, OHIO

STRAIGHT-GAS POWERED INDUSTRIAL TRUCKS EXCLUSIVELY—SINCE 1919

Forge and Foundry Problems Studied

• • • **An improvement in** safety and health conditions, as well as increases in unskilled wage brackets, will be necessary before foundry and forge industry production can meet demands, the special foundry and forge shop Labor Advisory Committee has reported to the Office of Labor Production. The committee consists of 14 representatives of AFL and CIO unions in the critical foundry and forge shop industry.

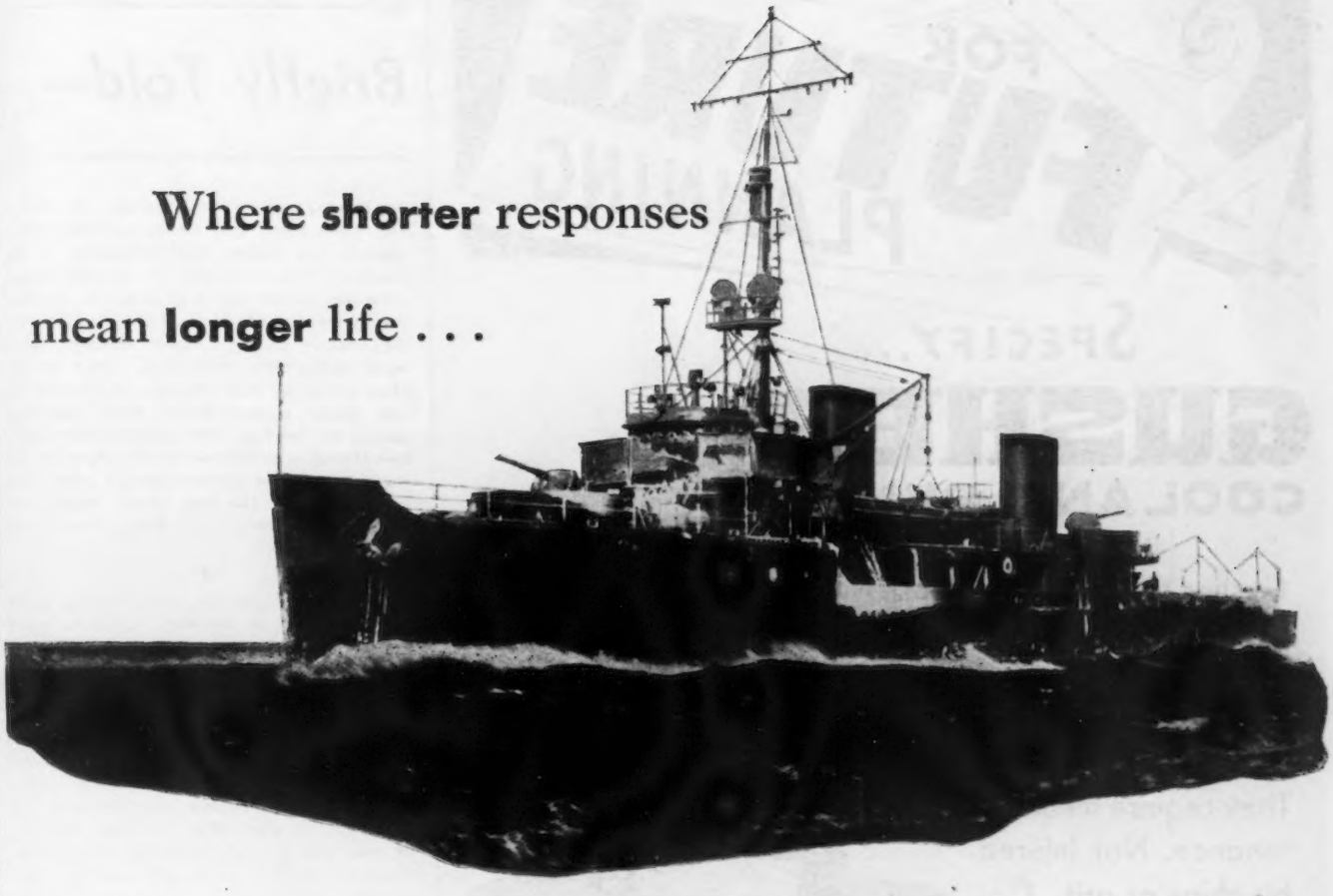
The committee recently discussed with representatives of government agencies health and safety conditions prevailing in foundries and forge shops. The committee requested the Division of Labor Standards to intensify inspection procedures to obtain more thoroughgoing compliance with requirements of the Walsh-Healy Act and the various state safety codes for foundries and forge shops. The Walsh-Healy Act requires concerns undertaking Government work to provide safe working conditions for their employees.

The committee also outlined the manpower difficulties that foundries face, due in part to the inherently unattractive nature of foundry operations. New workers refuse to enter the industry at present wage scales, and therefore WLB should reconsider present area wage brackets established for the foundry industry.

The committee requested that in areas where WLB undertakes to fix wage scales, representatives of the unions be provided with the background data on which WLB proposes to act. This procedure would permit the unions to provide additional data if, in their opinion, information of the WLB seems inadequate. The committee further requested WLB to establish a special panel to hear foundry and forge shop cases. This action was based upon a conviction that only a special panel can adequately understand the unusual problems that prevail in the industry.

The committee announced it had received a report from WMC stating that employment in foundries—where manpower shortages are critical—has risen two per cent. The gain in employment is ascribed to the activities of the 15 Area Foundry and Forge Shop Production Committees, which have been operating throughout the country under joint WPB and WMC sponsorship.

Official U. S. Navy Photo



Where **shorter** responses mean **longer** life . . .

W·A·B *controls are serving*

Clearing the way in amphibious landings—breaking trail for battleships, carriers, cruisers, and destroyers—riding herd on convoys and doing anti-submarine work—minesweepers have a job second only to submarines in the hazards encountered. Precise and immediate response to the orders of the bridge may often mean the safety of the vessel, and the success of a mission. W·A·B Controls are now serving on a number of minesweepers.

* * * *

The marine field is only one of many where W·A·B Controls are helping or can help to solve difficult control problems. The job the controls are doing here gives an excellent picture of their possibilities, and may suggest places where they can serve for *you*.

W·A·B Control Systems for ships concentrate command of all engine maneuvering in small, compact stations, located on the bridge . . . in the engine room . . . or both. The entire cycle of engine maneuvering . . . speed control, clutching, braking and reversing . . . is governed by the movement of a small handle. Load balancing and synchronization of multiple-engine drives is simplified, simple interlocks prevent damage to equipment through operating errors.

If your post-war planning for your plant or your product requires a safe, simple, completely dependable control, it will pay you to investigate W·A·B Controls.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

General Offices: Wilmerding, Pa.

75 Years of Pneumatic Control Experience

W·A·B

Pneumatic . . . Pneumatic-Electric . . . Pneumatic-Hydraulic

control systems

SPECIFY...

GUSHER
COOLANT PUMPS

Gusher Coolant Pumps are used by leading machine tool manufacturers. They are simple in design. They have few moving parts. They require minimum maintenance. Not injured by chips or grit. Capacity is from trickle to 200 g.p.m. Many exclusive advantages. There's a type and size to meet your requirements. Write for new complete catalogue.

●

Model 1-P3
"V"-Belt

The essential features are the same as motor-driven Gusher models, the only difference being the substitution of an automatically oiled gear-driven mechanism for the motor.

THE RUTHMAN MACHINERY CO.

1821 READING ROAD CINCINNATI 2, OHIO

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

Briefly Told—

• Helping reduce the weight of Flying Fortresses, a new type of engine mount which requires less rubber was announced by the Goodyear Tire & Rubber Co. Another major advantage in the new type mount is the fact that it reduces vibration. The mounts permit the engines to reach their vibration peak much earlier than other types. Often the engines can reach their vibration peaks with the new engine mounts before flying operation ranges are reached. This permits more accurate aiming of bombs and guns, longer life for engines, and less nerve-strain on pilots and crew members. The new engine mounts decrease the weight of each Flying Fortress by about 15 lb.

●

• Conductive rubber gun heating pads are installed on aircraft machine guns and aerial cannon. These pads keep the plane's armament at proper firing temperatures at all times, and make possible pre-heating of gun breeches while the plane is grounded or maintaining required temperatures for instantaneous use at high altitudes. This heater, developed by U. S. Rubber Co., prevents the jamming of guns due to high viscosity of oils and greases and the contracting of steel under certain atmospheric conditions.

●

• U. S. Rubber Co., through an investment in capital stock, has become associated with Compania Croydon del Pacifico, S. A., leading rubber manufacturer of Colombia, S. A. The Colombian company, located at Cali, Colombia, uses the Pacific Coast seaport of Benaventura, and will continue to manufacture its own line of products under its own name. In addition the Croydon company will eventually produce and distribute in Colombia certain U. S. Rubber lines. Present products of the company include canvas rubber soled shoes, molded rubber products, a line of industrial rubber goods and camelback for tire retreading.

●

• Surpassing pre-ration figures 426 tons of tin cans were collected by the Buffalo War Council's salvage division Jan. 23d. The lot was sent to Vulcan Detinning Co., Pittsburgh.

●

• Entry of the screw machine industry into the field of plastics after the war and greater expansion in that period were forecast by Orrin B. Werntz, executive secretary of the National Screw Machine Products Association. At the annual meeting of the association he said that plastics can be machined in bar form on screw machines and the industry would widen its activities after the war to include such lines of products.

●

• During 1943, American Locomotive Co. built more diesel railroad locomotives than any other company in the world. Included were large numbers of switch engines for American railroads, locomotives for military use overseas, and giant freight engines to

WEAR-TESTED MATERIALS STEP UP TODAY'S PRODUCTION

American war industries quickly found they could obtain new speed from the consistent accuracy of Woodworth precision gages, ground thread taps, form tools and other perishable production tools.

Wear-tested metals give Woodworth accuracy its extra-long life. Every piece of metal used in Woodworth gages is tested for wear by the severest modern methods.

Old in experience and resourcefulness, Woodworth has charted new ways to speed war production and to cut inspection costs.

After the war, we shall continue to build to that same accuracy, passing on to Woodworth customers all the benefits of Woodworth production methods and their resultant efficiency, which the new peacetime economy will demand.

Our Engineering and Development Departments are available for consultation on special operating and production problems involving gaging and production tools.

ACCURACY YOU W CAN TRUST

WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN

PRECISION GAGES • GROUND THREAD TAPS • FORM TOOLS • PRECISION MACHINED PARTS • HEAT TREATING • PLATING

DUMB DORA MAY BURN DOWN YOUR PLANT!

Unless you protect oily floors with *SPEEDI-DRI*

There's one (or more) in every Plant. Rules or no rules, some Dumb Doras *will* sneak smokes and drop matches or butts on oil-soaked waste, rags and other inflammable absorbents. You can foil these "unconscious saboteurs" by spreading SPEEDI-DRI, the famous oil- and grease-absorbent on *all* oily floors. It works fast. It's economical. It retards fire, even when oil soaked (just ask your insurance company about that!). What's more, it sets up an immediate non-skid surface preventing many a falling and slipping accident —a major cause of industrial casualties. SPEEDI-DRI will brighten your plant, improve morale, speed production, and save vital manpower by freeing porter labor for more important jobs. Write for literature and FREE SAMPLE.

SUPPLIERS: East — Refiners Lubricating Co., New York 1, New York.
Midwest & South — Waverly Petroleum Products Co., Philadelphia 6, Pa.
West Coast — Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

SPEEDI·DRI
OIL AND GREASE ABSORBENT

help haul war-time traffic in this countr
Ten 4000 h.p. diesel-electrics were delive
to the New York, New Haven and Hartfo
Railroad out of an order of 20, the balan
to be completed this year. Unfilled orders f
diesels are a substantial part of the 19
production. Production will also inclu
hundreds of steam locomotives.

●

• The Surplus Program Section of the WP
Redistribution Division, in cooperation wi
the Metals Reserve Co., published a catalog
of 30,690 new surplus steel valves of vario
sizes and types for the use of war contracto
or others. It indicates the types of valve
catalogue specifications, manufacturers' name
and state location. The list includes bo
multi-purpose and specific use valves. Re
gional WPB offices and claimant agencie
will have copies of the list.

●

• It has been widely assumed that 100 octan
gasoline developed in large quantities for wa
planes will be the super fuel of postwar auto
mobiles. Actually, the octane number of gas
line generally available for automobiles afte
the war is not likely to average more than
three numbers higher than the prewar prod
uct. This is primarily because the economic
of producing aviation gasoline for war and
motor gasolines for peace-time operation ar
vastly different. Competition makes it neces
sary to employ techniques that will produce
as much gasoline of as good a quality as auto
mobile engines can use, and no better, from
the least amount of crude and at as low a cost
as possible. Many of the practices employed
to produce 100 octane are not economical
enough for producing motor gasoline.

●

• The Chicago, Milwaukee, St. Paul & Pacific
Railroad plans to build and improve equip
ment for which it has asked the interstate
commerce commission to approve a $7,260,000
trust issue. In addition to erecting some 150
freight cars and gondolas, the road will buy
10 steam locomotives and six large diesels.

●

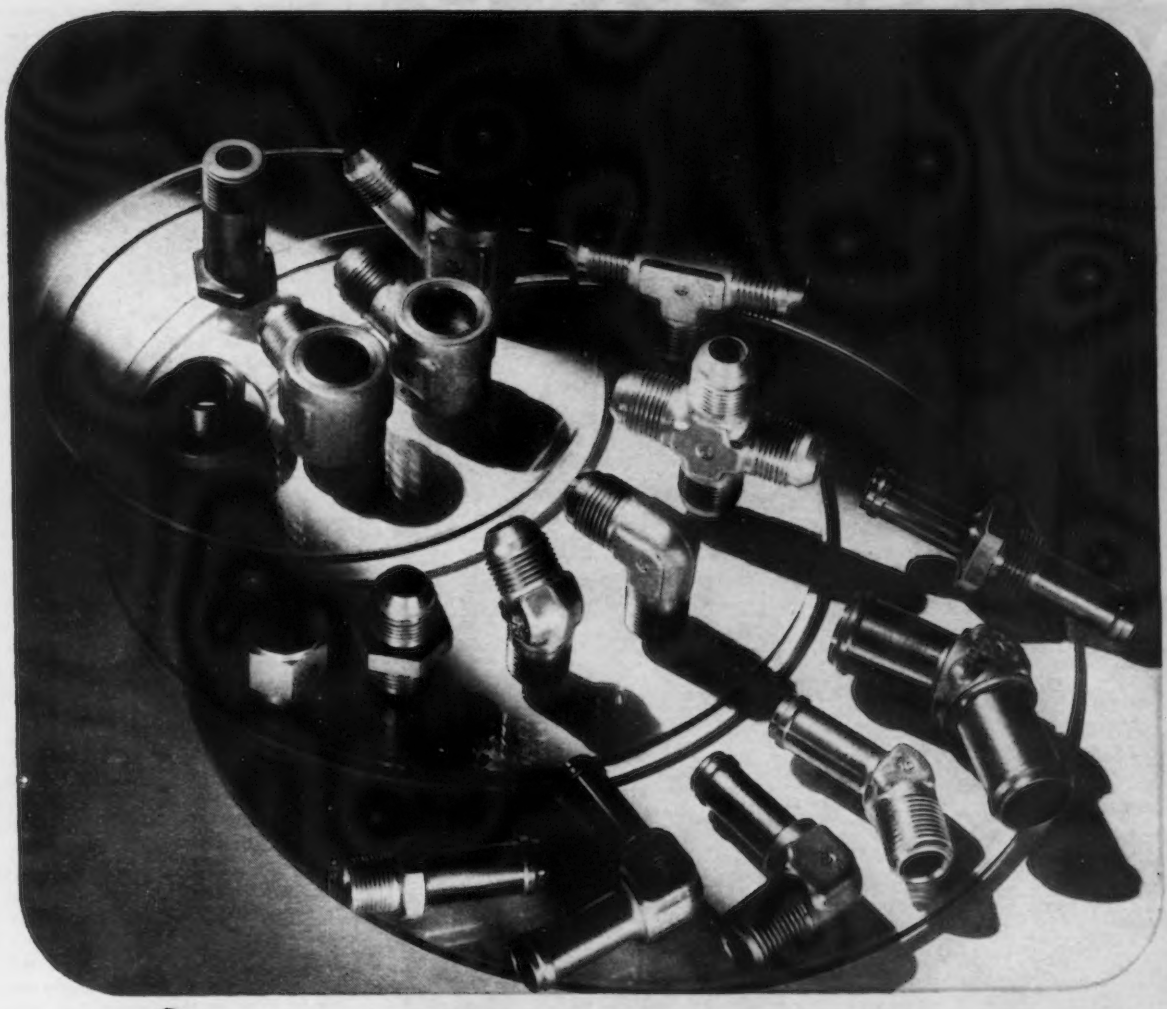
• Pan American Airways has opened an
all-freight service from Miami to certain
Caribbean points. Two principal routes
are being operated—between Miami and
San Juan, Puerto Rico, and between
Miami and Barranquilla, Colombia. An-
tilla, on the north coast of Cuba, and
Port-au-Prince, Haiti, will be served on
the 1200-mile route between Miami and
San Juan. Kingston, Jamaica, will be a
stop on the 1100-mile trans-Caribbean
route to Barranquilla. These points will
be served by a four-engine flying freighter
which will carry 8800 lb. of cargo at a
cruising speed of 150 miles per hour.

●

• Invasion boats of synthetic rubber are
being produced in quantity at the Wood-
socket plant of United States Rubber Co.
These inflatable boats are equipped with
quick release towing bridles so they can
be towed behind fast boats and released
to beach themselves by their own momen-
tum. Each will carry 10 men with full
invasion equipment. Equipment includes
12 paddles, outboard motors, repair kits,
a signal flag, bullet hole plugs, an extra
inflatable floor for added buoyancy and a
life line all around the boat.

●

• *A WPB 50-page catalogue of 30,690 new surplus steel valves of various sizes and types has been published. It indicates the type of valves, catalogue specifications, manufacturers'*



Ammunition for today and tomorrow

"Fittings" the trade calls them. But the term tells only half the story—and the least exciting half, at that. For these carefully-made but inconsequential-looking gimmicks are vital to every mobile fighting unit whether it wages battle on land . . . on sea . . . or in the sky. They are, in fact—ammunition!

These assorted fittings have been produced by the millions-per-week for war purposes in the four plants of The Weatherhead Company. And with Victory and Peace, they will become the ammunition with which we shall be prepared to help you build the better world for which we are all fighting.

Look Ahead with (W)

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles Canada—St. Thomas, Ontario

FREE: *Write on company letterhead for "Seeds Of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.*

PERKINS MAN COOLERS

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE

PERKINS MAN COOLERS are used successfully not only to bring comfort to workers in hot places, but also to perform cooling functions in hot manufacturing processes.

Perkins Man Coolers are made in stationary and oscillating types, both portable.

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.

names, and state location. It will be available for inspection by steel valve users in WPB's Regional or District Offices. Claimant Agencies will also have copies of the catalogue available. Persons needing steel valves may learn their location through the Surplus Program Section of WPB, 155 East 44th Street, New York City.

●

• A new all-cargo air service, Aerovias Venezolanes, S. A. (Avensa), to operate within Venezuela, has been organized. It will serve interior points. Technical guidance for the line will be contributed by Pan American World Airways. Pan American will have a minority stock interest. The line will carry cargo on a charter basis as far south as Santa Elena, near the diamond fields. The company will operate Ford tri-motor planes, a type which has been used in cargo and passenger operations in Cuba, Colombia and Central America.

●

• Police departments of three Cleveland plants of Republic Steel Corp. received Auxiliary Military Police Guidon Awards from the War Department. The presentation was the first in the Cleveland district, Continuous Security of the Fifth Service Command which covers northern Ohio and Indiana. The citation states: "This award is a tribute to their patriotism and efforts extended in providing internal and external protection of their plants against sabotage, espionage and natural hazards, and to supplement the Army in wartime emergency situations." The award was made by Major George J. Hales, district chief, to Capt. Raymond Meredith of the Cleveland District, Capt. William G. Holt of the Bolt & Nut Division, and Capt. Emmett M. Crum of the Cleveland plant of Truscon Steel Co.

●

• The Massey-Harris Co., Racine, Wis., has a new contract for rebuilding gun carriages which will be done in the former Nash plant, taken over about two years ago when the firm received its contract for building M-5 tanks. The company also is carrying on an increased farm machinery program.

●

• Master Metal Products, Inc., Buffalo, has completed its government orders for bomb kits, tool chests and refuse cans for the armed forces. According to president Edward J. Tate, the plant made more than 500,000 bomb kits for the Navy, 4000 step-on refuse cans for the Medical Corps, and tool chests for Army tanks and government arsenals. Production now is confined to tool chests for war industries and the firm is awaiting a signal to resume producing civilian refuse cans.

●

• Longer lives for propeller shafts on minesweepers, tugs, and similar seacraft are possible as the result of a new adaptation for synthetic rubber announced by Goodyear Tire & Rubber Co. Protecting the propeller shafts from corrosive action of sea water, the synthetic rubber propeller shaft coverings can increase the life of shafts by as much as 1000 per cent, according to Goodyear. The synthetic rubber is applied to a propeller shaft in a sheet about 3/16-in. thick after the shaft has been shot-blasted and has received a preliminary coat of cement. Then the shaft and its rubber covering, are cured under intense heat to insure firm adhesion of the coating to the metal.

THERMONIC

THE MOST EFFICIENT AND ECONOMICAL SYSTEM FOR INDUCTION HEATING

HITLER & CO.

SHIVER

WHEN

THIS "ORGAN"

PLAYS

The "organ" reproduced to the right, and so vividly dramatized by Noblitt-Sparks, is a Thermonic production set-up. It "plays off" an "octave" of highly specialized brazes every 65 seconds . . . 440 per hr!

The tall, pipe-like parts shown at the right are burster wells (aerial bomb exploders) in the stage of going through an important brazing step, while the large central illustration visualizes the actual operation involved. The requirement here called for brazing a small screw machine part onto the end of a steel tube . . . the condition being that the inside threading of the pieces be kept free from the flow of the brazing alloy!

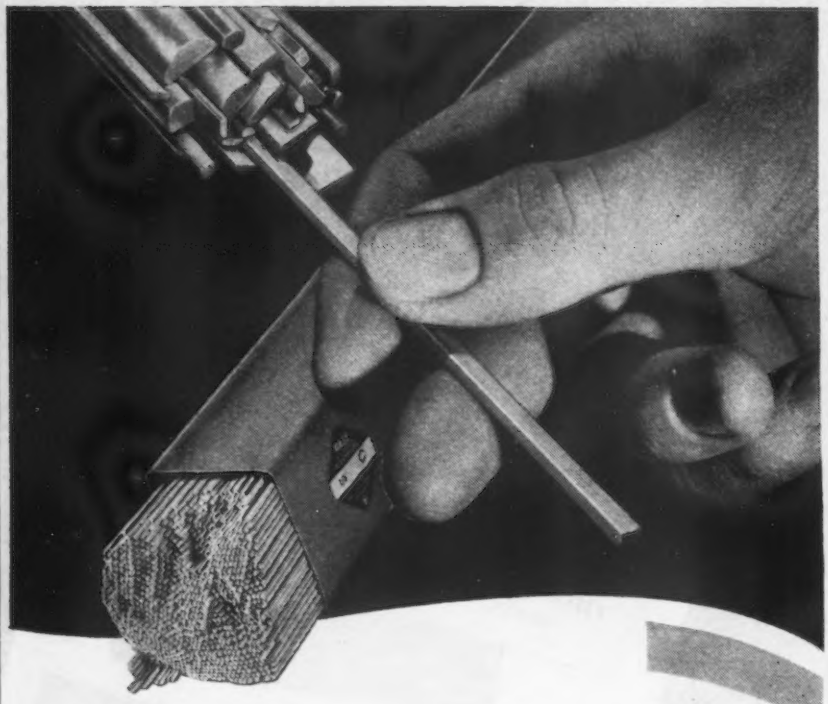
That this brazing operation was successfully and speedily accomplished by Thermonic is in no uncertain terms indicated by the Noblitt-Sparks copy headline! It packs a knock-out punch!

The versatility of Thermonic Induction Heating equipment is doing much to speed up vital war requirements. . . . It's boosting production by reducing, from minutes to seconds, operations calling for Brazing, Hardening, Forging, Melting and Annealing. . . . It cuts power and maintenance costs to fractions. . . . And unskilled labor quickly becomes expert in handling its many functions. For complete information about our equipment's proven advantages, we invite your inquiries. The counsel of Thermonic's engineering staff is at your service.

INDUCTION HEATING CORPORATION • 389 LAFAYETTE STREET, NEW YORK 3, N. Y.

Largest Producers of Electronic Heat Treating Equipment for Brazing Melting Annealing Forging Hardening

PAGE for WIRE



With mills practically at capacity producing wire for war and for essential industry, users of wire find that there are many things that they can do to conserve essential materials.

SHAPED WIRE: Use standard shapes. That can be done easily. **PAGE** has a wide variety, including ovals, hexagon, octagon, square, channel, keystone, flat, half-round, etc.—in diameters to ⅜"—with end section areas to .250 square inch.

WELDING ELECTRODES: Be certain that electrodes are correct in analysis for the job. Lean toward larger sizes for economy. See that no excess metal is deposited in the weld and that your men use electrodes right down to the holder.

GENERAL WIRE: The situation in such products as Spring Wire, Bond Wire, Telephone Wire, etc., is not subject to early improvement. It continues to be important to check waste.

If **PAGE** experience can help you work out any of these details, we will be glad to cooperate.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, San Francisco, Portland

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

New Loan Policy for Small Firms Set

• • • **A new loan policy** effective Feb. 1, was announced by Maury Maverick, chairman of the Smaller War Plants Corp. It increases the amount that banks are permitted to carry under a deferred participation from $100,000 to $250,000 where the bank takes a direct participation in the loan of 10 per cent or more.

Interest up to 6 per cent per annum is allowed on that part of the loan which the bank carries at its own risk and on the balance, which is carried under a deferred participation, interest of 4 per cent is charged with the bank paying to SWPC a graduated fee of from one-half of 1 per cent to 1 per cent per annum, depending on the percentage of the bank's participation.

Steel Construction Bookings In 1943 Total 563,584 Tons

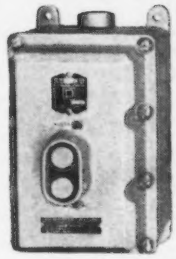
New York

• • • **Because the present** volume of fabricated structural steel for construction purposes is so small and conditions are so unusual, the American Institute of Steel Construction discontinued estimating total bookings and shipments and now records only a summarization of reports by the participating members from month to month. These companies represent some 79.8 per cent of the total average bookings of the industry during the years 1923 to 1925.

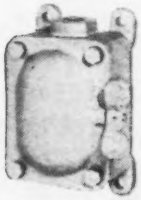
	Reported to the Institute, Net Tons, 1943	Estimated for Entire Industry, Net Tons, 1942
BOOKINGS		
January	50,172	183,387
February	34,657	228,688
March	32,009	248,319
April	50,726	313,953
May	32,020	161,039
June	79,409	184,516
July	56,712	125,243
August	37,563	80,605
September	61,659	88,520
October	59,282	50,946
November	34,093	49,637
December	35,282*	67,600
Totals	563,584	1,762,453
SHIPMENTS		
January	91,889	167,753
February	90,849	164,599
March	93,968	191,262
April	86,564	187,205
May	78,924	184,162
June	68,352	182,699
July	56,843	189,937
August	50,229	173,899
September	51,751	169,837
October	80,093	152,908
November	42,741	130,425
December	39,633	145,280
Totals	831,836	2,039,966

*Concerns reporting this month represent 79.8 per cent of total average bookings of the industry during the years 1923-25.

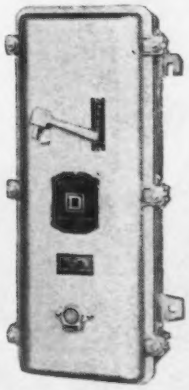
MOTOR CONTROL
for use in presence of
Magnesium dust



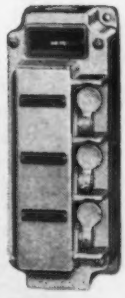
Class 2510 manual starter for motors up to 5 H. P. at 220 volts or 7½ H. P. at 440 volts.



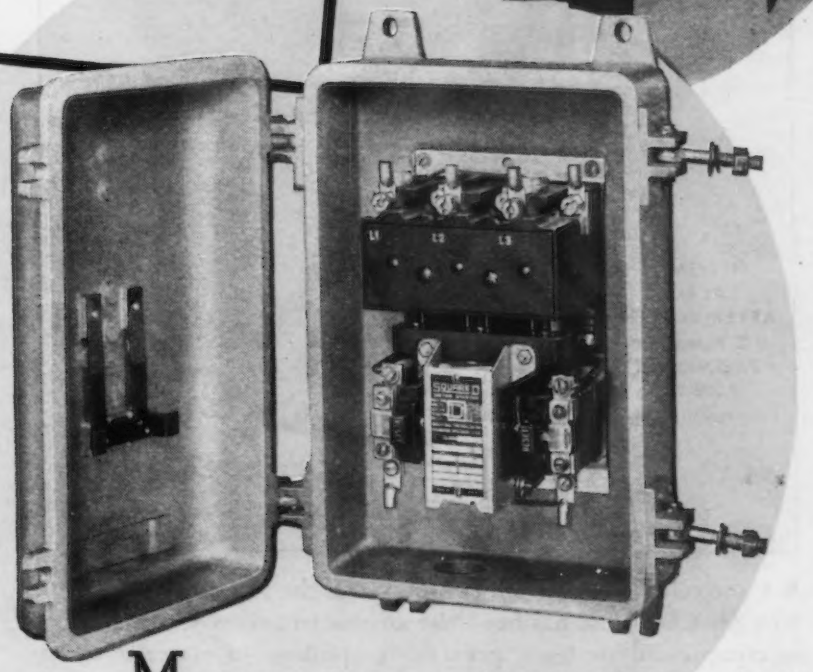
Class 9001, Type BR11 standard duty "Start-Stop" pushbutton station.



Class 8538 combination starter with circuit breaker and magnetic starter in one enclosure.



Class 9001, Type GD-31 three unit heavy duty pushbutton station.



MAGNESIUM dust is readily ignited by an electric spark or arc. Safe operation demands motor control with special dust-excluding enclosures in all locations where it is present.

Square D offers a complete line of control suitable for use in the presence of magnesium, aluminum, or other combustible metal dust. Devices listed for Class II, Group G hazardous grain dust locations, also meet Class II, Group E metal dust requirements.

Manual and magnetic starters, combination starters, reversing starters, push buttons and other accessories are available in a complete range of sizes.

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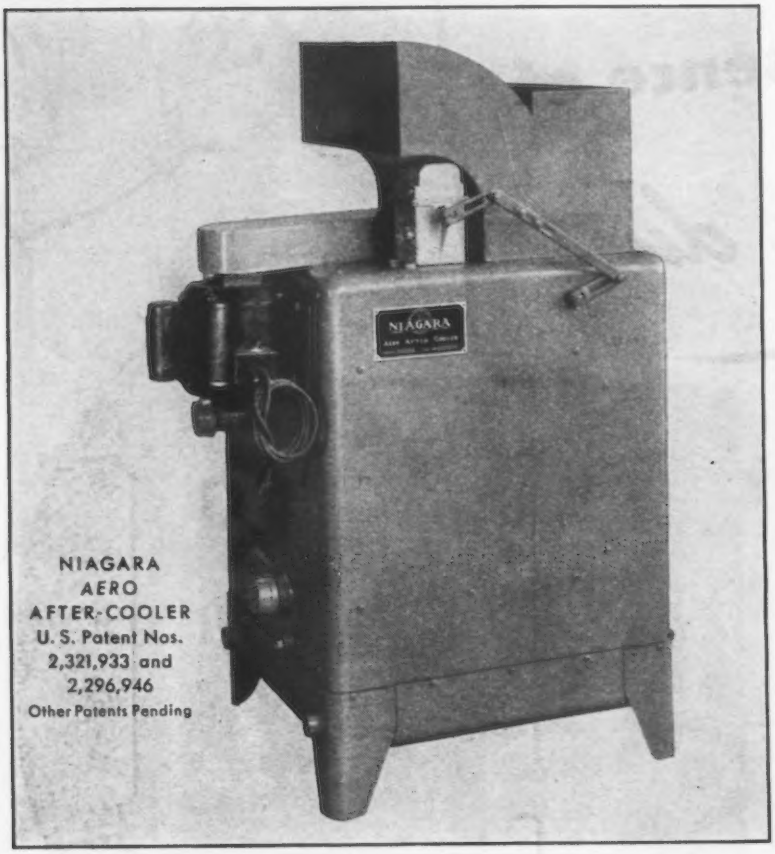

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2,296,946
Other Patents Pending

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Porcelain Enamel Group Maps Postwar Technical Advances

Washington

• • • **Di-electric heating** and induction heating for drying and fusing porcelain enamels are two suggested changes in porcelain enamel processing. These methods of heating may have revolutionary effects upon the application of porcelain finishes. Although such work has not been done previously, the importance in other fields indicate that such methods may be possible. The use of multiple or repeat tanks in cleaning operations and electrolytic cleaning has been suggested.

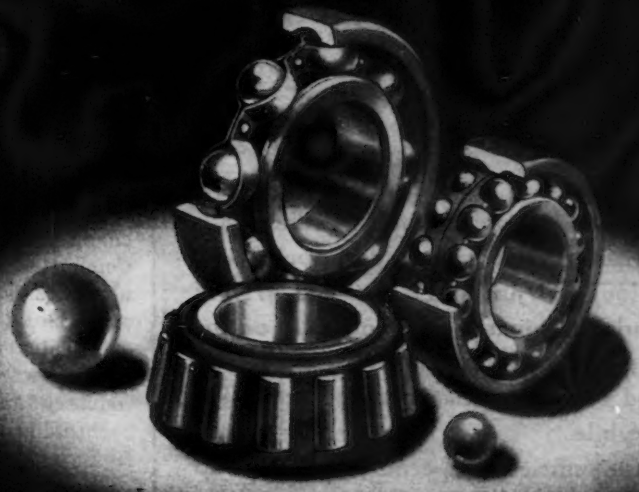
Atmospheric control of furnaces is progressing with great rapidity, especially when the protective nature of the porcelain enamel coating is important. Electrolytic precipitation of porcelain enamels in spraying, according to many engineers, will result in large reduction in materials used. It will also make application much more complete and uniform, and tend to reduce the loss resulting from irregular or thick coatings.

The importance of research work in

WOMEN SHIPBUILDERS: ***Margaret Beeson is termed one of the best burners at the Marinship Corp., Sausalito, Calif., builders of Maritime tankers.***

PRECISION

THE ARISTOCRAT of BEARINGS



BALLS - BALL BEARINGS - ROLLER BEARINGS

HOOVER

BALL AND BEARING COMPANY, ANN ARBOR, MICHIGAN

A GAY BLADE *that leads a* DOUBLE LIFE

IT WORKS THIS WAY:

Place in machine in usual way, first edge (A) down. As blade submerges in slot, edge (B), set narrower than edge A, clears work freely, undamaged. When A is dulled, invert blade. Edge B then cuts as fast and free as first edge.

Sounds fantastic, doesn't it? But Blu-Mol "Double-Life," a Millers Falls exclusive, is a *high speed* machine blade that actually leads a double life. When one edge is worn out from long toil, just turn it over and go right on sawing. The special set differential eliminates drag and wear on the trailing edge. One Blu-Mol "Double-Life" blade costs 33⅓% less than two molybdenum high speed blades and 47½% less than two tungsten high speed blades. The saving is worth-while.

"Double-Life" blades, while more efficient and economical, are also aiding the drive toward Victory by saving in alloy steel consumption, shipping, storing and handling. Put in your requisition now.

DOUBLE-LIFE *Hack Saws*

MILLERS FALLS TOOLS SINCE 1868

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GREENFIELD, MASSACHUSETTS

the porcelain enamel industry has led the Porcelain Enamel Institute to establish a committee on process development to study new manufacturing methods and report on their adaptability to this industry. This committee consists of: Chairman, L. E. Nordholt, vice-president, Tennessee Enamel Mfg. Co., Nashville, Tenn.; H. D. Carter, research engineer, The Harshaw Chemical Co., Cleveland; R. M. King, associate professor, Department of Ceramic Engineering, Ohio State University, Columbus, Ohio; Edward Mackasek, development engineer, Porcelain Enamel Institute, Washington, D. C.; A. I. Andrews, head of the department of Ceramic Engineering, University of Illinois, Urbana, Ill.; J. W. Hoehl, vice-president, Wolverine Porcelain Enameling Co., Detroit; G. W. Dykstra, engineer, Great Lakes Steel Corp., Detroit; R. E. Tayor, general superintendent, The Enamel Products Co., Cleveland; F. R. Porter, engineer, Inland Steel Co., Indiana Harbor, Ind.

The first meeting of this committee, held on Jan. 18, at Cincinnati, laid out a specific program of inquiry and assigned one new process to each member for further study.

Labor Group Proposes Study Of Machine Tool Conversion

Washington

• • • **The Machine Tools** Labor Advisory Committee in a report to WPB recommended advance planning designed to insure smooth adjustment of the machine tool industry to the changing needs of war production. Committee members expressed particular interest in carrying out a study of problems relating to the disposition of surplus machine tools, conversion to other war work by the machine tool industry and advance planning for eventual conversion to civilian production.

The advisory committee recommended that a preliminary study be undertaken by the Office of Labor Production and the Office of Manpower Requirements before specific recommendations are submitted to WPB. The government presiding officer of the Machine Tools Labor Advisory Committee is David Lasser, assistant director, Plant Productivity Division of the Office of Labor Production.

The advisory committee consists of representatives of important labor unions in the machine tool industry.

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Cemented-Carbide Tipped Form Tool
Width of Carbide Tip . . . . . 1¾"
Stock Removed . . . . . approx. .040"
Grinding time including set-up and complete inspection of contour before removal from machine . . . . . 3½ hrs.

Circular Form Tool with Preformed Cemented-Carbide Tips
Stock Removed . . . . . .015"
Grinding time including set-up and complete inspection before removal from machine approx. 2 hrs.

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Metal Receptacles Shown in Fifteenth Enemy Patent List

• • • **In the fifteenth list of seized** enemy patents available on the obtainment of license from the Alien Property Custodian, various types of metallic receptacles and closures are described. These patents deal with such items as higher pressure vessels, drums, storage tanks and other similar products. Rules and procedures for obtaining licenses to and the manner through which complete patent descriptions may be obtained are shown in the Nov. 4 issue of THE IRON AGE, page 95.

In the items shown in this list, the class number appears at the head of the list, and each separate item shows the sub-class number, patent number, patent description, inventor and his nationality, and the date on which the patent was issued.

Class 220—Metallic receptacles

(1) 2,156,400. Spherical container for storing fluids such as gas and liquids. W. Peckstein, Germany. 5-2-39.

(3) 1,645,944. Shell-shaped body suitable for the allowance of high-pressure stresses. H. Debor, Germany. 10-18-27.

(3) 1,753,871. High-pressure gas-developing cartridge or bottle for portable fire extinguishers as well as for the preparation of sparkling beverages in bottles. G. Schworetzky, Germany. 4-8-30.

(3) 2,029,606. High-pressure joint for pressure vessels. K. Bredtschneider, Germany. 2-4-36.

(3) 2,253,093. High-pressure vessel. L. Raichle and K. Riedinger, Germany. 8-19-41.

(3) 2,312,420. High-pressure container. E. Kopf and R. Wasmuht, Germany. 3-2-43.

(9) 2,043,183. Double-walled vessel for transport and storage of beverages more particularly beer, in which the inner vessel for holding the beverage is removable. K. Mauser, Germany. 6-2-36.

(10) 1,800,082. Jacketed metal drum. J. Knigge, Germany. 4-7-31.

(10) 1,888,899. Metal drum manufactured from stainless steel and intended for liquids which easily acquire a bad taste. P. Wolf, Germany. 11-22-32.

(10) 1,904,755. Jacketed metal drum. P. Wolf, Germany. 4-18-33.

(15) 1,956,512. Metal cask having double walls, more particularly casks of this kind for the transport of beer and similar liquids, the taste of which is very subject to contamination. A. Muller, Germany. 4-24-34.

(20) 1,644,821. Container of the type in which are provided two chambers or compartments each adapted to contain an ingredient or ingredients of a product, thus enclosing the whole of such product while keeping the ingredients separated until ready for use. J. Eckhart, Germany. 10-11-27.

(22) 1,669,333. Partition means for fluid containers, particularly for dyeing machines and the like. W. Gerber, Germany. 5-8-28.

(22) 1,758,335. Device for subdividing liquid containers. J. Schlumpf, Germany. 5-13-30.

(23) 1,731,847. Bronze and tincture container with an intermediate partition, separating the bronze and tincture from one another which can be displaced by pushing or is removable. C. Eckart, Jr., Germany. 10-15-29.

(24) 1,665,827. Packing device for pressure vessels. R. Tillmann, Germany. 4-10-28.

(24.50) 2,101,030. Expansion-plug for barrels and other tanks, fire-tube and water-tube boilers. W. Kunze, Germany. 12-7-37.

(25) 1,656,559. Means for closing manholes in the high-pressure drums of steam boilers working at very high pressures, say 30 to 100 atmospheres and more. O. Hartmann, Germany. 1-17-28.

(26) 1,693,468. Sealing piston for reservoirs for the storage of gas, steam, or easily-evaporating liquids. F. Schurmann, Germany. 11-27-28.

(26) 1,722,863. Sealing piston for reservoirs

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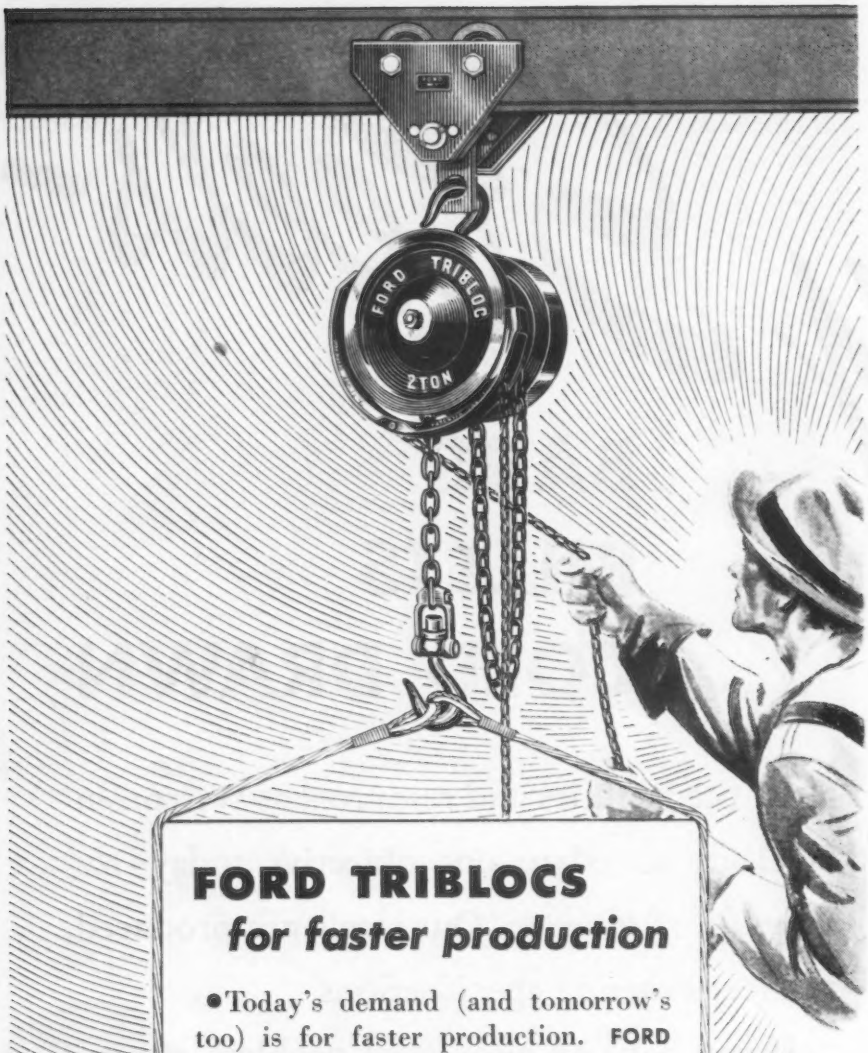

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for the storage of gas, steam, or easily-evaporating liquids. F. Schurmann, Germany. 7-30-29.

(26) 1,865,969. Sealing means for fluid storing containers. F. Schurmann, Germany. 7-5-32.

(26) 2,006,505. Semi-rigid insulating roof or top for protecting liquid fuels against fire or evaporation. B. Lentschewsky, Germany. 7-2-35.

(26) 2,108,380. Peripheral sealing means for tanks. B. Lentschewsky, Germany. 2-15-38.

(29) 1,988,223. Closure for heat-insulated containers. W. Voss, Germany. 1-15-35.

(31) 1,633,494. Cooking utensil with hinged and removable lid. E. Neumann, Germany. 6-21-27.

(31) 2,107,212. Sheet metal container for packing articles or commodities, which container possesses a lid having an overlapping fit with the container body when in closed position. A. Pfeghar, Germany. 2-1-38.

(35) 2,113,484. Hinged closure for petrol tanks. F. Krauss, Germany. 4-5-38.

(36) 1,811,165. Dust-bin comprising a closed receptacle having in one of its walls a rotatable plate carrying a frame wherein a slide is guided so as to allow being extended through an aperture in the plate for the reception of an ash pan. J. Wolter, Germany. 6-23-31.

(39) 1,737,605. Hollow sheet metal bung for iron transport casks, oil drums and the like. R. Mauser, Germany. 12-3-29.

(39) 1,774,839. Wash-out plugs for locomotive marine and other boilers, wherein the joint is protected from the excess of boiler water by being arranged inside the body of the plug. W. Kanning and O. Buschmann, Germany. 9-2-30.

(39) 1,925,503. Closure means for tin boxes. E. Schmidt, Germany. 9-5-33.

(39) 2,008,079. Bung closure for metal vessels. K. Mauser, Germany. 7-16-35.

(42) 1.624,901. Tin with tightly-closing cover for the reception of cream sweets, pills and the like. A. Schwieger, Germany. 4-12-27.

(42) 1,869,511. Sheet metal container or can having a detachable lid or top, wherein the edge of the lid is of U-shaped cross-section. E. Schmidt, Germany. 8-2-32.

(42) 1,922,789. Closing means, more particularly for milk cans and the like. P. Wolf, Germany. 8-15-33.

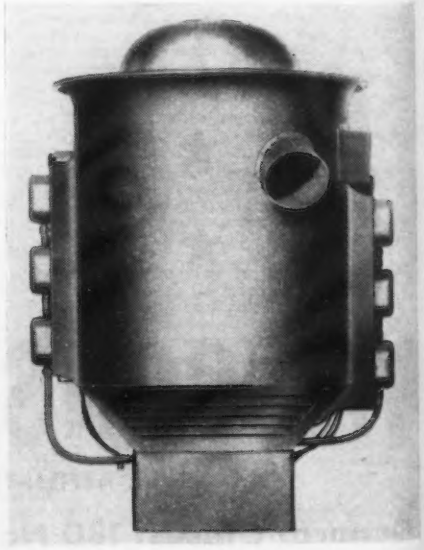
(43) 1,608,455. Tin opener consisting of a folded sheet metal strip which is straddled about or mounted jockey-fashion on the upper edge of the tin. A. Zecha and F. Zecha, Austria. 11-23-26.

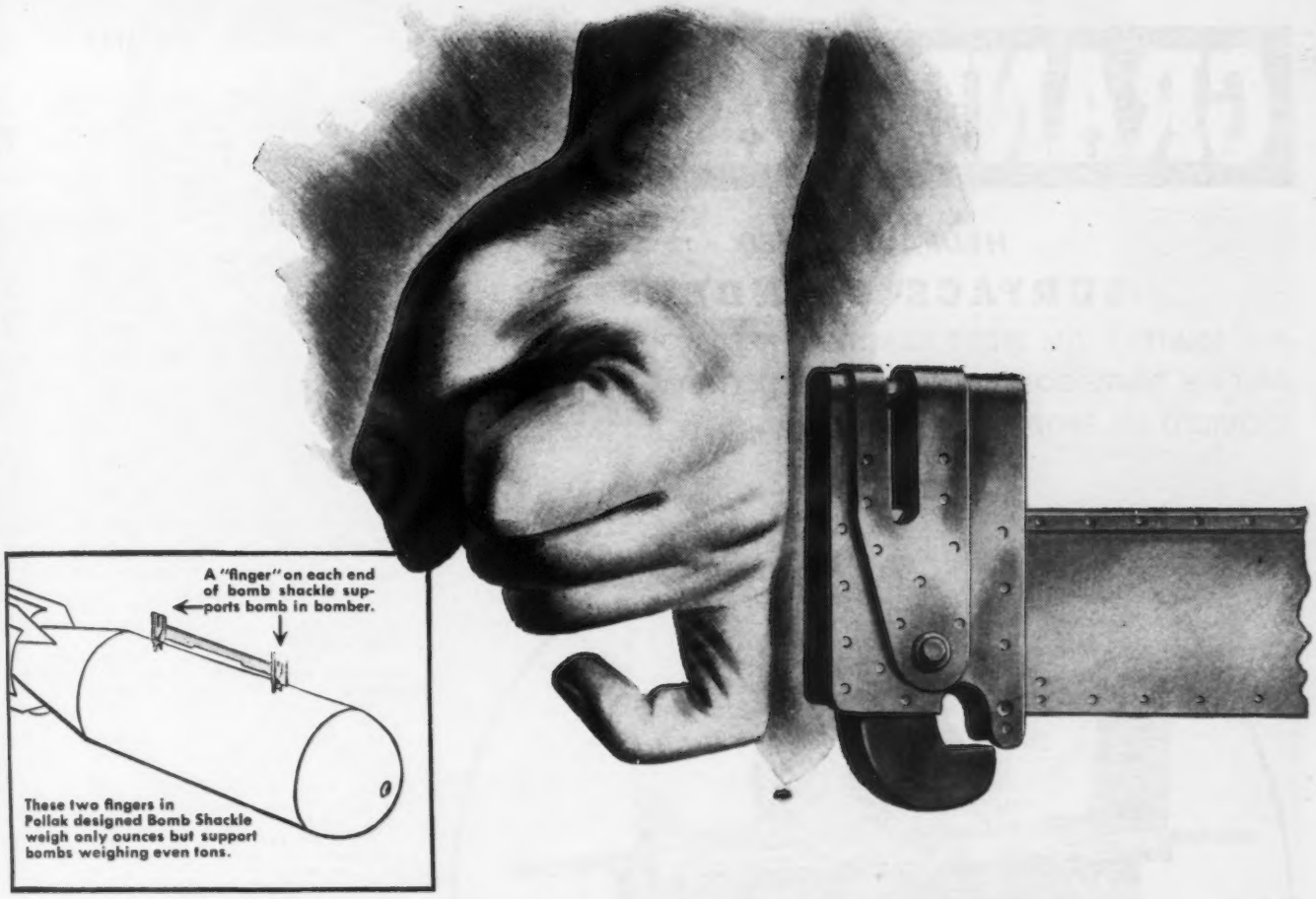
(43) 2,138,061. Box or container composed of sheet metal and furnished with a tilting lid. A. Friedinger, Germany. 11-29-38.

(44) 1,674,506. Valve to be used in conjunction with preserving receptacle. H. Ernst, Germany. 6-19-28.

(46) 1,839,340. Seal comprising a body with a funnel-shaped opening to be sealed and a

HELICOPTER ENGINE: *This 6-cylinder, opposed, aircooled Franklin engine, built by Aircooled Motors Corp., Syracuse, N. Y., is in service in several experimental helicopter ships. The engine operates in vertical position directly below main rotor shaft.*





EVER SEE THE LITTLE FINGER THAT HOLDS A BOMB?

THERE ARE TWO OF THEM. One on each end of the bomb shackle that supports the bomb in the bomber. These fingers, weighing only a few ounces, carry the weight of bombs weighing many hundreds of pounds. In split second timing with the bomb sight, in all kinds of weather and temperatures, they must release the bomb automatically—precisely—instantly.

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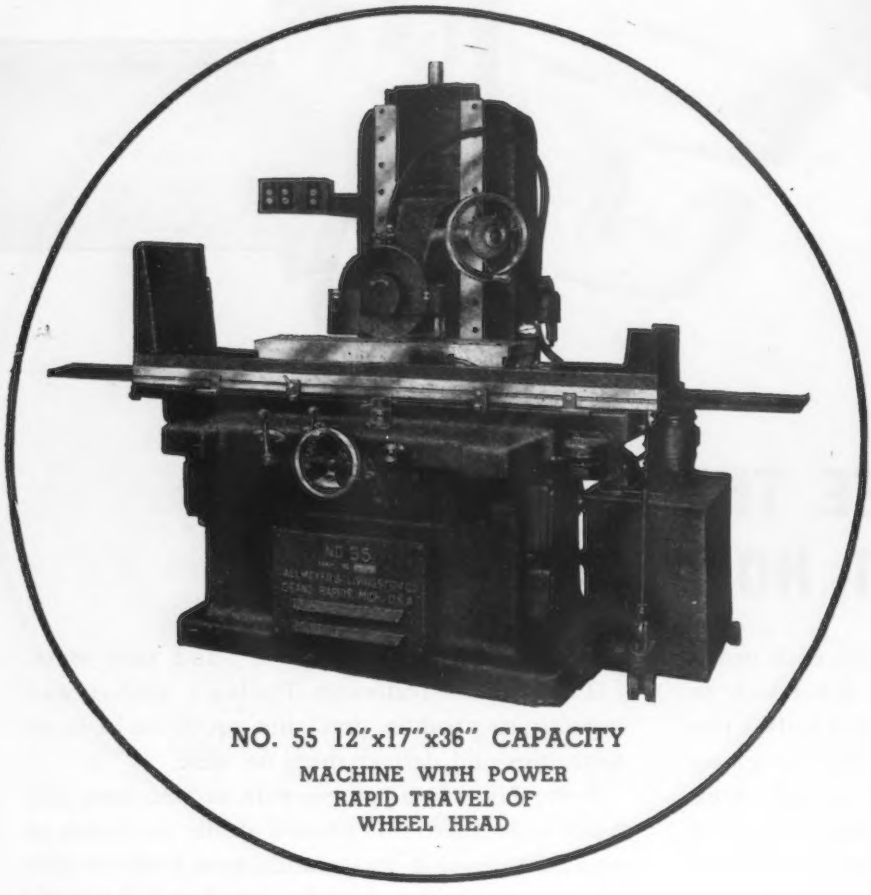

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TWO USABLE SPINDLE SPEED
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conical closing body cooperating therewith to seal same. H. Pittlick, Germany. 1-5-32.

(46) 1,889,606. Cover closing for steam barrels, heating boilers, and the like. H. Lange, Germany. 11-29-32.

(46) 2,257,213. Closure for high pressure vessels. U. Wolfrom, Germany. 9-30-41.

(47) 2,014,041. Closure for discharge openings. L. Eirich and J. Eirich, Germany. 9-10-35.

(51) 1,709,736. Tin openers of the kind intended for opening cans, the more or less liquid contents of which are not to be consumed immediately after the tin has been opened, but gradually in small quantities, such, for instance, as sterilized milk or cream and similar products. M. Patermann, Germany. 4-16-29.

(54) 1,950,065. Closing device for cans which are used for packing sundry materials, such as cocoa, sugar, meal or chemical substances. K. Reiche, Germany. 3-6-34.

(54) 1,952,487. Metallic cover for boxes, tins, flasks, and like articles. E. Biffi, Italy. 3-27-34.

(55) 1,617,076. Closure for receptacles and particularly sheet metal barrels or drums used as shipping or storage containers. A. Mauser, Germany. 2-8-27.

(55) 1,844,970. Steam cooking apparatus and closure therefor. K. Muller and P. Arnold, Germany. 2-16-32.

(55) 1,846,964. Steam cooking pot of the type having an outer cover. A. Hainlen, Germany. 2-23-32.

(55) 2,232,494. Method and means for fully or partly closing hollow bodies such as tubes, cylinders, etc. W. Stieber, Germany. 2-18-41.

(57) 1,821,726. Closure for pressure vessels. A. Saporta, Italy. 9-1-31.

(57) 1,913,908. Electric accumulator for operating miner's lamps. P. Wolf, Germany. 6-13-33.

(57) 1,945,752. Cam lever closing arrangement for pressure cooking pots. A. Pagano, Italy. 2-6-34.

(60) 1,693,150. Box of the type used as containers for shoe polish and more particularly for boxes of such type in which the lid is not frictionally secured but the turned-down flange of the lid is provided with means engaging, in the closing position, a circular groove in the body of the box. J. Malonyay, Hungary. 11-27-28.

(60) 1,919,432. Housing of electrical switches or distribution boxes. L. Holm, Germany. 7-25-33.

(60) 1,919,574. Closure means for cans. E. Schmidt, Germany. 7-25-33.

(61) 2,026,002. Sealing means for sheet metal containers. E. Schmidt, Germany. 12-31-35.

(61) 2,078,009. Tension ring closure for packing containers. A. Mauser, Germany. 4-20-37.

(61) 2,116,841. Closure for packing containers. K. Mauser, Germany. 5-10-38.

(63) 1,709,701. Thin metallic barrel designed to contain materials liable to injure metal by chemical or analogous action, said barrel being lined with an internal elastic lining of material resistant to the aforesaid injurious chemical action. W. Althoff, Germany. 4-16-29.

(64) 2,034,057. Process for the production of metal coatings on chromium or chromium-alloys. V. Reuss, Germany. 3-17-36.

(67) 1,605,229. Steam and water collector for high-pressure boilers. O. Hartmann, Germany. 11-2-26.

(71) 1,683,788. Container such as barrel, drum, or the like. A. Mauser, Germany. 9-11-28.

(71) 2,269,617. Liquid tank or container for use in vehicles and aircraft. W. Borstel, Germany. 1-13-42.

(72) 1,667,793. Method of reenforcing the walls of packing cases. A. Mauser, Germany. 5-1-28.

(73) 1,632,957. Closure means for manhole openings in steam boilers. H. Franke, Germany. 6-21-27.

(73) 1,664,985. Container for solid substances or liquids particularly such as are intended to be closed substantially airtight to preserve the contents during storage or shipment. A. Mauser, Germany. 4-3-28.

(73) 2,122,105. Metal container having a cover, fastening means for the cover and a ring-shaped seating for the cover and fastening means. K. Mauser. 6-28-38.

(75) 1,678,090. Casing for electric transformers and the like. O. Wehrle, Germany. 7-24-28.

(75) 1,837,845. Fuel tank arranged on the dashboard of motor vehicles. T. Zerbi, Italy. 12-22-31.

(85) 1,775,484. Tank for transportation of volatile liquids. E. Brainich, Germany. 9-9-30.

(85) 1,974,034. Fire prevention device for storage tanks. V. Pelleriti, Italy. 9-18-34.

(85) 2,216,717. Protecting cap for the

Home *is where they park their* Huts!

Official Signal Corps Photo

Ed Miller often cussed the cold of winter in his native state and dreamed of living some day in a warmer climate. But that was before the war. Now Ed's Private Miller, "wintering" with the U. S. Army at a frigid outpost in the far, far North. And home is where he parks his hut!

There are countless Ed Millers somewhere "up there" tonight—and not doing so badly, thank you. For those portable barracks Uncle Sam provides for his men in arms are comfortable beyond belief—well heated, well ventilated and well lighted.

Many, many more of these prefabricated steel dwellings may be needed as our offensive spreads to new lands in this vast global war. So, at the Cincinnati Sheet Metal and Roofing Company (one of several producers of corrugated steel panels for such barracks) every effort is aimed at speeding up production. An example of this was the company's installation of a DeVilbiss automatic spray system which saves time in preparing the steel panels for duty at the front. It applies *over 120 gallons* of olive-drab, lusterless enamel per hour!

Today, DeVilbiss Spray Systems are busy everywhere, coating, painting and finishing things quicker that they may join the fight sooner. *Tomorrow,* when *your* plant is freed for the competitive manufacture of the better peacetime products the whole world expects, DeVilbiss Spray Equipment will help you produce them faster—and at lower cost.

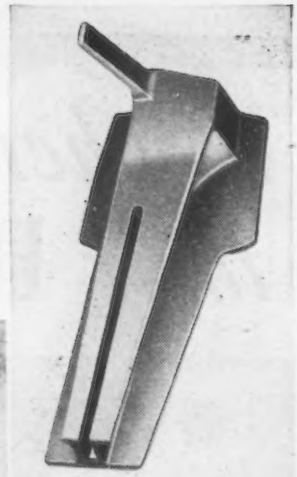
ARMY E NAVY

THE DEVILBISS COMPANY, TOLEDO 1, OHIO
Canadian Plant: Windsor, Ontario

DE VILBISS
Spray Systems

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

Precision made by FENN for Brewster



OFFICIAL U. S. NAVY PHOTOGRAPH

IN the legendary Corsair, built by Brewster for the Navy, only the finest materials and workmanship find a place. Among these is the bulkhead fitting shown above — a solid aluminum forging, machined to closest tolerances. When F3A Corsair goes into action, everything that engineering skill can contribute has been done to meet the exacting government specifications. From the Fenn Plants a steady flow of precision built parts and assemblies go to manufacturers of planes and other vital war products.

FENN FOR SPECIAL MACHINERY

Years of experience in the design and building of Special Machinery has given the Fenn organization a skill and know-how that may prove helpful to you in the days which lie ahead. We have the plants and facilities for handling almost any size and kind of special machinery job and we welcome inquiries from those who are looking for a dependable source.

PLANNING NOW FOR 1945 PRODUCTION

When the time comes for reconversion to peace time production, Fenn engineers, toolmakers and machinists will be ready to serve you. It is not too early to think of planning now.

THE FENN MANUFACTURING CO.
HARTFORD, CONNECTICUT

valves of pressure gas bottles. E. Alessio, Italy. 10-8-40.

(88) **1,918,906.** Safety device for containers for explosives, particularly explosive gases. H. Grohmann, Germany. 7-18-33.

(88) **2,305,923.** Receptacle for petrol or other liquids. C. Held, Germany. 12-22-42.

(89) **2,170,937.** Explosion safety device. H. Bruning, Germany. 8-29-39.

(89) **2,198,988.** Valve arrangement for electrolytic condensers. G. Biniek, Germany. 4-30-40.

(91) **1,736,961.** Handle-supporting closure band for vessels. F. von Alvensleben, Germany. 11-26-29.

(93) **1,822,138.** Insert for preserve tins for sausages. H. Fricke, Germany. 9-8-31.

(97) **1,622,399.** Bobbin bin and shelf. G. Schlesinger, Germany. 3-29-27.

(98) **1,647,829.** Device for emptying garbage bins into garbage-collecting receptacles or carrying-off cars in dustproof manner. P. Holzmann, Germany. 11-1-27.

(98) **1,715,364.** Device for the dust-free discharge of circular dustbins into refuse-collecting carts. K. Hirschner, Germany. 6-4-29.

(98) **1,752,950.** Device for the dustless discharge of dustbins into refuse collecting carts. K. Hirschner, Germany. 4-1-30.

(98) **2,096,630.** Chute device for ash, garbage, and dustbins. E. Fiedler, Germany. 10-19-37.

(1) **1,650,510.** Closure for vessels having the form and disposition of the float chamber of a carburetor. F. Goudard, France. 11-22-27.

(1) **1,654,016.** Large-sized reservoir for liquids. R. Salmon, France. 12-27-27.

(1) **2,031,553.** Tank for storage of liquids, especially hydrocarbons. A. Syndergaard, Denmark. 2-18-36.

(1.5) **1,843,505.** Freight handling container for transportation of goods. J. de Andia Yrarrazaval, France. 2-2-32.

(1.5) **2,002,422.** Container for the transportation of goods. M. Utile, France. 5-21-35.

(3) **1,632,447.** Device for closing compressed or liquid gas cylinders. L. Lemoine, France. 6-14-27.

(3) **1,651,521.** Method and apparatus for the storage and the transportation of gas. P. Girardville, France. 12-6-27.

(3) **1,795,388.** Arrangement for securing the longitudinal binding wires in the bound recipients used for the storage and transportation of gas. C. Dumat, France. 3-10-31.

(3) **1,801,910.** Reenforced gas container. C. Dumat, France. 4-21-31.

(9) **1,726,143.** Box for the secret packing of hygienic rubber protective means or the like. R. Eisinger, Austria. 8-27-29.

(13) **1,779,786.** Container particularly adapted for fluids which are inflammable or explosive, such as gasoline, fuel oils and the like. M. de Alzaga Unzue, France. 10-28-30.

(24.5) **1,736,350.** Closing device for containers made of aluminum or other soft metals. S. Larsen, Denmark. 11-19-29.

(25) **1,675,640.** Cooking pot, the cover of said pot being arranged inwardly and tightened from the inside toward the outside by means of an outwardly arranged locking mechanism. C. Charlier, and A. Errera, Belgium. 7-3-28.

(25) **1,759,732.** Cooking pot of the self-closing type for the cooking of food and for other uses. M. Charlot, France. 5-20-30.

(33) **1,910,033.** Device for obturating an orifice. Z. Mincovsky, France. 5-23-33.

(35) **1,611,494.** Box, small chest, case and similar article of small dimensions such as those manufactured for gold and silver articles, jewelry and fancy goods. R. Strauss, France. 12-21-26.

(39) **2,194,147.** Packing of a sealing cap for the sealing and tightening of container closures, especially bund closures. A. Mauser, Germany. 3-19-40.

(42) **1,758,691.** Hermetic slip-type closure for metallic boxes. G. Dolliens, France. 5-13-30.

(42) **1,833,752.** Closing device for tin cans and the like. L. Casimir Longchamp, France. 11-24-31.

(43) **1,699,445.** Opener, for tins or the like container, of the type rotatably mounted on one part of the container and adapted on rotation to lift the lid or cover thereof. B. Polak, Czechoslovakia. 1-15-29.

(43) **1,700,682.** Box opener consisting essentially in a plate or disk rotatably supported on the box and engaging with its edge between the rim of the box and the rim of the lid. L. Kurpiel, Czechoslovakia. 1-29-29.

(43) **1,703,778.** Device for opening containers, boxes, tins, or the like. B. Polak, Czechoslovakia. 2-26-29.

(43) **1,717,252.** Lid opening device for closed receptacles. B. Polak, Czechoslovakia. 6-11-29.

(43) **1,717,253.** Lid opening device for re-

Stronger, More Accurate Parts

Produced at Low Cost on...

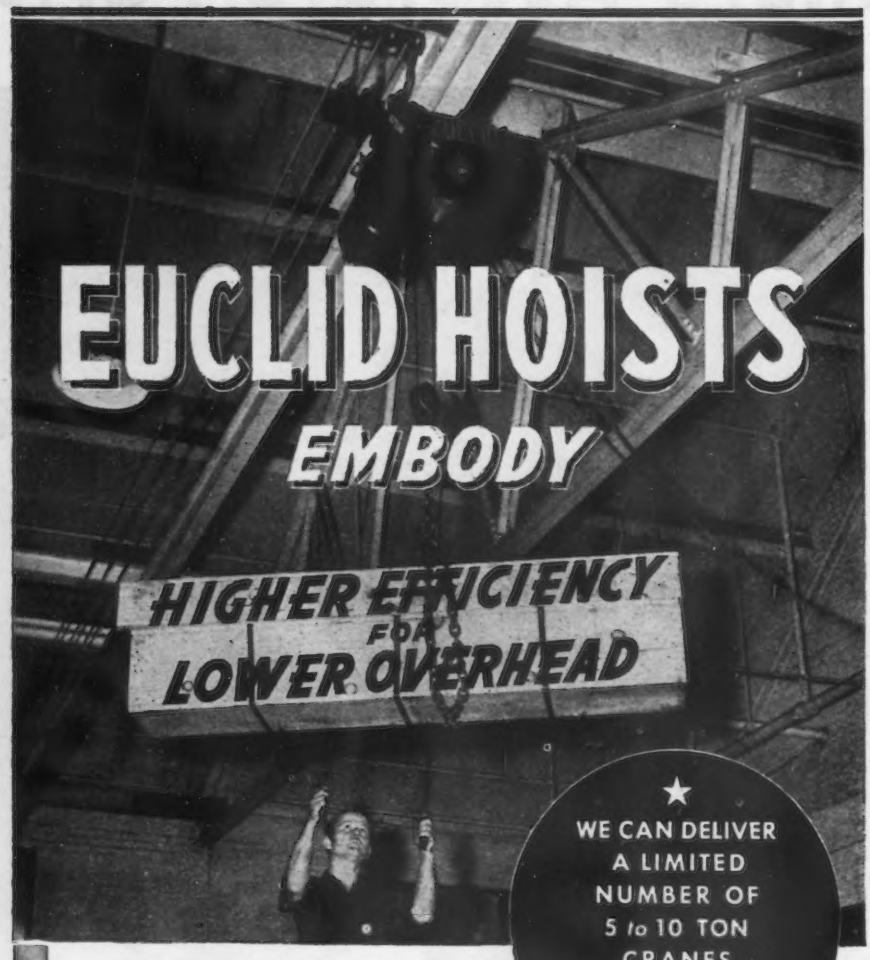
AJAX *High Speed* Forging Presses

Forgings of aluminum, brass, magnesium and steel for aircraft parts, shell parts, valves and many types of hydraulic fittings can be produced at high production speeds on AJAX Forging Presses. Production by this forging process shapes the grain flow so that the finished forging has a denser, stronger structure for maximum reliability.

The air clutch on the main shaft provides instantaneous application of tremendous pressure in response to the treadle. This not only makes possible higher operating speeds but results in better filled die impressions without excessive flash. Even small parts of intricate design can be forged to close tolerances, economically on AJAX FORGING PRESSES.

Write for Bulletin No. 75

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
621 MARQUETTE BUILDING • CHICAGO, ILLINOIS



The name "Euclid" on a crane or hoist identifies equipment with a consistent reputation for delivering more than the expected quota of work—*more efficiently—at lower overhead!*

The main frame of EUCLID HOISTS is made of rolled steel plates arc welded into a unit that is not only lighter but many times stronger than a cast frame. Alloy steels, heat-treating, anti-friction bearings and double brakes assure a prolonged life of usefulness.

Motors and controllers are the fully enclosed type and wiring is all enclosed in conduit.

Other exclusive EUCLID features assure continuous dependable performance and low maintenance cost.

THE EUCLID CRANE & HOIST COMPANY
1361 Chardon Rd.
EUCLID, OHIO

ceptacles. B. Polak, Czechoslovakia. 6-11-29.

(43) 1,731,860. Box with cover projecting with its edge over the lower part of the said box and possessing a curved, circular and resilient surface. J. Kucera, Czechoslovakia. 10-15-29.

(43) 1,762,076. Device for opening containers such as boxes, tins, or the like. B. Polak, Czechoslovakia. 6-3-30.

(43) 1,807,417. Container provided with an opening device. L. Lechner, Czechoslovakia. 5-26-31.

(43) 1,818,695. Tin with opening device. L. Couade, France. 8-11-31.

(44) 2,103,935. Device for preventing evaporation of volatile products. 12-28-37.

(48) 2,023,744. Can for preserves and the like and a can opener for cutting it open, the can comprising a rim around the top and being formed with a depression, the said opener being mounted on the rim. B. Polak, Czechoslovakia. 12-10-35.

(48) 2,165,720. Lid for hermetically sealed cans or boxes. T. Norland, Norway. 7-11-39.

(49) 1,820,594. Device for opening preserve tins with a wire. G. Bertout, France. 8-25-31.

(54) 2,313,198. Key-opening can. N. Haustrup, Denmark. 3-9-43.

(59) 2,085,358. Tin with a jamming slip-on cover. R. Gunzel, Germany. 6-29-37.

(60) 1,676,868. Arrangement for closing boxes. A. Petersen, Denmark. 7-10-28.

(60) 2,254,559. Device for closing of containers, coupling of tubes, etc. H. Andresen, Norway. 9-2-41.

(61) 1,963,675. Method of obtaining an autoclave closure for vessels of all kinds. P. Plainevaux and J. Antoine, Belgium. 6-19-34.

(63) 1,931,798. Bleaching solution container construction adaptable to sudden changes of temperature without damage and resistant to the action of active oxygen compounds. W. Hundt, Germany. 10-24-33.

(85) 2,057,248. Tank for petroleum or other liquids. J. Peyrouse, France. 10-13-36.

Brazilian Plant Rolls 45-lb. Rails for New Railroad

• • • **According to Brazilian** reports, 45-lb. rails are now being produced in Brazil for Brazilian railways. The rails are made at the plant of the Compania Siderurgica Belgo-Mineira, at Monlevade. This is one of the older steel plants in Brazil and is not connected with the new National Steel Co. of Brazil. The new plant at Volta Redonda, now under construction, will be the source of heavier rails in excess of 65-lb.

Production of light rails at Monlevada was encouraged as a means of obtaining rails for the 310 mile railroad line being built to connect the railways of the southern and northeastern section of Brazil.

Brazilian steel capacity at present only provides about 35 per cent of Brazil's needs, but this capacity will be nearly trebled when the Volta Redonda plant, 80 miles inland from Rio de Janeiro, begins operations late in 1944 or early 1945. Compania Siderurgica Belgo-Mineira was founded in 1921, beginning operations at Sabara and later at Monlevade. In 1939, with a steel ingot capacity of 85,000 tons per year, this company represented 60 per cent of Brazil's total ingot capacity of 114,000. Steel ingot capacity in 1941 in Brazil was 155,000 tons per year, to which will be added an initial output of 275,000 tons per year when the Volta Redonda plant is put into production.

"PUT IT ON THE BLANCHARD"

Grinding Main Housing Poles for Magnetos on a No. 18 Blanchard Surface Grinder

Ability to remove metal quickly and cheaply makes it possible for Blanchard Grinding to carry through from roughing to finishing in one operation.

These Housing Poles for magnetos have .140" stock to remove from steel laminations. Ten pieces are held on a Blanchard designed fixture on the No. 18 Grinder and 30 pieces are finished per hour.

The weight and rigidity of the Blanchard are essential for economical machining of parts such as these.

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ Production
- ★ Adaptability
- Fixture Saving
- ★ Operation Saving
- Material Saving
- Fine Finish
- Flatness
- Close Limits

★ . . . . *Especially valuable on jobs like the one illustrated.*

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASSACHUSETTS

BLANCHARD

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

● This advertisement is doing a recruiting job for industry, in publications with an aggregate circulation of more than eight million.

DELTA
MILWAUKEE
Machine Tools

WOMEN
(Yes, You!)
WANTED

. . . for easily-learned, well-paid jobs operating simple, safe Delta Machine Tools

— in war plants the country over

If you've been hesitating about war-plant work because you lack a blacksmith's biceps and a technical training, let us assure you that neither is needed. In war plants all over the country, there are Delta Machine Tools waiting for women just like you, offering pleasant jobs well within your capacity—good-pay jobs that give you the thrill of pride and financial independence.

You can do it!

Thousands of women everywhere are setting production records on Delta Tools, after brief instruction on the job. There's nothing complicated or hard about it.

The thousands of Delta Tools now used in war industry are built on exactly the same principles as those favored for twenty years in schools and hobby shops. Delta engineers have merely given them the extra strength, the super-accuracy, the automatic features needed for continuous operation.

Delta machines *had* to be safe — they were originally developed for use by school children and amateurs. They *had* to be simple, easy to understand. They *had* to be convenient, easy to operate without fatigue. And they ARE — today more than ever.

The time is NOW!

When you operate one of these Delta machines, you take your place behind our fighting men and speed them along the road to victory. And remember, every hour of delay in turning out the weapons of war must be paid for in American lives.

Take this ad to the nearest office of the U. S. Employment Service. Tell them *that's* the kind of war job *you* want — *now.*

HH-12C

DELTA
MILWAUKEE
Power Tools

Make this War Work Your Post-war Hobby

Free booklet tells you how. "Happiness Is in Your Hands." Article on manual hobbies for mental health. A story of pride in creating beautiful, useful objects. Free. *Tear out the coupon, mail it today!*

THE DELTA MANUFACTURING CO.
705B E. Vienna Ave., Milwaukee 1, Wis.

Please send me your free booklet, "Happiness Is in Your Hands," picturing the ideal hobby and showing how to get started.

Name.....

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City.....(.....) State.....

Bison Earns Title Of No. 1 LCT Builder

North Tonawanda, N. Y.

• • • **Although winter** has closed navigation on the Great Lakes and the New York Barge Canal, production of LCT boats continues heavier than ever at Bison Shipbuilding Co. here. Instead of being shipped by waterway, the 157-ton vessels are dismantled, each packed on 11 freight cars, and sent to an East Coast for reassembly.

According to Lieut. Fred J. Bartell, assistant supervisor of shipbuilding for the Navy in the Buffalo district, Bison is the largest producer of LCT's in the country. Frank E. Ernst, company treasurer, says the Navy's order for the craft has been tripled and are now five times greater than those of any other firm. In 1943 Bison turned out five times more of this type of landing craft than any other company. Ten vessels are under construction at the Bison yard at all times. Facilities of two other companies, Ernst Iron Works, Inc., and August Feine & Sons Co., Buffalo, help build the boats.

The Gould coupler plant of Symington-Gould Corp. in Depew, Buffalo suburb, is turning out a heavy tonnage of steel for invasion craft, armored tanks, locomotives, and other heavy railroad equipment for the armed forces. One of the largest foundries in New York, this greatly-expanded coupler plant is operating under the pressure of military needs for invasion equipment, while much-needed railroad castings are being produced only in limited quantities under WPB allocations

Buick Tools to Build P & W Twin Row Wasp Engine

Flint, Mich.

• • • **Buick is tooling** to manufacture a cargo plane engine of the Pratt & Whitney twin row Wasp type. A 14-cylinder radial engine, developing 1200 hp., it is comparable in most parts with the Pratt & Whitney engine, being mass produced by Buick and others for the Liberator bomber program. A similar cargo plane power plant is built by Chevrolet.

The new production will be carried on in the Flint and Melrose Park, Ill., plants in which the bomber engines are manufactured, with many of the parts and sub-assemblies produced on the same machines and assembly lines.

SALEM CAN BUILD YOU ANY TYPE OR ANY SIZE OF

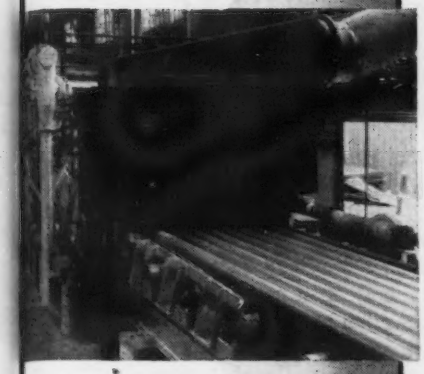
INDUSTRIAL FURNACES

● Salem designs heat treating furnaces to provide maximum operating efficiency for your specific manufacturing operations.

We can design and build any size or any type of heat treating furnace, gas, oil, or electric-fired, for either ferrous or non-ferrous material.

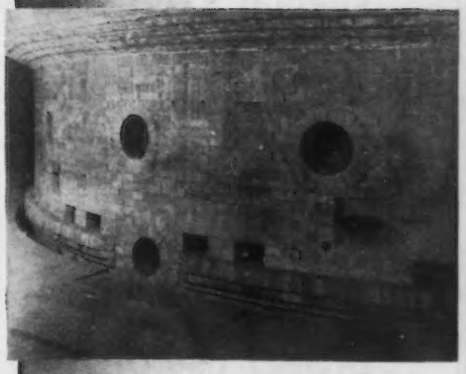
On this page we show current examples of Salem equipment, illustrating our scope, versatility, and experience.

When you need heat treating equipment, check the firm which will build the kind of installation you want . . . SALEM ENGINEERING COMPANY.



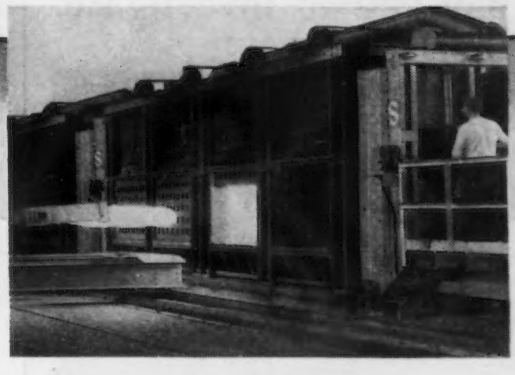
ular Furnace for Tubular Products

horizontal cylindrical furnace affords ex- nt heating uniformity between 800° F. and ° F. Designed to handle steel pipe, 2 to 14 es diameter.



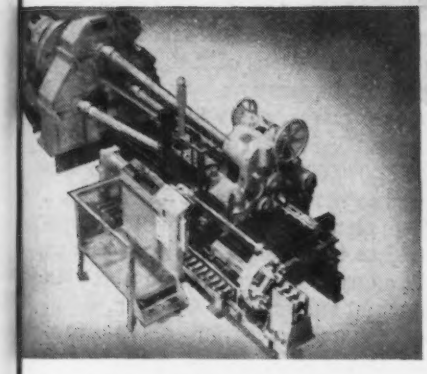
World's Largest Rotary Furnace

Billet Heating Furnace has a capacity of 80,000 pounds per hour at 2250° F. when heating 10" billets on a five hour cycle. Hearth area of 2100 sq. ft. is equipped with a variable speed mechanism which gives range of 2 to 8 hours per revolution.



Batch Type Furnace

Produces over 30 tons of alloy steel per hour at 2250° F. Handles either ingots, billets, or slabs. Equipped with Salem Needle Metallic Recuperator which preheats either gas or oil for greater combustion efficiency.

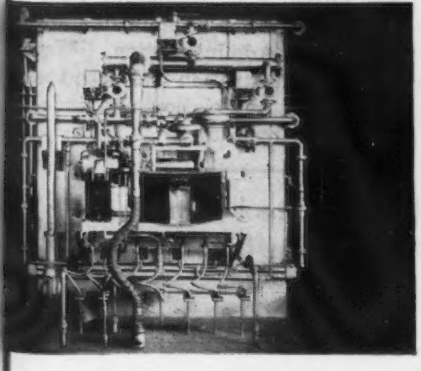


Salem's Witter Mill

is mill elongates and rolls shells to finished ing dimensions which eliminates much of the machining operation, saves material and man rs, provides low operating cost, plus min- m maintenance. Small floor space required.

Aluminum Annealing Furnace

Each furnace is built to individual customer specifications. In this furnace, a unique method of convection heating is applied for processing aluminum plates and sheets.



osphere Annealing With Direct Firing

with gas for an operating temperature of 1450° h capacity of 40,000 pounds of bar stock per . The heating and cooling cycle is 20 hours,

Circular Soaking Pits

They heat cold or hot carbon or alloy steel ingots 25% faster. Heat is obtained from a multiplicity of oil or gas burners.

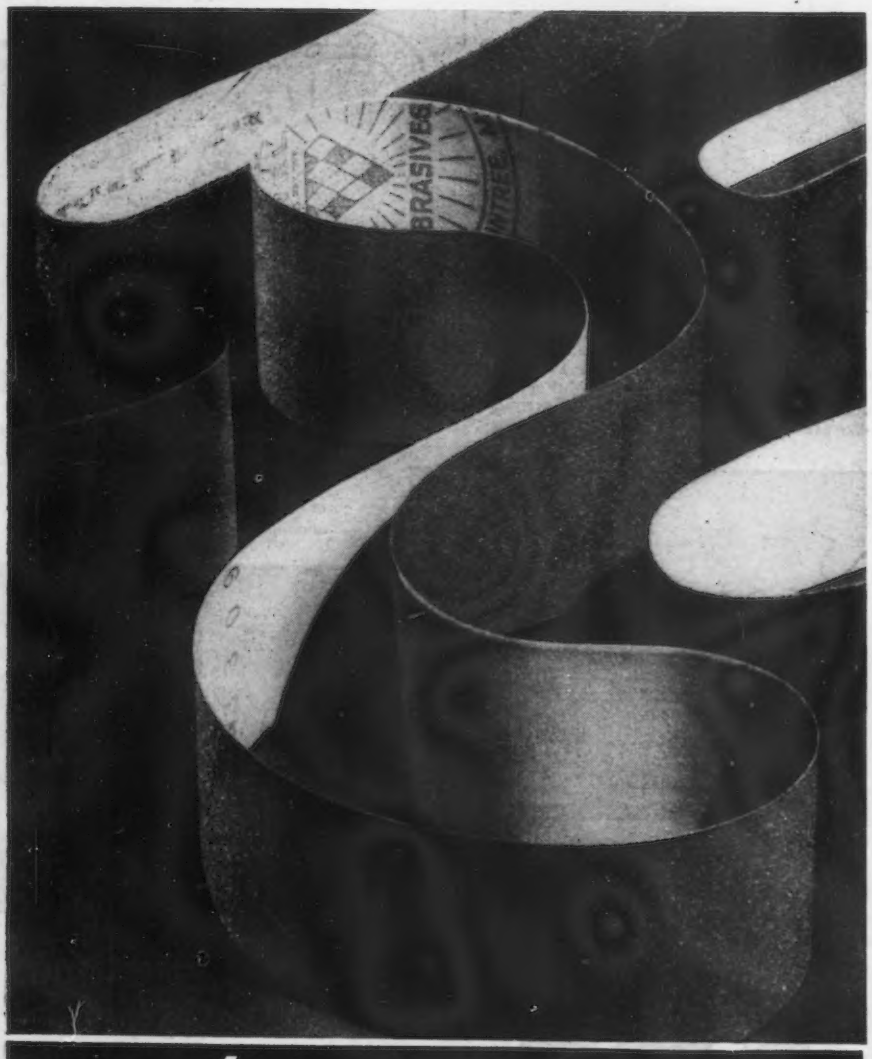
Continuous Pusher Type Furnace

Has double chamber—one for hardening small fo ings or stampings and one for drawing. Both be used for normalizing.

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. · SALEM, OHIO

ABRASIVE BELTS...for any type of job, for every requirement . . . there's a standard or special type and grade in the large, complete Jewel Line. Users in all industries specify Jewel Abrasive Belts for cleaner surfaces, faster work . . and time and labor savings. No matter what your problem is..the proper use of Jewel Abrasive Belts will help you solve it. It will pay you to investigate.



Abrasive Products, Inc.

SOUTH BRAINTREE 85, MASSACHUSETTS MAKERS OF JEWEL COATED ABRASIVES

Lake Carriers Study Manpower Problems

• • • A plan to recruit personnel and stabilize manpower on Great Lakes vessels to meet manning problems which might affect the coming 1944 shipping season was announced by ODT

The proposed program, if accepted, would provide for the recruitment of both skilled and unskilled seamen from groups not liable for immediate military service; cooperative control by the Recruitment and Manning Organization and the Coast Guard of all exits and entries of men in the industry; occupational deferment of officers and skilled men in selected age groups through RMO request; and the opening, where needed, of additional RMO offices to carry out the program.

Anticipation of increased tonnage movement by the Great Lakes carriers during the 1944 season makes an early solution of the manpower problem imperative. According to ODT estimates, some 90,000,000 tons of ore, 285,000,000 bushels of grain and 52,000,000 tons of coal are expected to move via Great Lakes lanes.

The plan as proposed will be presented to the Great Lakes industry as well as to the agencies involved in the actual operation of the plan. Final adoption and execution of the program is expected in the near future.

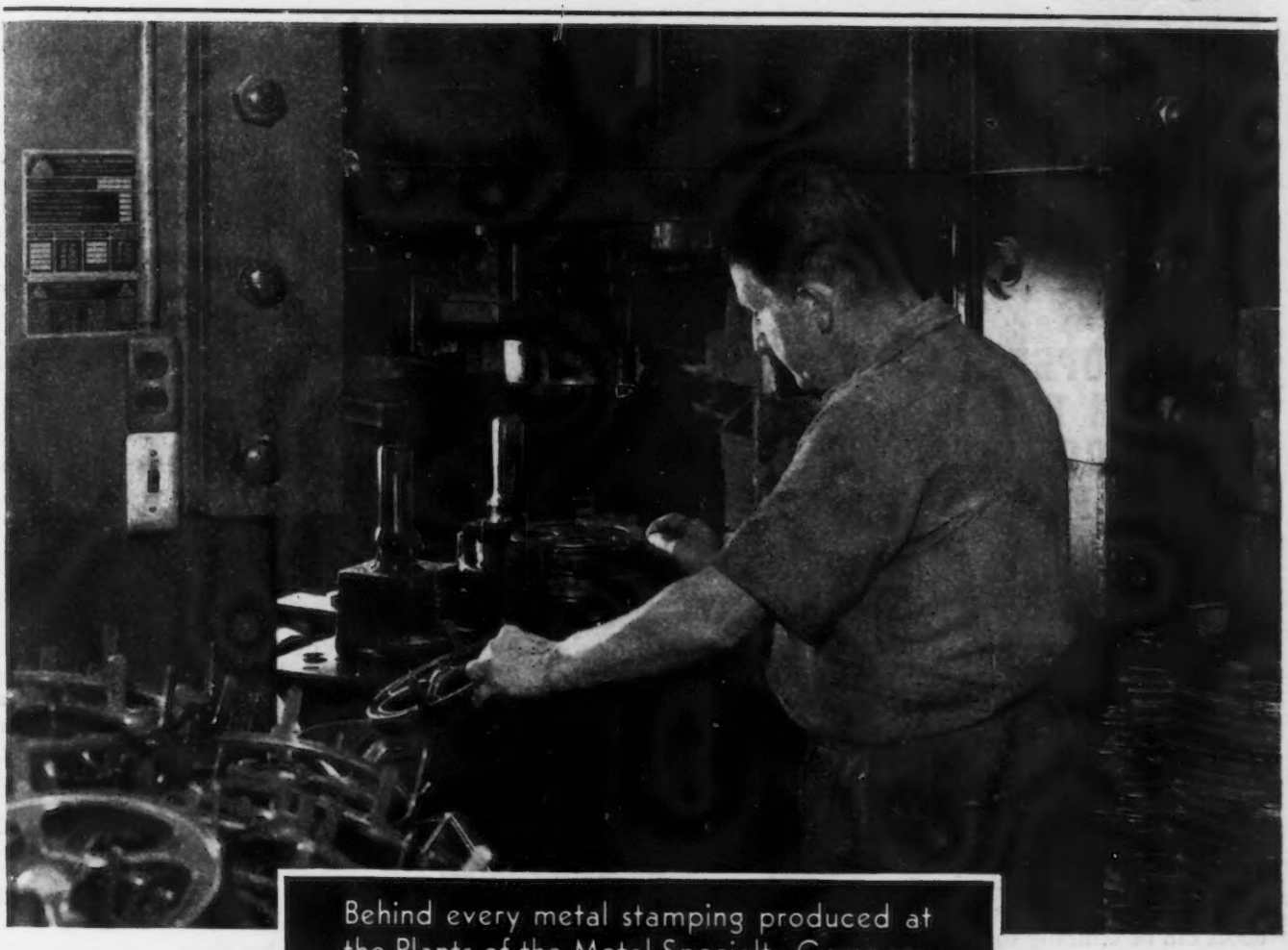
The meeting held to discuss the manpower problems was called by the ODT and included representatives from the War and Navy Departments, Selective Service System, War Production Board, War Manpower Commission, War Food Administration, Solid Fuels Administration, War Shipping Administration and both the Lake Carriers Association and independent Lake operators.

Pittsburgh Steel Earns $1,734,222 in 1944

Pittsburgh

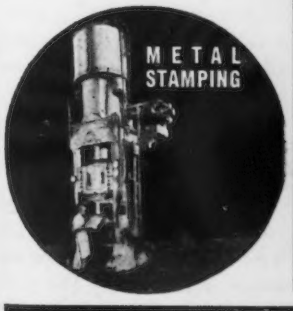
• • • **Pittsburgh Steel** Co. reported preliminary earnings for the year ending Dec. 31, 1943, of $1,734,222, after all charges including provision for state and federal income taxes, and excess profits taxes of $3,140,000. For 1942 the company reported net earnings of $2,488,074. The company has signed an agreement with the Pittsburgh Ordnance Branch of the War Department to refund 1942 earnings of $515,000, to the government, which, after tax adjustments, will reduce net profit for 1942 by $97,850.

PRECISION STAMPING

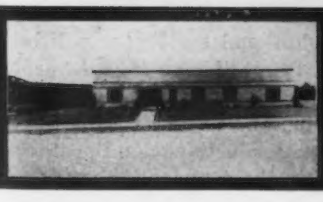


Behind every metal stamping produced at the Plants of the Metal Specialty Company is a background of years of experience. This experience combined with an Engineering and Designing Staff of the highest calibre assures you not only the finest in Metal Stamping, but an efficient and authoritative Service for your specific problems. Metal Specialty serves Industry in Stamping, Coining, Forming, Drawing, Annealing and all types of Welding. Specialists in Hydraulic Cold Drawing and Embossing on all metals, including Stainless Steel and Aluminum. Deep Drawing and Embossing up to 850 tons capacity. Shells drawn up to 20" depth.

Address inquiries on Plastic Molding to The Metal Specialty Co., Plastic Division, Cincinnati, Ohio.



Branch Plant and Sales Office — Richmond, Indiana. Sales Office—Detroit, Michigan.



The
METAL SPECIALTY *Co.*

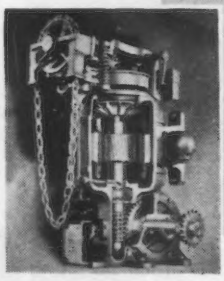
MAIN OFFICE AND PLANT • ESTE AVENUE • CINCINNATI, OHIO

PRESS A BUTTON and DOORS OPEN for greater doorway economy!

MOTOR OPERATED KINNEAR ROLLING DOORS DO THESE THINGS FOR YOU!

They save time and labor—touching a button sends the door instantly on its way up or down. They save heating and air conditioning costs — ease of operation eliminates the tendency to leave the doors open. They operate more smoothly — with automatic operation there's no jerking or slamming, no rebound at top or bottom. They permit the use of remote control switches — doors may be operated from several convenient points, and any number of doors can be centrally controlled.

And the oftener the doors are used, the more these savings mean to you!



The Kinnear interlocking-slat construction has proved its efficiency and durability over a pediod of half a century. The sturdily-constructed curtain rolls smoothly into a neat coil overhead, out of the way of damage. When closed it presents a formidable steel barrier to theft or intrusion. Materials and merchandise may be stored within a few inches of the door at any point, saving floor and wall space. Kinnear Rolling Doors are made to order for any size or type of opening. For the answer to your doorway problem write for full details on Kinnear Rolling Doors. The Kinnear Mfg. Co., 1760-80 Fields Ave., Columbus 16, Ohio.

SAVING WAYS IN DOORWAYS **KINNEAR** ROLLING DOORS

Strike Vote Closes Chicago Foundries

Chicago

• • • **As a result** of the first strike vote taken in the midwest under the provisions of the Smith-Connally anti-strike law, 26 Chicago foundries, most of them gray iron but a few non-ferrous, were closed this morning by strike of Local 233, Molders and Foundry Workers Union AFL. Between 2000 and 2500 men are involved. At ten other foundries, represented by the Chicago Foundrymen's Association, no strike vote has been taken but it seems possible that workers may fail to report to work if the duration of the strike is long.

The inception of the difficulty occurred last November when the Regional War Labor Board denied a union pay raise request, a decision subsequently confirmed by the National War Labor Board at Washington. This was followed by an NLRB sponsored election, which resulted in a strike vote for Dec. 27. The strike was avoided at that time, however, when the foundrymen's association joined the workers in an application filed Dec. 30 for a six-cent per hour increase. This application was denied.

Kaiser May Operate Ohio Plant

Cleveland

• • • **The Henry J. Kaiser** empire is again thought to be spreading eastward, judging from a report that he will soon take over the largest of nine production lines of the Scioto Ordnance plant at Marion, Ohio, for the production of incendiary bombs under the operation of his Permanente Metal Corp.

About 400 employees may be required, about 60 of which may come from the Permanente organization in California. Operation of the portion of the plant to be held by Kaiser will be for the Chemical Warfare Service, it is understood.

Bell Retools for New Models

• • • **New machinery** installed and retooling completed, Bell Aircraft Corp.'s Niagara Frontier Division plants will begin immediately the production of two new models. About 2000 additional employees will be required. Production on P-39 Airacobras will halt when current contracts are completed and all facilities devoted to the new production, details of which remain in the confidential stage.

Perfected through testing
to meet the most rigid requirements

Electro Steel Plant Cement

THIS NEW BULLETIN GIVES YOU THE *Facts!*

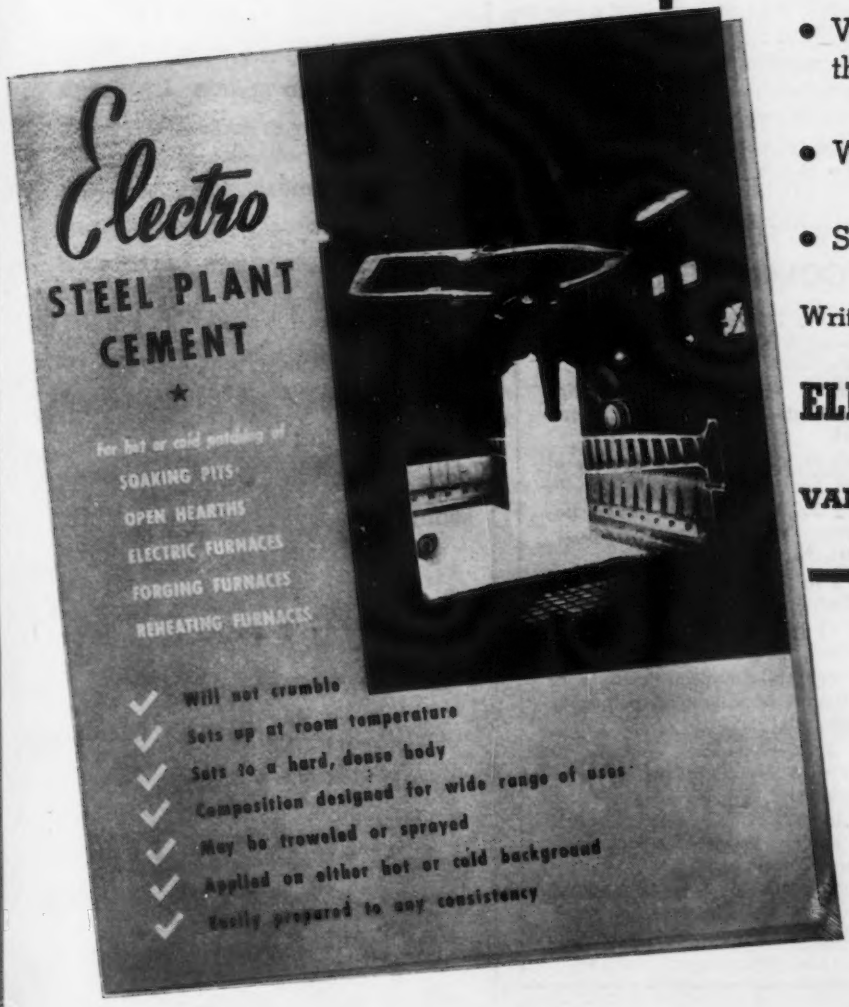
. . . tells about several factors contributing to:

- Greater durability
- Higher heat resisting qualities
- Valuable time conserved through easy application
- Wide range of uses
- Simple preparation

Write for Bulletin No. 50 Today

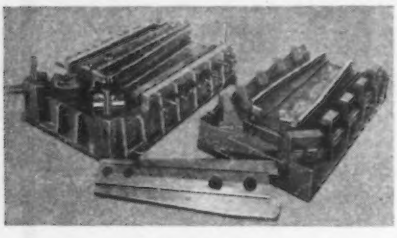
ELECTRO REFRACTORIES AND ALLOYS CORP.

VARS BUILDING, BUFFALO 2, N.Y.



YOU CAN'T ESCAPE THE IMPORTANCE OF THESE FIGURES

Tractor top die (75% Strenes metal) 33⅓% less costly than like die of conventional metals. Weight 17,000 lbs. More than 500 hours of machining time, saved because the collapsible die, pressure pad, and cam blocks were so closely cast to shape. Important saving in raw stock also reported.



Tractor Top Die, 75% Strenes Metal

At the best, any tooling program runs into money. All the greater reason for using the most effective materials and saving time and money wherever possible. We make many and strong claims for Strenes metals, but can support them. Challenge us.

Automobile, truck, tractor and farm implement manufacturers.

Refrigerator, stove, and metal furniture manufacturers.

Casket and vault manufacturers.

Fan, blower, bicycle, vacuum cleaner and scores of other products involving sizeable forming and drawing operations.

Today while it is on your mind, investigate Strenes Metal.

THE ADVANCE FOUNDRY CO.

100 Seminary Street

DAYTON, OHIO

STRENES METAL

J. W. Frazer Reported Buying Warren City Tank & Boiler Plant

Cleveland

• • • **Reports of negotiations** for the sale of the Warren City Tank & Boiler Co., property at Warren, Ohio, to Joseph W. Frazer, former president of Willys-Overland Co., were confirmed. These negotiations involve only the holdings of the Taylor-Winfield Corp., parent concern, which constitute only the value of the old Warren City plant prior to an extensive Navy expansion program at the plant. While the deal had not been concluded, it appeared to be progressing since Mr. Frazer recently formed an Ohio corporation believed to be known as the Warren City Mfg. Corp., to operate the facilities.

The plant is now making landing barges, but previously produced diesel engine bases. Mr. Frazer's eventual plans after Navy contracts are satisfied, while reported as centering around farm machinery and similar equipment, have not yet been officially disclosed.

Warren City Tank & Boiler Co. was once an independent, later a holding of Taylor-Winfield Corp., and more recently almost entirely Navy property. Further complications to present negotiations might occur because of the condemnation proceedings which were filed against certain company properties by the Navy last fall.

COMING EVENTS

Feb. 21 to 24—American Institute of Mining & Metallurgical Engineers, New York.

March 14, 15—National Association of Waste Materials, Inc., New York.

March 27, 28—American Society of Tool Engineers, Philadelphia.

March 30, 31—American Gas Association War Conference, Rochester, N. Y.

April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.

April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.

Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.

Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.

Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.

CONCENTRATE ON ASSEMBLY

Accelerating assembly lines with accurate parts in large quantities is our specialty.

Time saving methods and devices we have recently invented enable us to make parts better and faster for less!

The more space you devote to assembly, the more products you market. Plan on U. S. to start your peacetime assembly lines sooner.

U•S•AUTOMATIC

CORPORATION

Screw Machine Products

AMHERST • OHIO

U.S. AUTOMATIC

ANOTHER ORIGINAL AJAX DEVELOPMENT!

THE ISOTHERMAL HEAT-TREAT PROCESS

Battery of Ajax-Hultgren electric salt bath furnaces for Isothermal Treatment of SAE 4140 alloy steel parts: Hardening Bath 1550° F., Quench Bath 700° F., Draw Bath 1000° F.

1. ELIMINATES QUENCH CRACKS
2. REDUCES DISTORTION
3. AVOIDS SCALE AND DECARB
4. INCREASES TOUGHNESS WITH SAME HARDNESS

Isothermal quenching in this process gives results superior to the conventional quench-and-temper method of treating carbon-alloy steels. Stresses that produce quench cracks and distortion are eliminated. For the same final hardness the physical properties, such as ductility and tensile strength, are improved (as much as 25,000 psi in some cases).

This three-step salt bath process consists of austenizing in the first unit, followed by immersion in the isothermal quench for transformation, and then immediate transfer to the final draw bath—all three steps occurring in a rapid and uniform cycle.

With this Ajax 3-step process, the "S" curves (Time-Temperature-Transformation) are now translatable directly into practice by any heat treater. This is important because until now no production equipment was available for doing what Time-Temperature-Transformation data shows clearly can be done.

Investigate the wide range of usefulness opened up by freedom from limitations of the conventional quench-and-temper method. Send for the simplest practical exposition ever offered on this subject: "Isothermal Quench Bath: Theory and Practice." It will be sent free on request.

NOTE: We are prepared to treat specimen products by this new process for direct comparison.

AJAX ELECTRIC COMPANY, INC.
Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

...GIVES THE HEAT TREATER A REMARKABLE NEW TOOL OF PRODUCTION!

SELF-SEALING • SELF-CIRCULATING

THE AJAX ELECTRIC SALT BATH FURNACE
HULTGREN

ASSOCIATE COMPANIES:
AJAX METAL COMPANY, *Non-Ferrous Ingot Metal for Foundry Use*
AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ENGINEERING CORPORATION, *Ajax-Tama-Wyatt Aluminum Melting Furnaces*

ADVANTAGES of Positive Displacement

Roots-Connersville Rotary Positive Blowers and Gas Pumps have lowest power consumption per cubic foot of air delivered at moderate pressures. Noted for exceptionally long life and ability to carry emergency loads in excess of rated capacities.
Twin impellers alternately suck in, momentarily entrap, and then expel definitely measured amounts of air or gas, resulting in the delivery of four equal pre-determined volumes each revolution of the drive shaft. Impellers need no seal or lubrication. Capacity varies with speed. Pressure automatically builds up to overcome resistance on discharge side. "R-C" Units are extensively used for cupola blast; coal preparation; smelting and treatment of ores; chemical processes; boosting air and gas pressures to ovens, forges, and heat treating furnaces; pneumatic conveying of bulk materials; agitation and aeration of liquids, etc. Write for Bulletin.

"R-C" Gas Pump with automatic pressure regulator and by-pass.

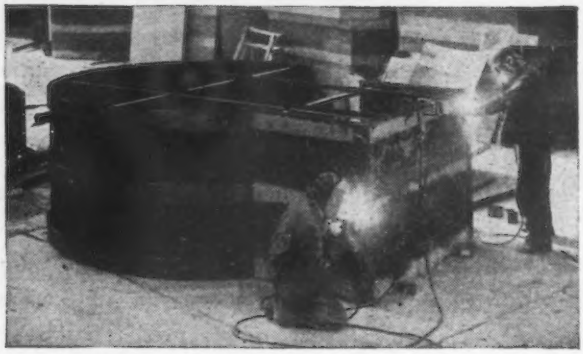
Roots CONNERSVILLE SINCE 1854

ROOTS-CONNERSVILLE BLOWER CORP.
402 Ohio Avenue, Connersville, Ind.

BLOWERS and GAS PUMPS

★ *Add YOUR Punch to the Attack — Buy an EXTRA War Bond!* ★

DECK GUN ENCASEMENT with plastic armor applied to the outside of the body, built by Brandt for protection of Merchant Marine gun crews.

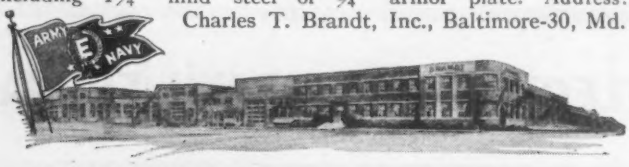


Heavy Plate or Light Sheet—

Call BRANDT of Baltimore

for Precision in Heavy Plate and Sheet Steel Work

Here, at your command, is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Address: Charles T. Brandt, Inc., Baltimore-30, Md.



BRANDT of Baltimore—*Craftsmen in Metal Since 1890*

NEWS OF INDUSTRY

DPC and Army Contract Awards

• • • **The Defense Plant Corp.** has authorized the following contracts:

Republic Aviation Corp., Farmingdale, Long Island, N. Y., to provide additional plant facilities at Farmingdale at a cost in excess of $150,000, making a total commitment of more than $18,000,000.

•

Pennsylvania Salt Mfg. Co., Philadelphia, to provide additional machinery and equipment at a plant in Cornwells Heights, Pa., at a cost in excess of $55,000, making a total commitment of more than $2,890,000.

•

Howard Foundry Co., Chicago, to provide additional equipment and machinery at a plant in Chicago, at a cost in excess of $90,000, making a total commitment of more than $2,650,000.

•

Ford Motor Co., Dearborn, Mich., to provide additional machinery and equipment at a plant in Detroit, at a cost in excess of $50,000, making a total commitment of more than $2,350,000.

•

General Chemical Co., New York, construction and equipment of facilities at Front Royal, Va., at a cost in excess of $1,500,000.

•

Pittsburgh Forging Co., Pittsburgh, to provide additional equipment at a plant in Coraopolis, Pa., at a cost in excess of $100,000, making a total commitment of more than $300,000.

•

Lederle Laboratories, Inc., New York, to provide additional equipment at a plant in Pearl River, N. Y., at a cost in excess of $65,000, making a total commitment of more than $300,000.

•

The Budd Wheel Co., Detroit, to provide equipment and machinery at a plant in Detroit, at a cost in excess of $60,000.

• • • **The War Department** announced:

Atlanta Ordnance Depot, Georgia, authorization in amount of $500,000 for reconstruction of base shop and warehouse. Work will be supervised by the Savannah, Georgia, District Office of the Corps of Engineers.

•

Benicia Arsenal, Cal., to build additional facilities for storage, repair, and micellaneous operational uses. Initial authorization is in amount of $600,000. Work will be supervised by the San Francisco, Cal., District Office of the Corps of Engineers.

•

830th Army Air Forces Specialized Depot, Memphis, Tenn., to build three additional warehouses with minimum essential utilities. Initial authorization is in the amount of $500,-Ala., District Office of the Corps of Army En-Ala., District ffice of the Corps of Army Engineers.

•

Dow Magnesium Corp., Midland, Mich., to provide additional equipment at a plant in Velasco, Tex., at a cost in excess of $180,000, making a total commitment of more than $61,800,000.

•

The Ohio Steel Foundry Co., Lima, Ohio, to provide additional facilities at a plant in Lima at a cost in excess of $90,000, making a total commitment of more than $3,800,000.

•

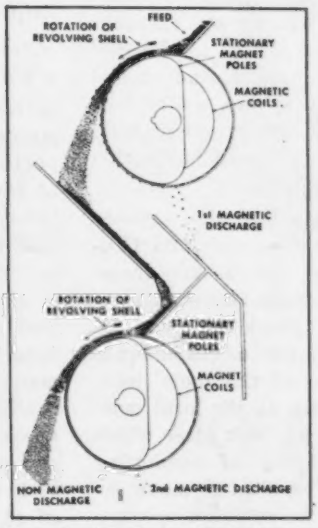
The Firestone Tire & Rubber Co., Akron, Ohio, to provide additional facilities at a plant in Atlanta, at a cost in excess of $130,000, making a total commitment of more than $740,000.

Dings

MAGNETIC DRUMS

. . . Specially Developed to Meet Requirements of the Metal Working Industries!

Principle of Operation
Cylindrical shell revolves around stationary magnet coil. Magnetic particles are held to shell surface until they pass out of magnetic field. Non-magnetic passes over drum in normal trajectory.



The illustration above, left, shows a Dings Double Drum Separator purifying aluminum turnings at the East Chicago, Indiana, plant of U. S. Reduction Company. Diagrammatic sketch of operation shown at right.

DINGS Magnetic Drums and Drum Type Separators for such jobs as removing iron from foundry sand or non-ferrous scrap are completely automatic, simple, and fit in ideally where space is limited. Capacities of standard size drums range from 300 to over 6000 cu. ft. per hour on scrap and sand. Single magnetic drums may be installed at the bottom of chutes, or single and double drum separators enclosed in housings and equipped with hoppers are available. For handling hot sand, drum coils can be wound with glass covered wire to withstand high temperatures. For badly entangled particles, agitating drums are built to combine magnetic attraction and mechanical agitation for maximum separation. Complete data, diagrams, tables, etc., are contained in Dings Catalog No. 660 available on request.

At the left is a Dings Type XM Drum Separator separating ferrous and non-ferrous machine shop scrap. A compact, powerful unit for borings and turnings.

ALNICO TEST MAGNET
Now available — horseshoe type magnet. Very powerful. Size 2½" high x 3" wide. Pole bases ¾" x ¾". Prices on request.

DINGS MAGNETIC SEPARATOR COMPANY

516 E. Smith St., Milwaukee 7, Wis.
Separation Headquarters Since 1899

Dings MAGNETIC SEPARATION HIGH INTENSITY

MACHINE TOOLS

. . . News and Market Activities

Machine Tool Executives Sight Bright Ray in Modernization Needs

(*Continued from Page* 104)

original "sale" prices. This, likewise, would give the ultimate purchaser a centralized point from which to buy specific machines at less than list costs of new machines yet with a factory guarantee and service policy. For the machine tool builder who will deal exclusively in the machines of their own manufacture it presents an opportunity to protect their reputations and supply employment for their own sales and service staffs despite an otherwise poor market.

Questions relating to what activities the machine tool builders will participate in during this period of redisposition of excess equipment have brought the following conclusions:

Builders are expected to find a fair volume in specialized machines for postwar purposes. New attachments and re-tooling of existing equipment will supply some work as will the maintenance of repair part stocks. Rebuilding programs which have been a source of income even during the current period are expected to be continued. Redesigning is also expected to produce a number of extremely low cost machines which will appeal to a part of the market not heretofore seriously considered.

Subcontracting appears to be a very fertile field for the machine tool builder who has engaged in such contract work extensively during the current period. This work is expected to be drawn from producers of civilian products which will be in flood demand after the war and who do not wish to expand their own facilities for the brief period of the rush demand.

The immediate desires of the industry appear to be that a government board, constituted especially to control the redistribution of excess materials, be appointed at an early date and that its policy be put into effect almost at once. This desire for action is brought on by the immediate need to begin the orderly process of redistribution being caused by cutbacks and cancellations. It is also hoped that this board will set a staunch and simple price and selling policy and clarify the part each government agency will play in the redistribution of machine tool equipment.

It has been suggested that present branch government agency and Ordnance offices and contractors themselves be used as sales outlets all operating under a single policy. All sales so far as possible might be made within the region of the tools' location until such time as the local market had absorbed its limit after which a national cataloging of remaining equipment might be used to move the remainder.

Through such a course the troubles of dumping on the market are thought to be reasonably well avoided. Speculation buying is also thought to be of little danger in that a bloated market would offer a minimum of profit possibility to any speculative buyer for years to come. Set prices for original purchase from the government would halt bargain buying for speculation and the return of a free market which might permit profitable selling of held blocks of equipment is believed too distant to tempt much speculative money.

•

Monarch Declares 75c. Dividend

• • • **The board of** directors of the Monarch Machine Tool Company, Sidney, Ohio, at their meeting on Feb. 8 declared a dividend of 75c. per share, payable March 1 to stockholders of record at the close of business Feb. 19.

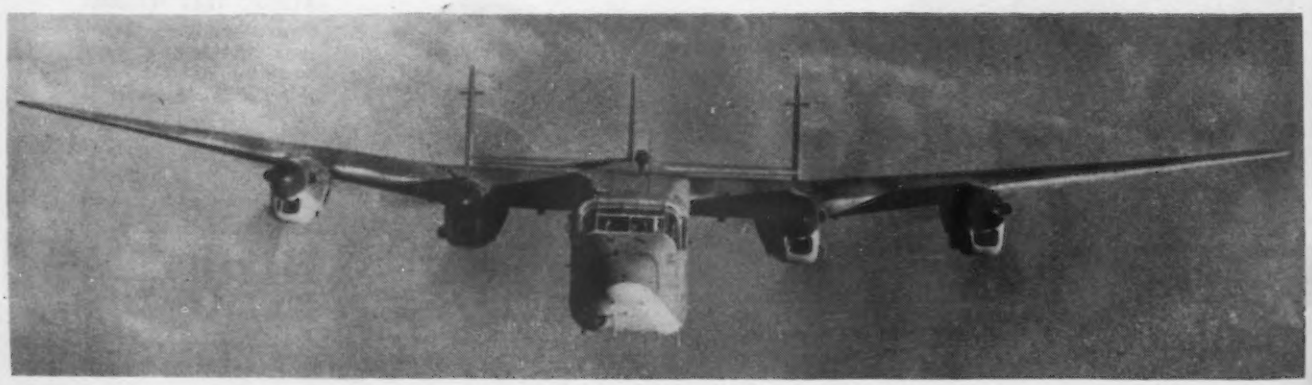
•

Inquiries for Postwar Projects

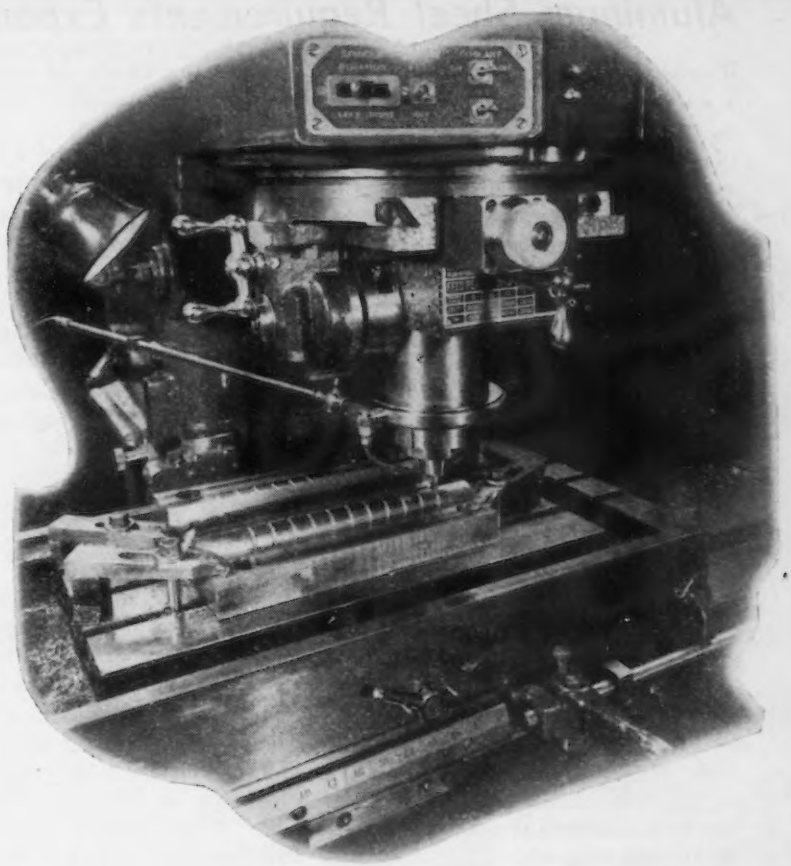
Cincinnati

• • • **Manufacturers generally** indicate that there has been quite a substantial quantity of inquiries, a large portion of which are for postwar work or for reconversion to civilian operations, but because of Washington's stiff attitude on priorities, attention is not being given to these inquiries in any great degree at this time. Attention, of course, has also been brought to bear upon the foreign demand which manufacturers indicate probably will not be within Lend-Lease provisions, but none of this has yet materialized or developed into such a situation that it has definite effect upon the market. Production, by and large, is tapering, since backlogs are being rapidly cleaned up. Conversion to other types of manufacture and jobbing work is going ahead at good pace, but is still far from sufficient to employ all the facilities of local shops.

HEAD-ON VIEW *of the Avro-York in Air: Transport version of the Lancaster bomber is a high wing, four-engined monoplane with a wing span of 102 ft. and overall length of 78 ft. Powered by four Rolls Royce Merlin liquid-cooled engines.*

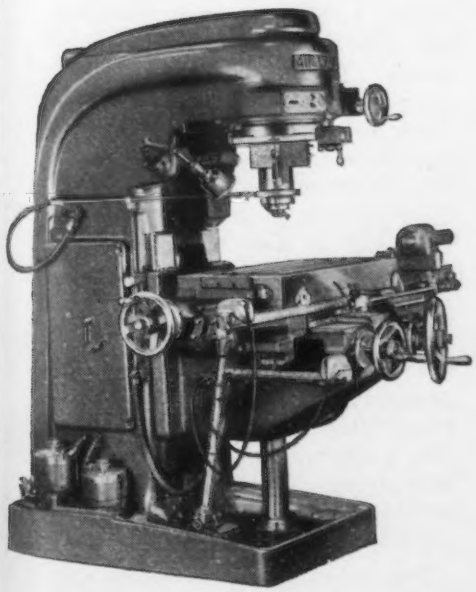


ROTARY HEAD MILLER . . . PLUS CHERRYING ATTACHMENT . . . SIMPLIFIES THIS "*TRICKY*" MILLING OPERATION



The Milwaukee Rotary Head Miller equipped with a cherrying attachment made "short work" of the "*tricky*" milling required on this injection mold. It took just two hours to complete the job — far less time than by any other method known.

The cherrying attachment is an auxiliary rotary head, mounted at 90° to the head of the miller. It is used to mill circles and angles in a vertical plane. When used with rotary head motion, spherical and conical cavities can be accurately and rapidly milled — in almost all cases difficult operations become a comparatively simple task.



KEARNEY & TRECKER'S ROTARY HEAD MILLER

The Most Versatile Machine Ever Designed for Mold and Die Work

DIRECT . . . mills mold cavities in a single set-up without the aid of templets or models.

ACCURATE . . . chances for error are eliminated because there is no change in set-up. Exact control of all combinations of cutting movements —possible only with this machine— transmits mathematical precision to the work.

FAST . . . initial job preparation and set-up time is reduced to the minimum. Accurate performance of the machine saves operator's time and rapid production of intricate molds and dies is the result.

Write for Bulletin No. 1002C for complete information on the Milwaukee Rotary-Head Miller and the accurate and rapid production of all types of molds and dies.

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker *Products*
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

NON-FERROUS METALS

. . . News and Market Activities

Aluminum Sheet Requirements Expand

Washington

• • • **Philip D. Wilson,** director of the WPB Aluminum and Magnesium Division last Thursday issued a statement warning aluminum sheet producers that production must be stepped up immediately if 1944 requirements of the aircraft program are to be met.

Mr. Wilson cited the 60 per cent increase in airframe weight in 1944 over 1943, and decried rumors that there is an oversupply of aluminum sheet. He said:

"Just because there has been a reduction in aluminum pig production, a misunderstanding has arisen concerning our need for sheet. This is unfortunate, since there is no surplus in sheet. It is essential, therefore, that steps be taken not only to meet current increases in sheet requirements but also to prepare for greatly expanded requirements of this product expected later in the year."

Mr. Wilson also appealed to workers in sheet plants to stick to their jobs at this time so as not to endanger the aircraft program.

Rhodesian Copper Cut Studied

• • • **Sir Charles Hambro** and William L. Batt, British and United States members of the Combined Raw Materials Board, last week jointly issued the following statement in respect to Rhodesian copper:

"A recent announcement by the British Government of its intention to reduce copper production in northern Rhodesia has aroused considerable attention. Some reduction is desirable due to the fact that copper is competing with vitally needed coal and metallurgical chrome for the limited rail facilities in that area. The question of the magnitude of the cut in copper production is still under discussion by the CRMB and the British authorities.

"It is the view of the CRMB that although the copper position has improved in recent months, the uncertainties of future production and military requirements are such that the United Nations should proceed cautiously with any program to reduce output or relax consumption.

"When the determination of the extent of the Rhodesian reduction has been made, a statement will be forthcoming."

Bronze Powder Redefined

• • • **Flake type bronze** powder has been removed from the definition of copper and copper-base alloy powders for which it has heretofore been necessary to secure authorization to receive deliveries, WPB announced Feb. 11.

This action was taken by amending Copper Order M-9, which governs the acceptance of delivery of specified types of copper and copper-base alloy materials and copper-clad and copper-base alloy-clad steel scrap.

Reynolds to Get Haitian Bauxite

• • • **The Reynolds Mining Corp.** has been granted a 60-year concession by the Haitian Government to mine bauxite and other aluminum ores in the island republic. Renegotiations on behalf of the Reynolds company were conducted by Walter L. Rice, president of the mining company, with President Elie Lescot of Haiti over a period of several months. There followed months of prospecting for aluminum ore deposit by Reynolds geologists accompanied by geologists headed by Dr. Warren J. Mead from the Massachusetts Institute of Technology. Until the discoveries were made, there had been no indication that Haiti was a bauxite source.

The Haitian ore has entirely different physical properties from American and Guinea bauxite now used for aluminum production. Because of its unique properties—it contains an extremely low content of silica—the Reynolds geologists obtained President Lescot's permission to name it "Lescotite" as a tribute to the cooperation the Haitian authorities gave in making the concession a reality.

A party of geologists, headed by Dr. Walter L. Whitehead, was sent by Reynolds to the island republic last July to conduct field explorations. They worked under the general direction of Dr. O. C. Schmedeman, chief geologist of the Reynolds Mining Corp. The Haitian Government assigned Ing. Max Magones, of the Haitian Department of Travaux Publics, to accompany the exploration party. Captain Edouard Roy, head of the Haitian Air Force, piloted the party over a large section of the republic.

It was on one of these flights that Dr. Schmedeman detected signs of what appeared to be a large deposit of aluminum bearing ore in one of the mountain plateaus. The following day the geologists went to the area on horseback. They took samples and found them to be of good quality. Next, test holes were drilled and hundreds of samples were taken for analysis. Through the cooperation of Haitian officials this analytical work was performed in the laboratories of Haiti's School of Medicine.

Because of the unusual nature of the ore, research and experimental work has been necessary for its utilization in the production of aluminum. This work has been carried on in Reynolds Metals Co. laboratories at Listerhill.

Transportation facilities in Haiti are not of the best. However, the fact that some of the deposits are only three miles from the sea, and fortunately, the same distance from a potential deep water port, has made the transportation problem fairly simple. The ore can be brought to shipside by means of an aerial bucket chain, a method which will reduce materially the transportation cost, a most important factor in bauxite mining and aluminum production. Haitian labor will be used for most of the work on the mining project.

No Reports for Nickel Scrap

• • • **Generators of nickel** scrap and secondary nickel have been relieved of the necessity of filing report forms. This action was taken on Feb. 10 by WPB to reduce paper work, and was effected by the revocation of Supplementary Order M-6-c.

The revocation of this order does not in any way relax the control on or segregation of nickel bearing ferrous scrap which is still covered by Supplementary Order M-24-c or the use of nickel, including scrap and secondary nickel, which is still covered by Conservation Order M-6-b.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper: 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Easing of Scrap Supplies Weaken Price Structure

New York

• • • **With the general** easing of scrap supplies throughout the country, there are growing evidences that the OPA scrap price ceilings will no longer act as minimum as well as maximum standards on prices. Low phos and alloy turnings and borings have been selling at under ceiling prices in various consuming markets for some months. As the alloy scrap stocks began to pile up at mills and scrap yards and the demand sloughed off, consumers refused to pay the premiums and dealers were more than willing to forego top prices so as to work off their growing stocks.

Rail Scrap Price Differentials Set by O.P.A. Details on Page 105.

However, past West Coast under ceiling sales of melting grades are supplemented by evidences this week from the Detroit area that some blast furnace grades are selling at as much as 50c. per ton under the ceiling. This may be the finger pointing to a general breakdown of scrap prices, with prices falling off in various localities on specific types of scrap, depending upon the local conditions. However, an across the board drop in prices, that is, a downward revision, in all grades, throughout the country is very unlikely. There will continue to be shortages in specific types of scrap, such as broken cast grades, through to the end of the war. As long as the steel production rate holds up to its present high figure, there is little likelihood of any sweeping slash in scrap prices.

Yard help is the biggest problem of the scrap dealers, and there is little hope that the shortage of manpower will be eased in this industry. However, this week the heavy snows in the east further hampered yard operations and incoming scrap just piled up for the already harassed yard operators to handle. While a year ago, predictions were made that scrap shortages might hinder steel production, shortages never reached such an acute stage. Now, however, scarcity of manpower in scrap yards may accomplish what scrap shortages couldn't.

The situation regarding scrap shipments from the West Coast has been clarified to the extent that new allocations from that area to midwestern and eastern mills will amount to about 70,000 tons as reported in THE IRON AGE last week. Of this, apparently 40 or 50 thousand tons have been allocated to three Chicago mills. Other shipments will go to Sheffield at Kansas City and St. Louis, Republic at Canton, and other mills. This material will be shipped via government land grant railroads on government bills of lading, mills being unwilling to take it on any other terms.

Price Increase Proposed

• • • The Scrap Iron and Steel Industry Advisory Committee to OPA is reported to have proposed a $1 increase for the breaking of cast scrap, which would raise the price from $2.50 to $3.50 per ton.

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CHICAGO — Bad weather already has been reflected in decreased incoming scrap shipments here. Revisions of scrap ratios on alloy melts has not improved alloy market, mills having adequate stocks without having to make purchases.

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DETROIT — Machine shop turnings, particularly alloys, continue weak in this market, selling as much as $1 per ton below ceilings. Some blast furnace grades also are selling 50c. below the tops. Cast grades, broken up, continue tight although unbroken heavy cast is in fair supply.

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PHILADELPHIA — Although bad weather has stopped shipments, mills here are well supplied. Because of delayed furnace repairs, one mill has stopped most scrap shipments. Inventories have been increasing slowly. A boatload of some 60 15 to 30-ton Army tanks were sold Feb. 12 at $10.50 a gross ton.

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PITTSBURGH—Adverse weather conditions are expected to effect scrap shipments here by the end of this week, although no serious results will materialize. Heavy melting grades appear to be in good balance, with several sources here actively buying. Carbon steel turnings are easier than a week ago, and shipments are coming from New England and Detroit areas. Turnings from Detroit are being sold here at the spring board price.

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CLEVELAND — The market here did an abrupt about face last week with some brisk local buying of open hearth grades, resulting in somewhat of a tight situation. This is the first local buying of any consequences for some time, but follows the trend of buying in other parts of the country. Alloys continue in excess and in poor demand, although three-alloy scrap is reported to be moving once again, as a result of the recent government order increasing alloy scrap charges in both open hearth and electric furnaces. Prices are mainly being sustained with exceptions in the cases of turnings and alloys.

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CINCINNATI—Machine shop turnings are definitely weak in the current market, as mill consumers are reported to have cut down requirements. There appears to be enough material to keep the market balanced between supply and demand, although heavy steel grades and cast iron grades are still hard to get. Alloys continue to be a surplus item.

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BOSTON — Yards report production scrap supplies declining, with indications of a further drop. Other kinds of scrap are scarce, more particularly breakable cast for which there is a big demand. With the scrap supply and labor outlooks so uncertain, one of the largest yards operating two presses has sold one. Two other yards with presses have not operated them so far this month. Brokers report February shipments to date well under those of January. The January showing was the poorest on record in many cases.

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BUFFALO—Dealers report very little scrap coming out but mills are well supplied. The district's largest consumer has passed the critical stage after operating on scanty reserves. Yard men expect the mild winter will result in an early navigation season with much scrap coming in by lake freighter and canal barge. Premiums continue to be waived on alloys, but no hint of below-ceiling sales on regular grades has appeared.

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BIRMINGHAM — A downward trend continues here in the demand for scrap. Mill inventories are plentiful despite small movement of material to dealers' yards.

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ST. LOUIS—A snow fall halted collection and handling of scrap in this area. The sale of borings and turnings shipped to Chicago and eastern markets at $1.50 to $2 below ceiling prices is reported. Railroad offerings have been light.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails 3 ft. and Under	Scrap Rails 2 ft. and Under	Scrap Rails 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
U stripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
*Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico. Group B—North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida. Group C—States not named in A and B; switching district of Kansas City, Kan., Mo.

Effective Dec. 14, 1943, dealers no longer absorb freight from point of origin to yard for preparation to No. 1 Cupola Cast.

* Preparation charge allowable, see order.

Tool Steel Scrap Prices (MPR 379)

SEGREGATED	Solids Per Lb. Cont. W	Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS	UNSEGREGATED TURNINGS
$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.	$1.00 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.	$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.

If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.

If Cu or Ni content over 0.25%, price shall be reduced by 50%.

If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Comparison of Prices . . .

Advance Over Past Week in Heavy Type; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 15, 1944	Feb. 8, 1944	Jan. 11, 1944	Feb. 16, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 15, 1944	Feb. 8, 1944	Jan. 11, 1944	Feb. 16, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 169-183.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Feb. 15, 1944	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia[a]
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Weirton = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢c	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢f	2.10¢f		2.10¢g	2.10¢		(Bethlehem = 2.10¢)			2.45¢b	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	3.40¢	3.40¢		3.40¢	3.40¢		(Duluth = 3.40¢)					3.90¢			
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[6]	$5.018[a]	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	8.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.90[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.85[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .48	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras showr are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.... $54.80
6-in. and larger, del'd New York... 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50 ..... $4.75
Old range, non-bessemer, 51.50..... 4.60
Mesaba, bessemer, 51.50 ..... 4.60
Mesaba, non-bessemer, 51.50 ..... 4.45
High phosphorus, 51.50 ..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

Inside this Cover is a "Can't Be Done"

that *WAS* done!

It is not a claim but a plain, unvarnished truth that Apex heavy-duty aircraft universal joints combine:

Highest strength (axial and torsional) weight ratio obtained to date;
Greatest resistance to fatigue and vibration;
Longest service life;
Permanently sealed-in lubrication;
Fully meet AAF "Winterization" directives.

The cover, an exclusive Apex development, makes the lubricant integral with the joint and lengthens its life by reducing wear and vibration, the two worst enemies of joints in service.

Now used in crucial controls of both Army and Navy combat aircraft, these Apex joints have achieved a highly improved strength-weight ratio over previous types in their field and have widened the usage of universal joint applications. They exceed all requirements of the current AAF Specification for Class 2 Universal Joints, and AAF Standard Sheet No. 271.

Five sizes are available with torque ratings up to 10,000 inch pounds. Your request for any desired data will receive prompt attention.

THE APEX MACHINE & TOOL CO.
DAYTON, OHIO
Exclusive Licensee Under F. & S. Joint Patents

APEX Aircraft Universal Joints

Where a finished appearance is important..use
FLAT HEAD CAP SCREWS *by Cleveland*

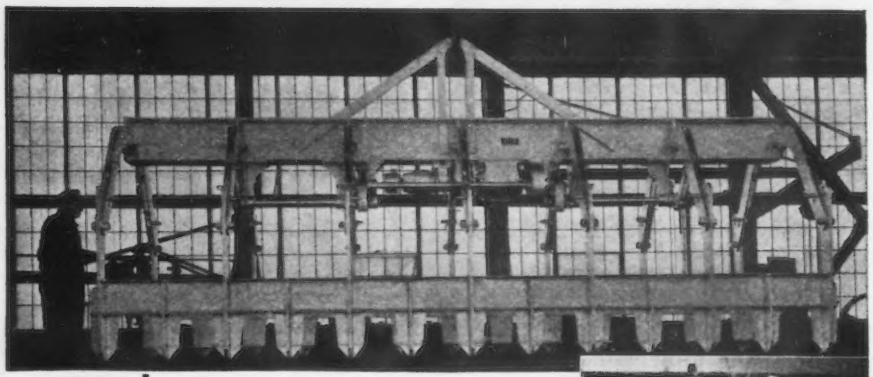
Fully machined, accurate concentricity on 82-80 degree angle, uniform lead on thread. Clean slotting . . . threaded to head . . . chamfered point. Write for samples and prices.

THE CLEVELAND CAP SCREW COMPANY
2917 E. 79th Street • Cleveland 4, Ohio

Cleveland Cap Screws
Set Screws and Special Upset Parts

Made by the Originators of the Kaufman Process for Greater Strength and Accuracy
Specialists for 26 years in Headed and Threaded Products

WAREHOUSES
CHICAGO: 726 W. Washington Blvd.
PHILADELPHIA . . 12th & Olive Sts.
NEW YORK. . . . . 47 Murray St.
LOS ANGELES . . . 1015 E. 16th St.



A 1-man "crew"

. . . with a C-F Sheet Lifter you can pick up, carry and stack, loose or bundled sheets without bending or denting the thinnest stock . . . can stack it closer and higher, greatly increasing your storage capacity . . . can handle the longest and narrowest strip or the widest, most flexible sheets without "rippling" edges.

C-F Sheet Lifters are self-contained units, accurately balanced and counterbalanced so that patented "elbowed" arms are operated easily (by hand chain or motor push button). Sizes for any crane, monorail or hoist. Types for any working situation.

Write for Bulletin SL 21

CULLEN-FRIESTEDT CO.,
1303 S. KILBOURN AVE. CHICAGO, ILLINOIS

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

This is no time for

EXCESS INVENTORY!

These days of cancellations, cutbacks, and design changes are hardly the time to increase surplus inventories. It's timelier to start streamlining your stocks — to get them "fluid" for future operations.

For example, why not reduce your inventory by buying a larger percentage of your steel requirements from warehouse? Frasse stocks of cold finished bars, tubing, stainless steel, alloy and aircraft steels and tubing are now in good shape. By buying from these stocks only what you need for immediate production, you avoid leftovers and dead material when contracts change.

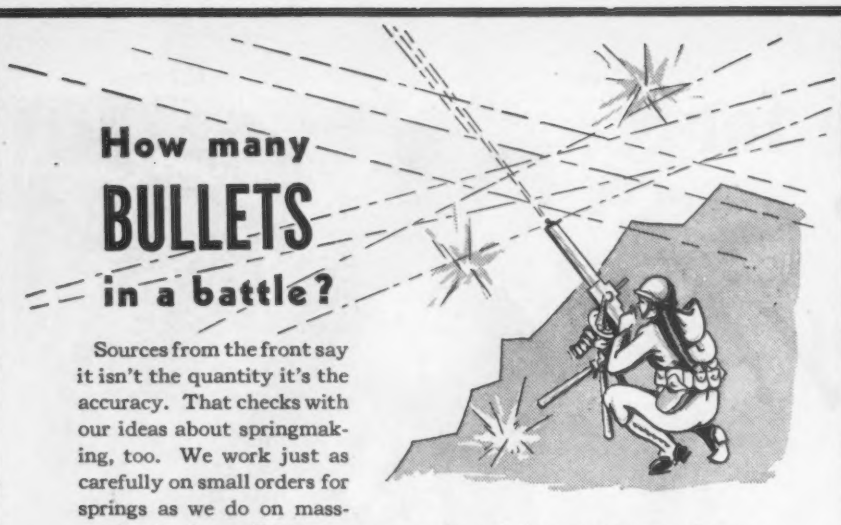
Cancellations and cutbacks in your future operations may require quick action. Why be hampered with heavy awkward surpluses? Start reducing yours now by using Frasse inventories instead.

Frasse

MECHANICAL AND AIRCRAFT STEELS

SEAMLESS MECHANICAL AND AIRCRAFT TUBING
COLD FINISHED BARS • ALLOY STEELS • AIRCRAFT STEELS • DRILL ROD
STAINLESS STEELS AND TUBING • COLD ROLLED STRIP AND SHEETS • WELDED STEEL TUBING

Peter A. Frasse & Co., Inc. 17 Grand St., N.Y. 13, N.Y. (Walker 5-2200) 3911 Wissahickon Ave., Phila. 29, Pa. (Radcliff 7100—Park 5541)
50 Exchange Street, Buffalo 3, New York (Washington 2000) • Jersey City, N.J. • Hartford, Conn. • Rochester, N.Y. • Syracuse, N.Y.



How many BULLETS in a battle?

Sources from the front say it isn't the quantity it's the accuracy. That checks with our ideas about springmaking, too. We work just as carefully on small orders for springs as we do on mass-production lots. There are many springs that may seem to suit your requirement — there's only **one** that meets all conditions of efficient manufacture and performance. Dunbar experience helps to select that spring — and to produce it efficiently and economically.

There's plenty of fight in springs made by

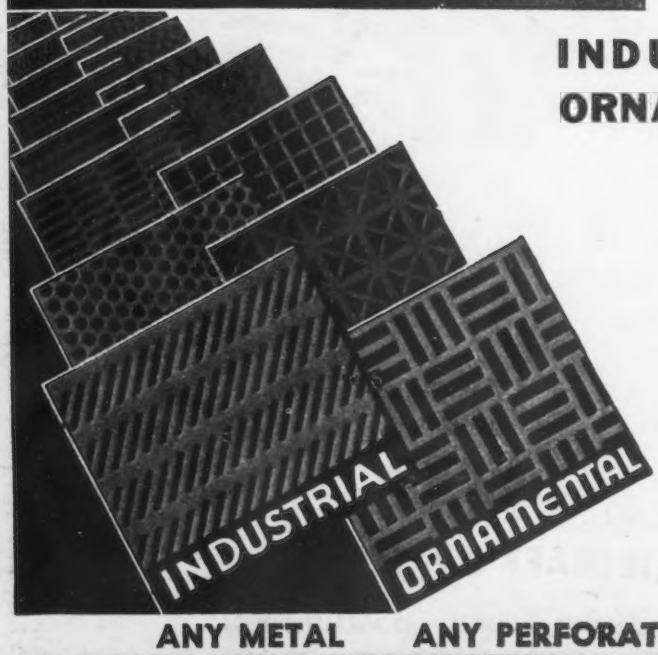
DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

PERFORATED METALS



INDUSTRIAL
ORNAMENTAL

ANY METAL ANY PERFORATION

The Harrington & King PERFORATING CO.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office: 114 Liberty Street, New York 6, N. Y.

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.30c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	2.35	....
	Base per 100 Lb.	Pacific Ports
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	Pacific Ports
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

MARKAL PAINTSTIKS

"Reddy" Markal

Major STEPPING STONES to this COVETED AWARD

MARKAL PAINTSTIKS write with top-most legibility on any surface—any material, hot, cold, wet, dry or oily. Clean and easy to use—no mess, no fuss—no sloppy paint bucket and brush.

MARKAL PAINTSTIKS avoid confusion and costly mistakes. No smeary, faded, hard-to-read markings to cause errors and delays.

Write with Paint

MARKAL PAINTSTIK marks are not touched by sun, rain, heat, cold. They're Fade-proof, Weather-proof, Permanent.

Join the nation-wide swing—
Switch to MARKAL

Write for Samples—
State type surface
to be marked.

Choice of Colors

MARKAL CO. 6-W. EAST LAKE ST. CHICAGO 1, ILL.
"Originators of Paint Sticks"

JOHNSON

High Carbon —

Drawn under constant laboratory control to meet the most exacting specifications.

XLO Aircraft Cable Wire, extra high fatigue wire, carefully drawn to size and finish.

XLO Music Wire (WD-1085—WD-1095) — the wire of a thousand uses. Wire sizes .005" to .200" dia.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos-phorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

LOOK FOR . . . and get . . . ALL THREE

THOROUGH engineering knowledge, wide and varied experience, ample fabricating facilities—each is important. Here you find all three. They helped build a reputation for competent service—brought assignments to build war factories, ships and drydocks for the Navy and Maritime Commission, unit construction bridges for the Army, numerous equipment items for war-busy plants. . . . Today, they are attracting forward-looking businessmen, who want counsel on problems of reconversion and future development. It's a practical idea—worth acting upon.

MISSISSIPPI VALLEY STRUCTURAL STEEL CO.

Engineering, Sales Offices, Fabricating Plants at Decatur, Ill. • Melrose Park, Ill. (Chicago Suburb) • St. Louis, Mo.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

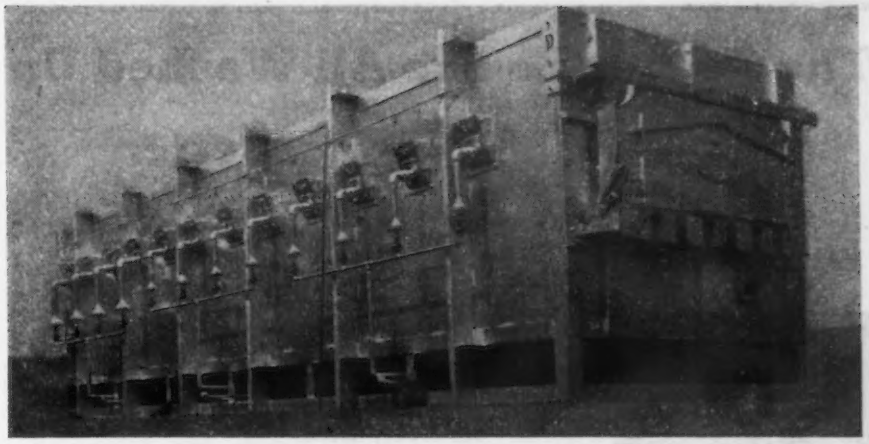
Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	3.15
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



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are designed for the job.

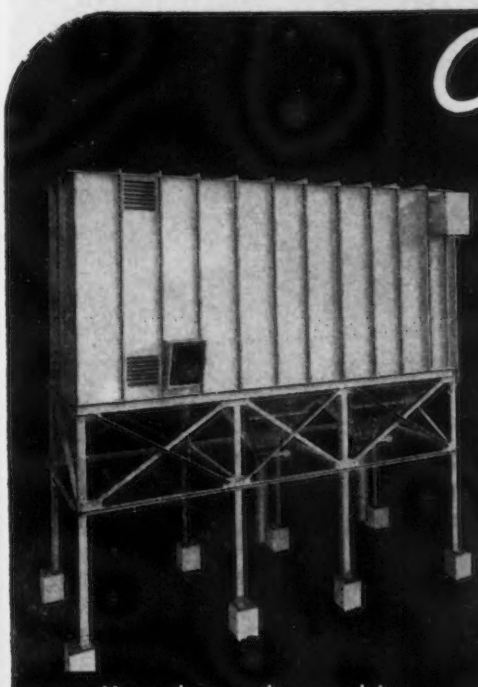
In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.



Control DUST!

FILTERED AIR
Avoids Dust Damage

Dust in your plant is both a *danger* and a *nuisance*, affecting employee health and causing damage to machines, equipment and buildings.

The Ruemelin Dust Filter gets rid of dust, easily and economically. It filters dust-laden air from tumblers, sand blast equipment, grinding wheels, crushers and other dust creating equipment. Reduces maintenance costs and shutdown periods. Reclaims all valuable dusts in processing chemicals, minerals, dyes, etc.

Ruemelin pioneered the highly efficient, tubular cloth bag filter. If you have a dust problem, let one of our experienced engineers help you. Ask for Cat. 24-C.

Also mfgrs. of Sand Blast Equipment, Welding Fume Collectors, etc.

RUEMELIN MFG. CO.
3870 N. Palmer St., Milwaukee 12, Wis.

More than a thousand installations prove Ruemelin Dust Filter superiority.

RUEMELIN DUST FILTER

The Sooner You're All Washed Up —the Better

● LOW PRODUCTION COST is a corollary to fast washing speed. Why? Because here is what happens: You spend less for power and labor time . . . other operating costs and fixed charges are spread over a greater volume of production . . . fewer machines are required, thus saving unnecessary investments in equipment and factory space.

The basic requirement for faster metal washing is quick and *complete exposure* of the work to the action of the sprays. And every machine of our manufacture has this element perfected to the 'nth degree—most of them, like the endless conveyor tumbling principle, being an original and exclusive development.

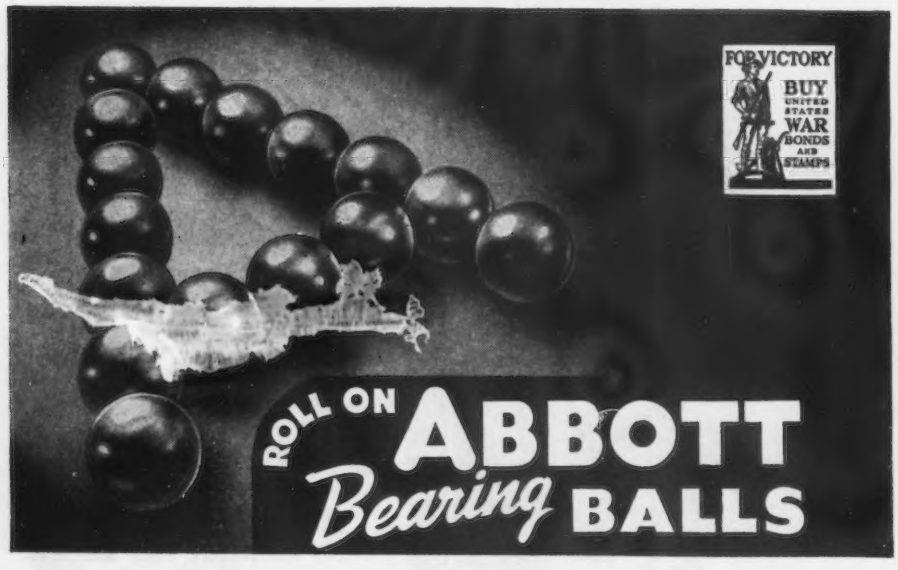
If you will write us we will gladly tell you more about these unique machines and how they will fit into your production.

METAL WASHING DIVISION

American FOUNDRY EQUIPMENT CO.

510 S. BYRKIT ST. MISHAWAKA, IND.

*The Tumbl-Spray machine, illustrated at left, is ideal for washing metal parts, stampings, and screw machine products. Write for Bulletin No. 9.
Also available: The Table-Spray, Conveyor-Spray, Monorail-Spray, etc.



UNINTERRUPTED PERFORMANCE

SPECIFY "ABBOTT"—When you use ABBOTT BEARING BALLS you are assured of uninterrupted performance whether the application is a light, intricate mechanism or a heavy duty assembly. ABBOTT will carry the load as planned.

Estimates of delivery gladly given.

ROLL ON ABBOTT Bearing BALLS
THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

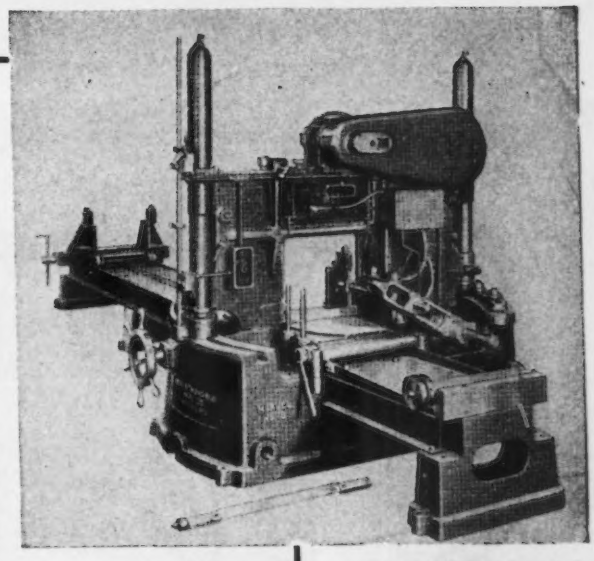
OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

PRICES

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more...	$1.90
Ferrovanadium, 50-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.	
2000 lb. to carload	$1.20
Under 2000 lb.	1.30
Per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)	
Carload lots	25c.
2000 lb. to carload	26c.
Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)	
Carload lots	58c.
2000 lb. to carload	59c.
Grainal No. 1, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis, per lb.	37.5c.
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.	
2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales	
Carload lots	14c.
Zirconium, 12-15%, contract basis, lump, f.o.b. plant with usual freight allowances, per lb. of alloy	
Carload, bulk	4.6c.
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	6.5c.
Ton lots	7.25c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.

CUTS the Toughest Steels and Largest Sizes *easily*.



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

SPECIFICATIONS
for Greater Fuel Economy
Improved Working Conditions

Therm-O-Flake Casting Vertical walls — bulkheads — roofs — arches.
Therm-O-Flake Brick Flue Walls and Arch — Checker Chamber Walls. Slag Pocket Walls.
Therm-O-Flake Concrete Flue — Checker Chamber Hearth Bottoms.

Illinois Clay Products Company
JOLIET, ILL.

High Temperature
INSULATION

SEMISILICA BRICK

In STEEL MILLS:

For Heating, Reheating, Annealing and Heat Treating Furnaces, OH Regenerators, Blast Furnace Stoves, Soaking Pits, etc. In the roofs, where spalling failure is most prevalent, they perform their greatest service.

In MANY INDUSTRIES:

Such as Chemical, Ceramic, Zinc Smelting and other industries where continuous heats in the temperature range of RM's are required for their processes.

Steadily maintained temperatures between 2200°F and 2700°F cause vitreous spalling of clay fire bricks. Shutdown and temperature changes are hard on Silica Bricks.

RM Brand Semisilica Bricks are the answer to many such furnace problems.

Use them in furnaces where temperatures are maintained high enough, and long enough, to cause "First Quality Clay Bricks" or "Super Duty Bricks" to "Vitrify and Spall" or to "Shrink and Deform," yet where shutdowns or severe temperature changes prevent satisfactory performance of silica bricks.

RICHARD C. REMMEY SON CO.

HEDLEY STREET & DELAWARE RIVER

Philadelphia, Pa.

The
IRON AGE

ESTABLISHED 1855

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FEB. 24, 1944

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Approaching Common Ground

INDUSTRIAL economics has two branches. One has to do with the creation of values; the other with the division of the wealth represented by them.

The first of these two, the economics of creation of values is or at least should be a science as definite as arithmetic. It deals with multiplication and no one can argue with the multiplication table. As to the second, it will be subject to controversy as long as human nature exists.

In seeking to enlarge the common ground on which employers and workers can unite for their mutual welfare as well as for the good of the public, a large step will be taken when this distinction becomes recognized and acted upon. By reducing the area subject to friction in employer-employee relations we follow the simple laws of physics which tells us that the less the frictional area, the smoother and the faster the progress of any moving body.

It was for this reason that I suggested, in The Iron Age of March 18, 1943, the co-education of our future managers and labor leaders in economic fundamentals. To quote from this editorial: "Our future managers and labor leaders alike will largely be college graduates. It would be a good thing if they could go to school together, learn what the fundamentals are on which they can and should agree and how to settle that on which they cannot agree with the least possible friction."

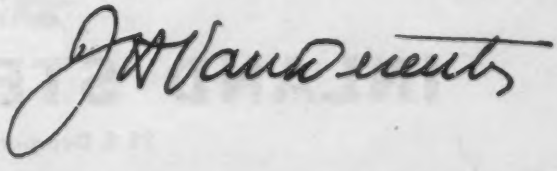
It is encouraging to note that within the past few days, Cornell University has announced the establishment of such a course. And it is to be hoped that other universities and colleges will follow suit.

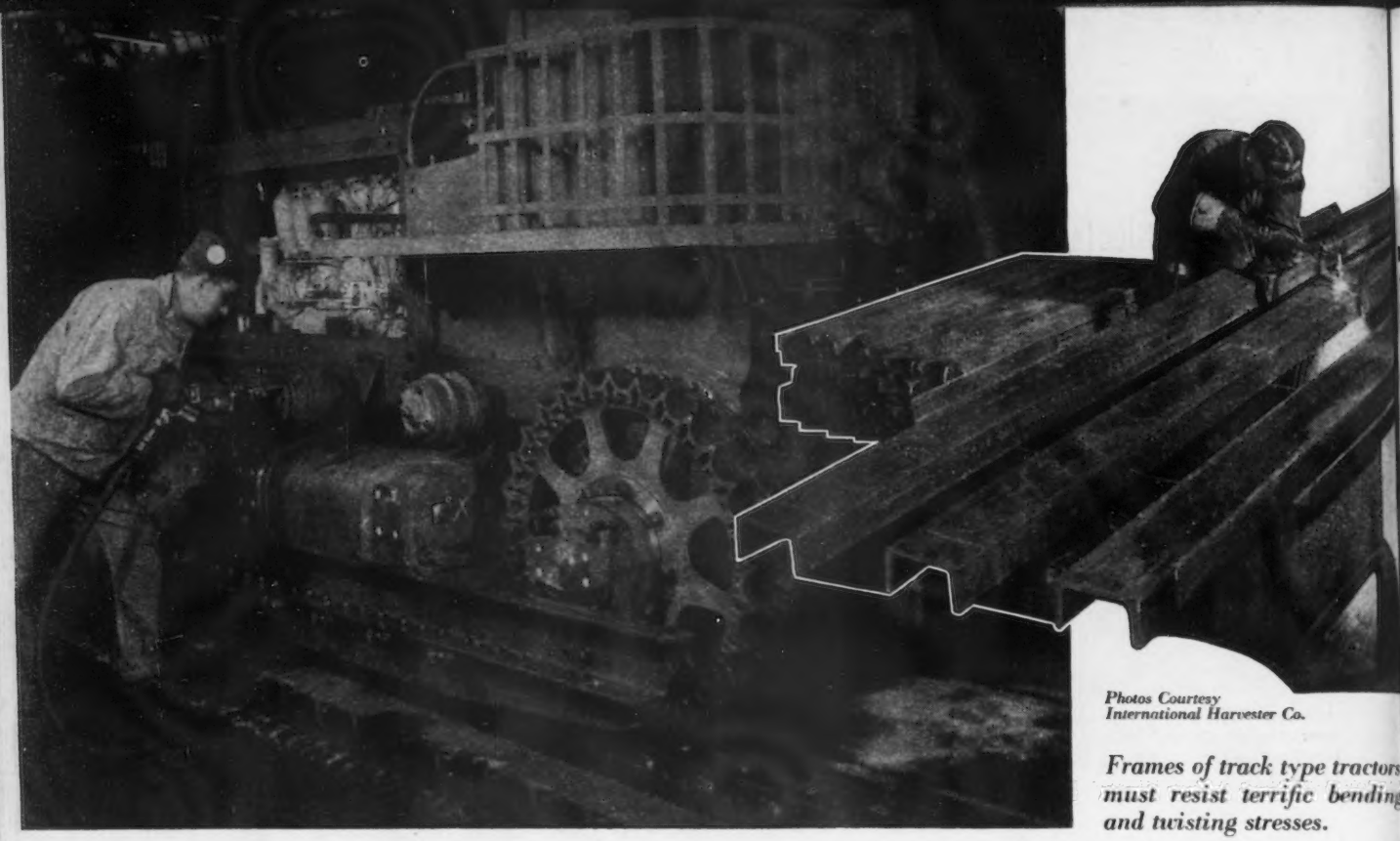
No one suffers from the creation of new values and new wealth but on the contrary all benefit by them. Enlightened labor leaders now accept this view as evidenced by the panel discussion on "Jobs in Peacetime" conducted by the National Association of Manufacturers, in which William Green and Philip Murray participated with Paul G. Hoffman and Frederick C. Crawford.

Symptomatic also of the new thought in this direction by both parties is the successful functioning of labor-management committees in many of our plants, which was brought about by common acceptance of the need to increase war production.

Getting together to study and discuss these things has an additional benefit going beyond the acceptance of the scientific approach to the economic problem. It is a course in human relations as well in which people get to know each other better. It is much easier to do business with people you know than with strangers.

Out of all this, I hope and believe, will come not only a better understanding of mutual problems but also a more tolerant and sympathetic attitude in handling those questions which being controversial cannot be solved by text book or slide rule.





Photos Courtesy International Harvester Co.

Frames of track type tractors must resist terrific bending and twisting stresses.

Stronger Backbones for Tractors Using Inland Hi-Steel

Tractor frames must be strong—particularly those for track type tractors, which are turned by stopping one track, throwing terrific bending and twisting stresses onto the frame. That is why a manufacturer of tractors chose Inland Hi-Steel for the frames of their 10-ton track type Diesel tractors; Hi-Steel offers higher strength without added weight or size.

The original tractor design called for steel with 44,000 lb. per sq. in. yield strength. For the grueling service to which these tractors are subjected, especially when a bulldozer is mounted directly on the frame, it was found that greater strength was needed. Increasing the size of the frame section would have entailed complete redesign and sacrificing many desirable tractor features.

Inland Hi-Steel offered the perfect solution to the problem. Replacing the carbon steel channels with Hi-Steel, which has a yield strength of 57,000 lb. per sq. in., made possible retaining the same size and weight of frame, while increasing strength 29.5%. All design features were retained, and adopting Hi-Steel called for no change in fabricating methods. Thousands of these sturdy, powerful tractors in service confirm the dependability of the Hi-Steel frames.

Inland Hi-Steel, the corrosion-resistant and high-strength, low alloy, has established records for service and endurance on many of the toughest peacetime and wartime jobs. Today, most of the Inland Hi-Steel goes into war jobs but when peace comes, it will again be available for the construction of equipment in which higher strength, reduced weight and greater corrosion resistance are factors in product design, sale and service.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Sales Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

The Iron Age
FEB. 24, 1944

News Front

► A Swedish delegation is now in the U. S. trying to clear some shipments of pig tin and tin plate to that country, a movement that both the Germans and Allies may have different reasons for sanctioning.

The delegation is also attempting to lay plans for the recapture of pre-war steel outlets in this country. The desire is to ship high grade Swedish iron ore to the U. S. in payment for purchases.

► The continuous electrolytic tin plate line for wide strip, recently purchased here by British interests, is awaiting priority releases so that construction can start.

The Steel Co. of Canada has just about completed negotiations for an electrolytic tinning line, to be built in this country.

► Now that the pressure of the draft is biting deeper and war bond purchasing more insistent, there is a growing resentment in certain industrial areas to rank labor wastage in various war plants.

The policy of some plants seems to be to hire four people to do one job, probably as a deliberate means of keeping costs high. Workers themselves frequently complain, and campaigns to "make every minute count", or "buy bonds until it hurts", usually fall flat in such situations.

Some workers even decline to wear Army-Navy "E" buttons.

► USW's demand for higher pay before the WLB will probably be based on the AFL-CIO's cost of living study. Labor's survey insisted that the advance in the cost of living since the beginning of 1941 was 43.5 per cent, not the Bureau of Labor Statistics' figure of 23.5.

Anxious to get the case started, steel companies fear the cost of retroactive wage increases will not be recovered. Unofficial and speculative opinion as to amount of wage rise ranges from 7 to 10c. an hr.

► Greatest handicap to rehabilitation of war veterans is the many cases of psycho-neurosis, from shock caused by the rigors of training and actual war experience.

► Continuous casting of metals, for 100 years a dream of inventors, has within the past several years been adopted for the casting of practically all non-ferrous ingots and billets in this country. Costs are lower and the products are better.

For ferrous metals, interest in continuous casting is growing. Several different units are in experimental operation, but results to date are somewhat indefinite.

► Release and near-release of several large aircraft tooling jobs have filled Detroit tool shops. Some are not taking any new business now.

► Rumor has it that Buick will gradually become sole automotive manufacturer of cargo plane engines heretofore made only by General Motors in Detroit.

► Coating beryllium copper wire with silver increases surface electrical conductivity, reduces surface attack during heat treating and hardening and reduces wear on wire coiling tools. Little Falls Alloys, Inc., developed the new process.

► In spite of USES and WMC pressure and pleas in California for more workers, claims for unemployment insurance there are rising uncomfortably. There were 42,956 claims for benefits in September and 55,209 in December, an increase of 12,253.

► The Iron Fireman plant which burned down mysteriously in Portland will not be rebuilt. The management says it is impossible to supply the national market from a Pacific Coast plant.

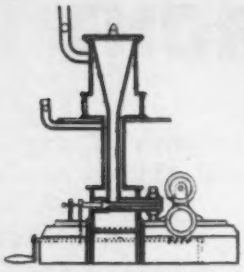
► With its Vulcan ore running as high 0.50 sulphur, the Kaiser Co. has purchased the Iron Chief Mine in the Eagle Mountains. RFC funds supplied a large part of the million dollars paid.

► Cartels are not the answer to domestic economic problems, Eric Johnson says. Increased postwar dispersion of industries will check the cartel movement.

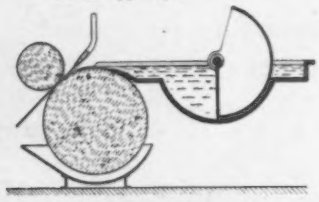
► With the lower Great Lakes free of ice, the 25 ships wintered at Milwaukee are receiving feverish preparation. Navigation is expected to open much earlier than the traditional April 15.

► Arrangements are now under way for the purchase of Bethlehem's boiler tube plant at Coatesville, Pa., by Lukens Steel Co., the plant's next door neighbor.

Continuous Casting



American Tube Casting, J. Laing, 1843



British Strip Casting, H. Bessemer, 1858

By T. W. LIPPERT

Managing Editor, The Iron Age

IT has been said that the cradle of every science is surrounded by dead theorists. And certainly there are innumerable examples of this in the metals industries. An excellent illustration, for instance, is the continuous rolling of metal, a tantalizing objective that for decades on end exhausted the efforts of a long line of famous, infamous and unknown inventors. And, finally, in 1922, John B. Tytus of Armco brought forth what now seems such an obviously simple scheme of a concave roll face, each stand of progressively less concavity. And, out of this one change in design sprang today's wide continuous mill rolling steel sheet, 100 inches wide, at 2000 ft. per min.

Another excellent example is the continuous casting of liquid metal into an intermediate form, preferably one requiring little subsequent breakdown. First, the casting of liquid metal alone was fascinating enough. Then, someone passed the cast metal directly into a rolling mill, and shortly thereafter this continuously rolled strip was passed directly into a stamping machine. This leitmotif of a continuous flow of metal from the liquid phase to a consumer end product, fast and inexpensive, and all housed within a small space, was enough to drive some 200 or so inventors into frenzy over the past hundred years. All the ideas, however, like mayflies, had only their brief afternoon of existence. They were born and they died on paper, as constant exemplification of that great void that always exists between cerebral production and commercial production.

Credit for starting the ball rolling is conventionally given to the famous Englishman, Sir Henry Bessemer, who early in 1858 suggested that the then successful rolling of glass plate between two rolls from the liquid phase could perhaps be adapted to a similar rolling of soft metals. Some ten years later he actually gave it a try, successfully rolling a 40-in. length of wrought iron strip, said to have excellent surface and metallurgical properties. But, Bessemer's idea (American patent No. 49,053) came long after a method of continuously casting soft metal tubing wherein the mandrel was vibrated to prevent sticking, conceived by J. Laing in 1843 (American patent No. 3,023). With nationalism in temporary eclipse, the proper crediting of the original ideas may not be of much importance at this late date. But, since today's commercial continuous casting processes resemble Laing's far more than they do Bessemer's, perhaps some of the accolade for being the father of continuous casting could be shifted from the shoulders of England's illustrious Bessemer to that of America's unknown Laing.

Following Bessemer and Laing, the next important twitch in the technology of continuous casting came during the period 1890 to 1900. In 1891, E. Norton and J. Hodgson successfully rolled some steel sheet by pouring liquid metal between two rolls. (For details see THE IRON AGE, April 11, 1940.) The results were promising, but work was abandoned due to lack of money and time. At about this same period the Washburn & Moen Mfg. Co., Worcester, became greatly interested in continuous casting of round billets. Washburn, Daniels and Stover of that company set down a number of excellent observations on such casting through a vertical water-cooled mold. A little later J. O. E. Trotz of the same company elaborated these ideas and is accredited with establishing some lasting principles of continuous ingot casting. But, no machine actually was ever built. Trotz became superintendent of the South Works of American Steel & Wire Co. (which had absorbed Washburn & Moen), and after some years retired to Sweden and died there some seven or eight years ago. Also, during this same period (1890), B. Atha (from which Atha Works of Crucible Steel Co.) built and commercially operated a vertical-mold continuous casting machine for turning out 4 x 4-in. high-carbon (1.15 C to 1.50 C) file steel ingots. This unit probably produced many thousands of tons of this file steel, and it was not abandoned until 1910, when crucible melting went into a decline. A single crucible was poured through the mold at a time, and the open mold shell itself (patent No. 425,846) was rather long but with no elaborate interior cooling innovations. Information available is that the surface of the ingot was none too good, but still fully satisfactory for commercial production. Furthermore, for some reason no steels other than the file analyses ever were so cast.

By 1900, practically every conceivable idea on continuous casting had been pawed over and set forth in patents by a long line of known and unknown inventors. There were infinite variations of casting the molten metal between metal rolls, with exquisite nuances of mold design, cooling technique and auxiliary equipment. The same applied to pouring between chains of half-molds carried on continuous belts, or of pressing, sucking and pouring of molten metal through all kinds of vertical, horizontal and slanted mold arrangements.

The next definite effort to actually physically cast metal came in about 1914. At this time, J. T. Rowley is supposed to have tried casting of steel through a vertical mold at the U. S. Horse Shoe Co., Erie, Pa. But a young man, fresh from college, by the name of Grenville Mellen, blew a surge of new life into the idea of casting between mold-halves carried on two continuous belts, first suggested in detail back in 1885 by A. Matthes and H. W. Lash. Remarkably little is known of the Mellen efforts considering the fact that the work didn't fold up until about 1925. During the period 1914-25, considerable financial support was given Mellen by Spencer Watters, of the New

. . . Swept along for 100 years on a wave of fascinating inventive vagaries, the continuous casting of liquid metals within these past five years has sprouted from an inchoate, diffident laboratory practice to a full-blown commercial technique. The bulk of coppers and brasses and practically all light metal production now pass through a variety of continuous casting equipment. And, in steel, no longer is the attitude one of cavalier disdain. Today, several machines are experimentally casting steel, and still another technique has continuously cast some thousands of tons of high-grade commercial ferrous alloys.

York Cotton Exchange. Mellen is probably still living, although where he is located this writer does not know.

Mellen came to the general machine shop of Thompson, Coates & McKay, of Harrison, N. J., early in 1913 to have a small horizontal chain machine built for casting solder. Attention was later shifted primarily to brass, and the machine in about 1914 was shifted to the Standard Underground Cable Co., Perth Amboy, N. J. During this interval the idea of a horizontal machine (see photo on page 50) was discarded in favor of a much larger vertical chain machine. In 1915, Mellen had his patents assigned to the Continuous Casting Corp., and the machines were all shifted to Gar Wood, N. J., where they became the seed from which grew the Gar Wood Brass Corp., a war enterprise of considerable size which completely disappeared from the industrial scene by 1925.

Mellen was a clever theorist and devised many improvements in the chain casting technique and metal feeding techniques. He also was quite an amateur athlete, and for years did a great deal of wrestling around eastern New Jersey as the "Masked Wonder," the mask being worn to conceal his identity. He usually won the matches, too.

A not very good photograph of the Mellen vertical chain casting machine is reproduced on page 51. The individual mold blocks (or half-blocks) were cast iron, about 5½ in. long and 5 in. wide. The machine was 12 ft. in height over all, 2 x 3 ft. in horizontal cross-section, and 6000 lb. in weight. It had a framework of cast iron, holding in position the two endless chains of mold blocks, which were made in sections and joined by pins in center alinement. Casting speed would rise to 25 ft. per min. for ⅞-in. brass rod, and mold block temperature was about 450 deg. F. even with some water cooling. In all, about 1000 tons or so of commercial brass rod, mostly 1½-in. rounds of cartridge brass, was cast in this machine. No trouble was experienced with the molds, but the greatest difficulty was experienced in getting the proper flow of molten brass to the point where the mold halves came together. The tip of the silica tube used to transfer the molten brass from the crucible to the pouring point had a tendency to burn off; or, the metal would back up and partially freeze and yank the entire tube off. Elaborate methods of minimizing this tendency were devised, but to the end the accurate control of metal flow was the basic difficulty and was greatly responsible for abandoning the process. The Gar Wood Brass Co. subsequently ceased to exist and the machine was scrapped.

There is to this day some interest in the idea of casting molten metal continuously by means of numerous half-molds linked together in two continuous belts, wherein the molds come together to form a casting chamber, and stay together long enough so the resultant billet can support itself, at which point the belts separate to carry the mold halves back to the casting point. The practice *seems* simple and foolproof. In 1930 the Frenchman, J. Chantraine, with some fanfare prophesied great things for such a method he devised. He spoke confidently of quality of product and economy of operation, and came up with the curious method of cooling the molds with refrigerated air rather than water. But there is no evidence that such a machine was built. Today, the Dortmund-Hoerder Huettenverein, in Germany, is supposed to be using a vertical machine of this type, but with what metal and how successfully is not known. Also, it is believed that Dow Chemical Co. once experimented with a vertical chain machine for magnesium alloys, but if such was the case the idea was abandoned; for this company now employs a downwardly open mold shell of the conventional type.

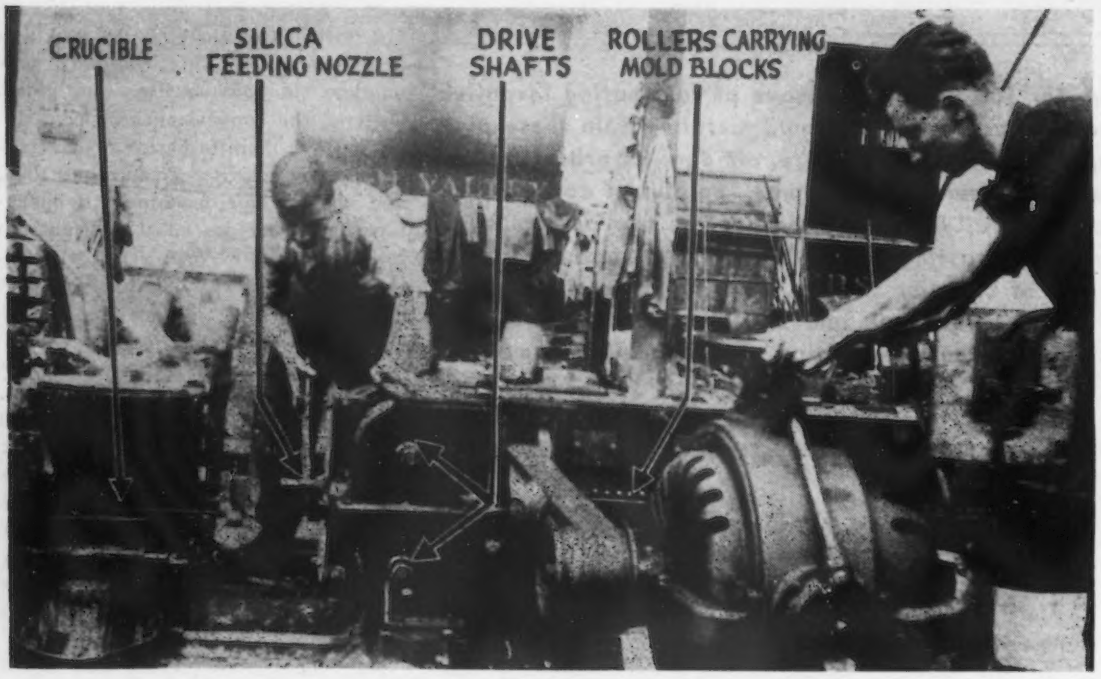
The next definite period of continuous casting activity came around 1940, and the various machines in operation then were described in great detail in THE IRON AGE, April 4, 1940. In the strip-sheet field, C. W. Hazelett had a number of wide casting-rolling mills in experimental operation; and, Merle was doing some work with high-speed film casting of strip. The continuous casting of rods and ingots was showing great promise. A number of Alcoa DC machines were in operation, Poland and Eldred were successfully producing quality copper rod, Williams was experimentally casting steel billets, and Junghans had one billet casting machine in operation on brass in this country.

But, today, the picture has again shifted and expanded. Work on continuous cast sheet or strip has faltered or died, and many of the machines are scrapped. As regards continuously cast ingots and bars, however, the technology has expanded dramatically. In fact, one process not detailed herein has, during the past year or so, continuously cast some thousands of tons of commercial steel billets.

All these shifts and the new work done is brought up to date in the following paragraphs. But, since the details tally up to quite a prolix document, a brief outline of interim changes and current status of thirteen continuous casting may be given as follows:

C. W. Hazelett Process:

The inventor, himself, has lost interest in the continuous casting-rolling of wide strip-sheet. Hazelett's activities today are practically exclusively of a political nature, attempting to interest Washington policy makers in his idea of "incentive taxation" as a means of encouraging industrial enterprise. For this reason the utilization of Hazelett mills has sagged drastically. The International Nickel Co. unit (20 in. wide) and the Scovill Mfg. Co. unit (12 in. wide) both have been scrapped. The Crucible Steel Co. 15-in. mill is still at the Atha works, but inactive. The Aluminum Co. of America 30-in. mill, probably the best ever built by Hazelett, was sold to the Harrison Radiator Division of General Motors Corp., Lockport, N. Y., and a great deal of experimental work is being done on the rolling of brass. Results to date have been encouraging. The Crown Cork & Seal Co. 24-in. mill has been



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● Original horizontal rod-casting machine of Grenville Mellen, 1914. Half-mold blocks are linked together into two continuous chains, which come together to form a casting chamber. Product was brass rod of diameter varying between ⅞ in. and 1½ in. This small unit subsequently was replaced by a larger vertical machine, shown opposite.

o o o

sold to the Winchester Arms plant at New Haven, Conn., which has an exclusive Hazelett license for rolling zinc. This mill currently is inactive. This accounts for the five domestic mills built. Of the three units sold in Japan, nothing is known of the 32-in. mill for zinc which was sold to Mitsui Mining Co., or of the 20-in. copper and brass mill sold to Furukawa. Advices prior to Pearl Harbor indicated, however, that the 16-in. brass mill in the Sumtomo plant was in operation.

The Harrison Radiator work at Lockport suffered considerably because of the war, and despite difficulties of roll deterioration and end-dam cracking, the company is diligently pursuing the problem and believes that results to date promise a successful future for the Hazelett machine. A great deal of excellent brass has been rolled on this unit for the Army, in 6-ton heats, the continuous strip being up to 30-in. wide and 0.012 in. thick. The mill is now working on copper, and likely will handle the quite large copper strip requirements of this plant after the war.

Junghans-Rossi Process:

Six units in commercial operation on brass and light metals. England has one large machine, and Germany has many units in production. Well over 500,000 tons of metal has been cast in this equipment. Described in detail later herein.

J. M. Merle Process:

This high speed method for film casting a thin steel strip onto a moving steel belt or onto a cooled wheel rim is apparently inactive. The three or four machines built for the Allegheny-Ludlum Steel Corp. have all been scrapped. The inventor, now at 9124 S. Laflin St., Chicago, is said to be interested in developing a continuous "cast-drawn" pipe machine for a Brazilian steel company.

Poland-Eldred Process:

The American Smelting & Refining Co. and the Chase Brass & Copper Co. together have purchased all Eldred patents to combine with their own patent structure on the continuous casting of copper rods. One very successful machine in operation at Perth Amboy, N. J., and new units likely to be built. Described in detail later herein.

Alcoa DC Process:

A highly successful ingot casting method, with over 60 units in operation in Aluminum Co. of America plants, and licensed units in operation in the plants of Extruded Metals, Tube- Turns, Bohn Aluminum and Revere Copper & Brass, Inc. This technique described in greater detail herein.

E. R. Williams Process:

Work on this unit for continuously casting steel billets has been shifted to the Republic Steel Corp., Cleveland. Results so far are indefinite. Details described later herein.

N. P. Goss Process:

A method of continuously casting steel billets. Results so far indefinite. Described in detail later herein.

U. S. Steel Corp. Process:

In addition to the interest that one U. S. Steel Corp. subsidiary has in the Goss process, mentioned above, the Corporation also has patented a somewhat unique continuous casting machine, and intends to give it an experimental whirl. The significant feature of the machine is the casting (or extrusion) of a ceramic mold around the liquid metal as it is cast into a billet. This mold is broken away after the billet cools, and reused in part or discarded. Such a mold is being used in an effort to avoid as far as possible the severe heat withdrawal conditions imposed by a short metallic mold. The method may be employed for carbon tool steel analyses.

R. K. Hopkins Process:

Originally used for continuously casting alloy steel onto the side of a carbon steel ingot. This method is a unique procedure which can be considered a continuous casting possibility. Described in greater detail herein.

Dow Process:

One 12-in. machine in operation and two 18-in. machines being built. For casting Dowmetal extrusion rounds. The unit has a single mold chamber believed to resemble the Alcoa DC machine described herein. But, the cast ingot does not drop down on a hydraulic platform—rather, it is pulled down by pinch-rolls and cut to extrusion lengths with a flying saw, just as does Rossi. The Dow casting speed is midway between the Alcoa and the Rossi speeds.

Reynolds Metals Process:

One unit in operation on aluminum alloy ingots. Has a definite physical resemblance to the Alcoa DC machine, but rate and distribution of heat extraction may be different.

Inco Process:

A bar and billet casting machine devised by the International Nickel Co. of Canada and used at the American Metals Co. plant at Carteret, N. J. Inco of Canada has one unit in operation on copper at Copper Cliff, Canada. The Carteret machine continuously casts 3-in. square copper wire bars or 3-in. piercing billets at a rate of about 4000 lb. per hr. The copper is continuously fed from one of two melting furnaces, through a closed runner to the mold chamber. The mold is copper, with many internal passages for coolant. Particularly interesting is that the mold is split in two parts axially, and these parts vibrate very rapidly to overcome friction, the amplitude of the vibration being very small, or less than enough to break the surface tension of the molten metal pool on top. Metallurgical characteristics of the metal are excellent and surface condition of the bar is so good as to not require scalping prior to subsequent manufacturing operations. This machine is very successful in all respects, and additional installations are to be expected.

Soro Process:

The equipment and techniques devised by Junghans, Alcoa, Goss, Poland, Lindner, Eldred, Williams, Hazelett, Merle, Dow, Inco, Reynolds, and a scattering of little known or unknown contemporaries, all fit within the ideological framework of ideas propounded by a long line of 300 or so predecessors reaching back almost 100 years to J. Laing and Henry Bessemer. The past few years, however, have brought forth several unique and unorthodox machines and methods. One of these is best known as Allegheny-Ludlum's Pluramelt process, conceived by R. K. Hopkins of M. W. Kellogg Co.; and the other is the Soro process, hatched by the Swiss inventor Edwin Schuetz, and employed commercially in several countries abroad but still practically unknown in this country.

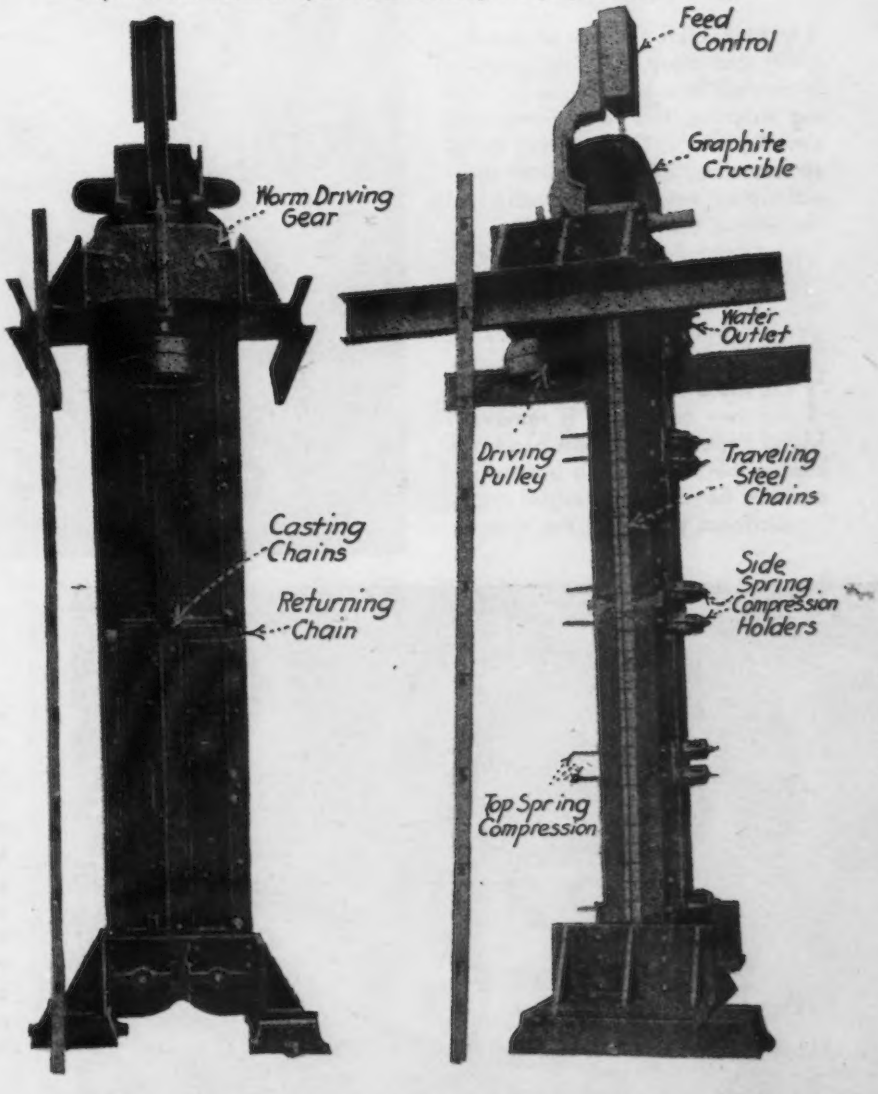
The Soro process certainly cannot be said to fall neatly within the generic boundaries of continuous casting. In fact, it isn't continuous casting—it's centrifugal casting with some specialized technical ramifications. None the less, the end-objective of all continuous casting schemes, that of using a small, comparatively simple and inexpensive piece of equipment to congeal molten metal into either a finished product or a precise and quality product a couple of jumps beyond the semi-finished stage, is fulfilled by the Soro process. And because of this once-removed kinship, the Swiss method can perhaps be fitted within the pattern of continuous casting, and weighed and judged by the same technical and economic considerations applied to the more obviously conventional methods.

While for almost four centuries the poets have belabored the phrase that "necessity is the mother of invention," there is no gainsaying the fact that anger can be an equally effective stimulant to the inventive Muse. Armed with righteous anger and a wad of plant "know how", the inventor of the Soro process showed that it is still possible for the little guy to make the big bad cartel sheath the iron fist and extend not only a velvet glove but a velvet glove with some money nestling therein.

In 1935 Edwin Schuetz was manager of A. G. Oederlin & Co., of Baden, Switzerland, somewhat of a peanut of an industrial enterprise by American standards, but still a profitable producer of a small line of plumbing fixtures and related brass products. That is, it was profitable until the dominating group of Swiss copper fabricators (Swiss Metal Syndicate) in an exquisite demonstration of free enterprise, stabilized rod and bar prices at neat but high level during a period when scrap prices were stabilized at an equally neat but low level. Oederlin & Co. and a few others sweated it out for a while, but after a year or so Herr Scheutz decided to hell with it all, and therewith proceeded to devise the ingenuous Soro process, which converted Oederlin's plant reflow scrap with some pig metal additions into all the bar and rod requirements of the plant.

By 1937 Herr Scheutz had his Soro equipment running full blast. (The tag, "Soro," is what was considered a euphonious mixture of S for Scheutz, O for Oederlin, and RO for ratationsguss or rotational casting.) With a couple of induction furnaces, a battery of three 39-in. diameter

● Improved vertical chain casting machine of Grenville Mellen, which cast brass rod at a 25 ft. per min. speed at Gar Wood, N. J., in 1915. The machine stood 12 ft. high and 2x3 ft. in cross-section. Some thousands of tons of cartridge brass were turned out by this unit. Greatest operational difficulty was proper metal feeding.



Soro Unit

. . . While in no way an orthodox continuous caster, the Swiss-developed Soro process is of the same genus in that it is a compact unit casting molten metal to a finished product. Also, the ability to turn out hot-short metals in long lengths and various cross-sections makes this process one which many a small company could seriously consider.

ABOVE

WHETHER ferrous or non-ferrous alloy, a given quantity is poured into a continuous casting machine, two rings being cast simultaneously. The resulting metal structure has all the excellent characteristics regularly associated with a centrifugal casting.

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RIGHT

THE mold is opened and one of the two cast rings is removed. Metal impurities and sink head are kept within the pouring burr which projects beyond the desired cross-sectional profile of the ring.

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LEFT

THE pouring burr which projects from the inner side of the ring is machined off, leaving the desired profile in sound metal. While these Swiss photos show the original set-up at Baden, newer installations make use of automatic equipment to a much greater extent. Baden capacity is some 1000 tons of finished bars a year, and all equipment from melting furnace to scalping benches are contained within one medium-sized room.

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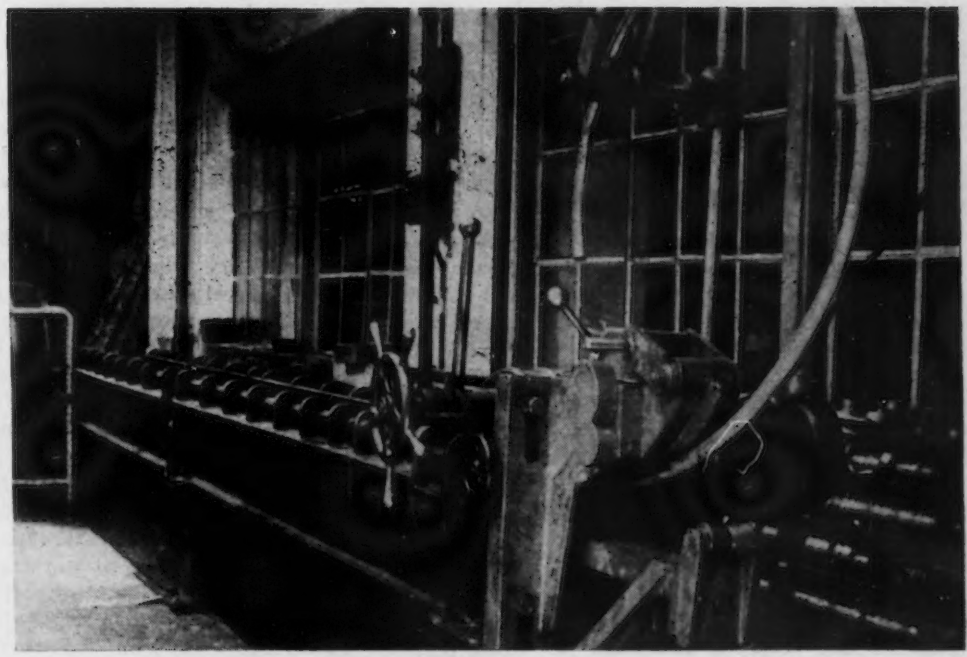
RIGHT

THE correctly profiled rings are sawed at one point, the two ends being sprung slightly apart in an eccentric press so that one end can be inserted into a straightening die fastened to a draw bench. Note particularly the hammer attachment in front of die which compresses the inner face of the ring, thus preventing fracture of the metal.



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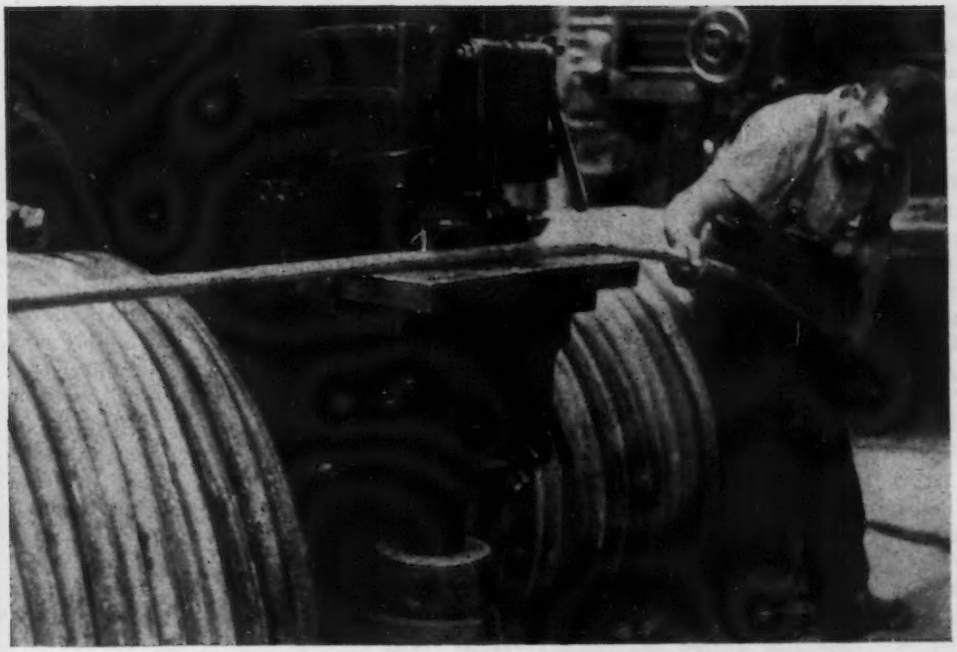

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LEFT

AFTER die straightening, the bar or rod may still be somewhat bent. It is fully straightened with a hammer or press, or more efficiently in a rolled straightener. The rods or bars frequently can immediately be used for upsetting, or for drop or press forgings. In Europe, this equipment is used to produce cartridge brass slugs.

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MOST frequently the fully straightened bars or profiles are scalped, as shown here, and subsequently drawn to a multitude of smaller sizes for all types of screw-machine work. Any cross-sectional shape without undercut can be cast and drawn to size, thus making available many hitherto unavailable hot-short metals in screw-machine lengths. Production can be stepped up to at least 1000 lb. of metal per machine hour.

centrifugal ring casting machines, an old horizontal lathe, a metal-cutting circular saw, and a draw-bench, all housed within a medium-sized room, Scheutz proceeded to turn out about 1000 tons yearly of Muntz metal and other brass analyses in rods, bars, forging blanks and rolling ingots, and a spotty supplementary output of bronzes, aluminum and magnesium alloys, stainless steels and a couple experimental runs on other alloy steels.

All this had the tendency to make the Swiss Metal Syndicate somewhat fidgety, so after a little formal sparring with Oederlin the Syndicate ended up as exclusive licensees of the Soro process in Switzerland (Oederlin excepted) on a rather satisfactory yearly royalty basis. While the syndicate has yet to build or operate a Soro unit, Oederlin turned to other countries and promptly proceeded to make a deal with the very large Government-owned armament plant of Zbrojovka in what was then still Czechoslovakia, which built a greatly improved unit for turning out bronzes and cartridge-brass slugs. Germany's largest copper and brass producer, Mansfelder Huettenwerke, at Hettstedt, likewise negotiated a license primarily on cartridge-brass production; while a smaller German firm, F. A. Lange, at Aue-Auerhammer, signed up primarily for aluminum rolling ingots. One of France's largest screw machine fabricators, E. Dubied, at Pontarlier, likewise, was soon licensed, as also was the large Italian outfit of Bombrini & Parodi, the wreckage of whose plant at Rome it is hoped that the Allied Fifty Army will soon be sorting out. A Polish government arsenal was licensed, as has also been the case in Sweden and Brazil. And Langley Alloys, at Slough near London, England, secured a license and got drawings out of Switzerland in time to get a machine built, but have been unable to get technological help to push the unit to capacity operation. All these activities have brought to Oederlin coffers some $750,000 in licensing fees, not an insignificant total for a company with but several hundred employees.

In the United States all Soro rights are owned by American . Abrasive Metals Co., at Irvington, N. J. (American patent 2,175,574, applied for in 1937 and issued in 1939), the rights being exploited with the assistance of Emri I. Valyi, vice-president of Sam Tour & Co., Inc., 65 Pine St., New York. One ring-casting centrifugal machine at Irvington is quite large, 62 in. in diameter, and for the past year or so has turned out quantities of 88-10-2 and 85-5-5-5 bronze rings, weighing approximately 500 lb., replacing sand castings for ordnance work. Currently, equipment is being set up for the experimental casting and drawing of bars and rods in a great variety of non-ferrous and ferrous alloys.

A series of pictures showing the sequence of operations of the original and rather crude Soro installation at Baden is shown herein on pages 52 and 53. Measured quantities of metal, preferably melted and refined in either an induction or arc furnace, are fed to a centrifugal casting machine. This machine is made up of readily demountable iron molds, double-faced for casting two metal rings simultaneously. The diameter of the cast ring may be about anything that desire dictates, varying from the 39-in. size at Baden to the 62-in. diameter at Irvington, or even larger. Cross-section of the ring may be a fraction of an inch or several or more inches, and may be round or any complex profile just so long as no undercuts are involved. The mold aperture is such as to give the cross-section desired as well as a pouring burr on the internal diameter wherein is concentrated the sinkhead or pipe and all chemical segregates associated therewith.

A cast is made, the mold is broken apart, rings removed, molds cleaned and a wash applied, and molds reassembled for another cast, the complete cycle requiring a comparatively short time interval. In fact, the machine can be rigged to cast every minute or so. A battery of, say, four machines is capable of casting some 2 tons of 3-in. copper alloy bar per hour. The rings then go to a horizontal lathe, which if equipped with automatic chucks and a form tool can readily remove the internal bead at a couple of swipes, leaving a correctly profiled annular cast of sound metal.

Next step in the operation is cutting the ring at one point with a small metal saw, then using an eccentric press to spread the two ends sufficiently apart to permit one end to be entered into straightening device attached to a draw-bench. This first draw-bench manipulation involves no reduction, the primary objective being to stretch the ring out approximately straight. The crux of the Soro operation is this first approximate straightening and the American patent is concerned just about exclusively with means for producing a compression and stretching of the metal adjacent to the inner face of the cast ring during the straightening, in order to obviate cracking or fracture. This compression may be carried out by a pair of pressure rollers, or more commonly (as shown in the illustration) by a hammer arrangement accentuated by compressed air, an electric motor or in some other mechanical manner, which hammer is located just ahead of the matrix or drawing ring of the draw-bench.

When straightened rods of accurate profile are desired, one end of the cut ring is placed on the device located at one end of the drawing bench. On the column of this bench are mounted rollers to guide the ring and produce slow opening thereof. The ring is so placed on the bench that its inner side is turned, for example, upwardly. One end of the ring is passed through the matrix or drawing ring and engaged by the jaw of the drawing carriage. As this pulls, a compressed air hammer located in front of the matrix rapidly strikes the ring's inner face and compresses and stretches the metal at this point.

The rod or bar is next hand-straightened under a press or trip-hammer although hand-straightening represents some penny-pinching on the part of Oederlin, and a more modern unit naturally would employ a roller straightener. At this point much of the brass rod or bar can be cut into forging blanks and sent immediately to the forge shop for fabrication, or to machining equipment for turning into final end-products. Large quantities, however, are scalped and progressively drawn to smaller sizes for a multitude of screw-machine or upsetting operations.

The Soro process, of course, brings to mind some prior art. One case readily cited is the well-known practice employed for years by the Rotary Electric Steel Co., of Detroit, whose practice is one of centrifugally casting large steel rings of ingot or billet-size cross-section. These are cut into segments and rolled or otherwise shaped to final end-products. Rotary, however, apparently has been concerned primarily with large breakdowns and has not exploited the continuous casting of small cross-sectional, practically finished bar and rod end-products, Elsewhere, scattered throughout all the basic ideas worked and re-worked with infinite ramifications and alterations in patent literature, other men have explored the art of centrifugal casting as a means of approximating continuous casting objectives. But of these ideas none resembles the Soro method.

In 1928, K. Suresch (deutsches Reichspatent 498,045) proposed a centrifugal casting unit that would spin two continuous wires. While this

machine was on paper designed for ferrous metals, it never got beyond the patent drawing stage. Years prior to that date (1907) somewhat the same end befell similar machines by F. W. Winner, Director of the Government (German) Steel Works (deutsches Reichspatents 215,352 and 215,447; American patent 950,884); and by N. Crane (American patent 1,444,953). J. M. Merle (American patents 2,129,702; 2,129,703) in 1934 proposed what he calls a film casting process, wherein metal with the latent heat substantially removed is projecting from a revolving disk in the form of a mass of separate particles (which may accumulate in a mold cavity), and subjecting each particle to a forming force while it exists at a temperature slightly below the freezing point and is plastic. Here again, it is doubtful whether such a machine has ever approached commercial operation. Other than these examples, centrifugal force has been pretty well ignored by the multitude of men who have throughout the decades been fascinated by continuous casting.

Merle's patents also deals with flowing a film of metal onto a rapidly moving metal belt, or rim of a wheel, to secure a continuously cast strip. As already mentioned, four experimental machines of this type were built and tried at the Allegheny-Ludlum Steel Co. plant Brackenridge, Pa. However, results were discouraging and the machines were subsequently scrapped.

● R. K. Hopkins method of continuously casting alloy steel against the face of a carbon steel billet, as used in the plant of Allegheny-Ludlum Steel Corp. This method is entirely different from customary continuous casting procedures, but could possibly show encouraging results in the continuous casting of steel, particularly the high-alloy types.

Being a comparative newcomer on the industrial scene the Soro process is still pretty much of an unknown quantity as regards its ultimate position among metal-working methods. It would seem, however, that if it can be an effective tool in the hands of the small entrepreneur in Switzerland, it also has possibilities of being of use to the small or intermediate manufacturer in the United States. The bulk of production so far by the Soro method has been in non-ferrous alloys, particularly in brasses and bronzes, and in the light metals. Where a plant operation involves a great amount of screw machine work, or other manufacturing producing large volumes of circulating scrap, the Soro equipment could be an adjunct making the plant to some degree self-sufficient. Also, equipment of the Soro type could possibly find a place in remote sections exploiting local scrap supplies while satisfying sectional small lot steel requirements.

Particularly in the ferrous field, the Soro bar is very much an unknown quantity. Being intermittent in operation and suffering as it does from cut in metal yield because of bar-end loss and pouring burr loss, the method in no way could be considered a competitor of the large integrated mill, mass-producing standard sizes and analyses with continuous rod or bar mills which disgorge at a 2000 ft. per min. clip. But normal steel business involves large numbers of small orders for special sizes and analyses, and here the Soro method could perhaps snuggle into a cozy niche. Similarly, certain remote areas with moderate demand and a steady flow of return scrap could perhaps support a Soro unit whereas an integrated mill would be impracticable.

One possibility the Soro equipment could perhaps exploit with belligerence would be the supplying of hot-short alloys in bar and rod form, which are not readily available now. For instance, the zinc-base Zamak alloys (95 Zn, balance Al, Cu/Mg) heretofore die cast, could be furnished as screw stock and thus compete with various brass analyses. The same applies to the 88-10-2 variety of bronzes and other high strength "foundry" alloys. Certain of the light metals, particularly the secondary metals in wrought forms could be conveniently handled with this equipment, and such is common practice in Switzerland. The same applies to certain bearing metal mixtures which usually are cast or machined to shape, but could obviously be more conveniently handled in a drawn form.

As regards ferrous metals, there are a great variety of high-alloy steel analyses that certainly could plumb attractive and expanding consumer applications if more readily or cheaply available in small lots and in a variety of accurate, drawn, intricate profiles. But, this ferrous picture a year from now can be weighed more judiciously, as so far the sketchy and inconclusive experimentation has been more imaginative than practical. Some ferrous analyses would certainly require heat treatment prior to the first cold straightening operation or subsequent drawings. But, in general, if the material should have an elonga-

Alcoa D. C. Unit

. . . First photographs of the Aluminum Co. of America's D. C. (direct casting) machine, which casts set lengths of billets on a recurrent cycle. Developed and perfected over the past 10 years by Alcoa engineers, this machine turns out the company's entire requirements of aluminum and magnesium extrusion rounds and sheet ingots in all analyses with the exception of 2S and 3S aluminum. There are now more than 60 D. C. machines in operation, all in Alcoa plants, with the exception of four licensed by other companies. The machine shown here in detail is the comparatively new unit in the plant of Extruded Metals Corp., Grand Rapids, Mich.

ABOVE

THE four water-cooled molds prepared for a cast. The molds are 10 in. deep, are made of 53S aluminum alloy. The mold coating is grease, a thread of asbestos seals the crack between the mold and the hydraulic platform, the latter dropping away as the cast progresses.

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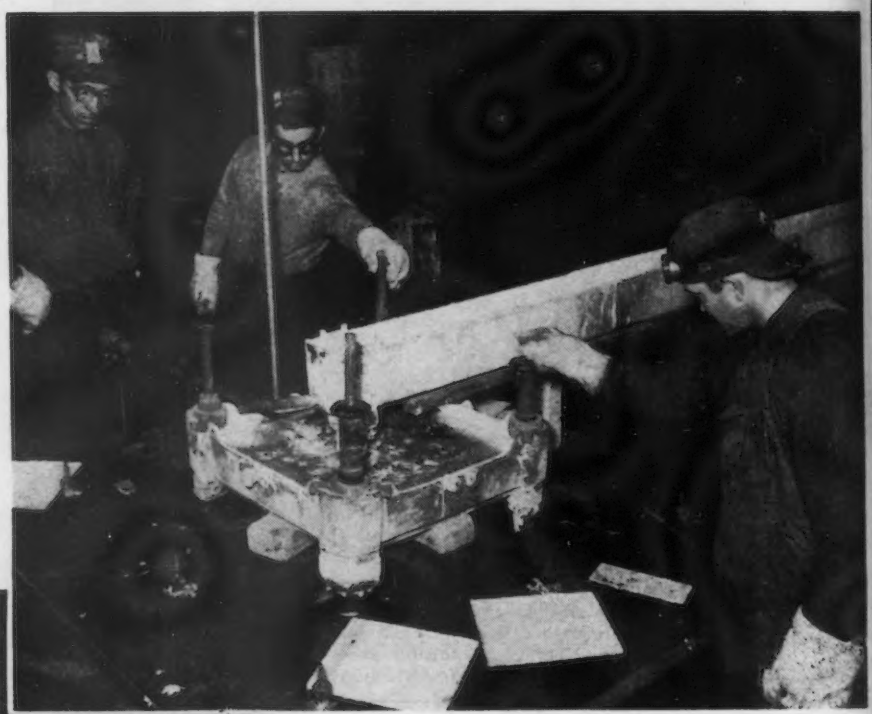
BELOW

A RUNNER carries the aluminum or magnesium from the furnace to the distributor pan. Alloy 17S, which is being cast here, has a furnace temperature of 1375 deg. to 1385 deg. F., the metal temperature in the pan varying between 1270 deg. and 1325 deg. F.



ABOVE

OVER the four molds is set a distributor pan, made of high grade cast iron and carrying four cast iron adjustable feeding nozzles. Aluminum alloy is delivered from the furnace, via the runner, to build up a 5-in. head in the pan, after which the individually controlled nozzles are opened and adjusted to feed metal into the molds at a proper speed. One "drop" casts the output of one melting furnace, after which the entire operation is repeated on tapping another furnace.

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THE hydraulic platform has started to drop away, carrying the solid 11-in. ingots with it at the rate of 3 in. per min. Note the distributor pan at the top. Some 7 to 25 per cent of the heat of fusion is extracted through the mold, the remaining heat being removed from the embryo ingot by means of water spraying onto the surface, as shown here.

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The balance of metal temperature, pouring speed and the intricate nuances of heat extraction determine the grain disposition, orientation and homogeneity.

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ABOVE

THE platform drops down until the billets are about 10 ft. long, the time interval being some 40 to 50 min. The unit easily makes five drops each 8 hr., with some 4500 lb. of metal cast per drop. Here the cast is completed, distributor pan and mold unit have been lifted off, and the hydraulic platform partially elevated so the casts can be lassoed with a crane sling.

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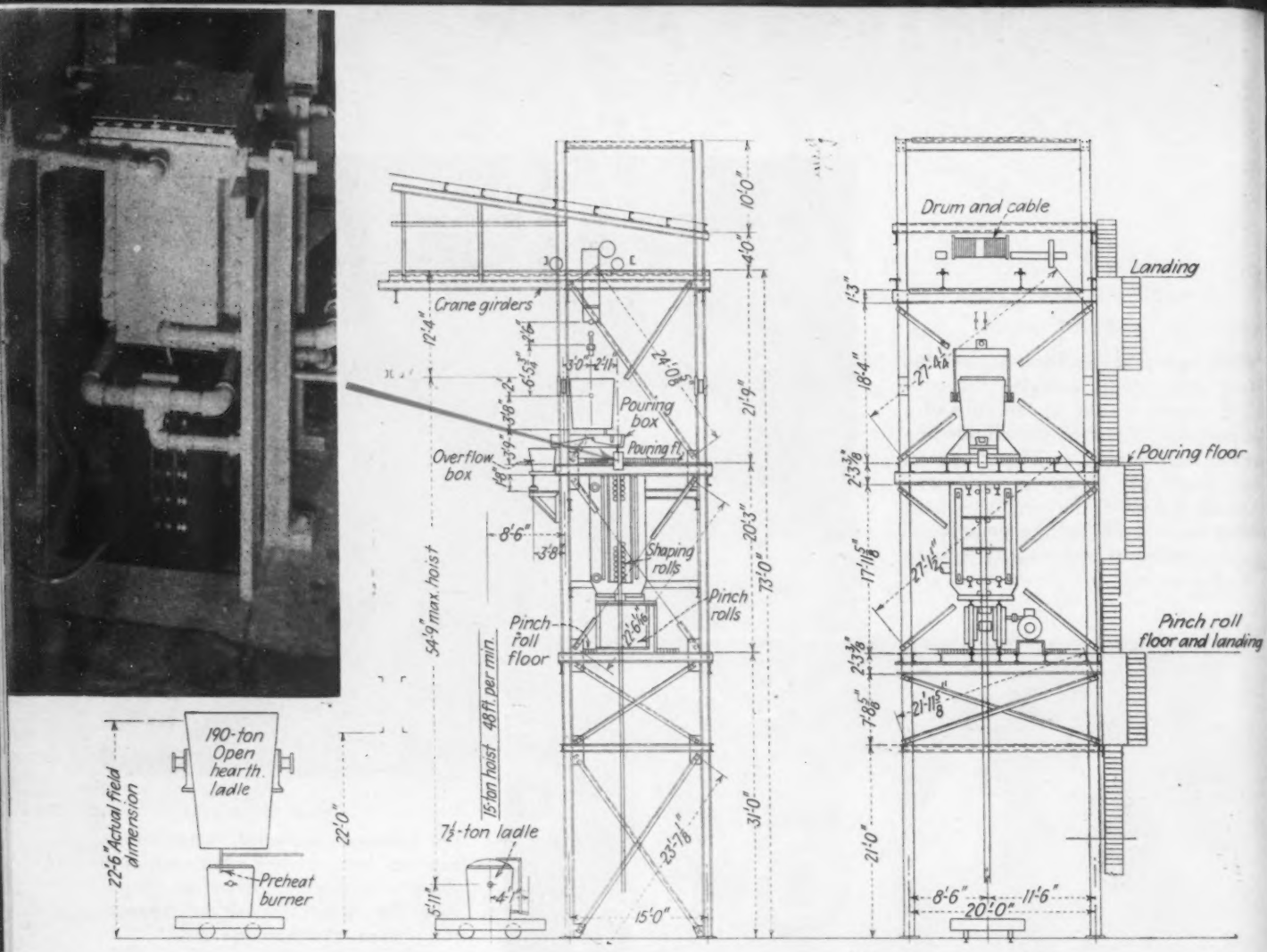
THE casting pit as seen from the crane. Two casts have been lifted out, and the remaining two are being removed. Each of these 10 ft. x 11-in. ingots go to a cold sawing machine, for cutting into billet lengths suitable for subsequent extrusion. The only metal loss is the saw chips, which are routed back into the furnace for re-melting. Casting of sheet ingots and blooming mill squares follow the same cycle.



● E. R. Williams machine, used for experimental continuous casting of steel at the Republic Corrigan-McKinney plant. The original Williams mold arrangement (picture insert) has so far been used, but the impressive Republic structure permits casting of 50 ft. lengths, which can be cut into billet sizes with an oxy-acetylene follower lance. About 40 casts have been carried out on this equipment.

tion factor of 15 to 20 per cent, it could be successfully cold-straightened in the as-cast condition. Many of the free cutting high-sulphur steels, particularly the leaded varieties that undoubtedly will enjoy great postwar popularity, may well lend themselves readily to Soro casting into bar form requiring few additional manufacturing operations prior to being chewed up by screw machines. The same applies to a number of tool steels compositions, which could perhaps enjoy the advantages of soundness, lack of ingotism and segregation, and availability in lengths and sizes heretofore unobtainable without a long series of rolling or forging operations. Even centrifugally cast tool bits, generally a high quality product, sometimes show segregation, which factor would not be a factor in the small centrifugally cast Soro section.

Pluramelt (Hopkins) Process:

The Pluramelt process used by the Allegheny-Ludlum Steel Corp. was originally developed to face carbon steel ingots with stainless, tool or other alloy steels. Either slabs or ingots of carbon steel are fastened into the Pluramelt machine and any desired thickness of alloy steel is continually built up on one or more surfaces. This procedure, which has been steadily employed in the production of carbon steel faced with stainless steel, and also carbon steel faced with armor steel, has been described in detail in THE IRON AGE issue of March 6, 1941, and is covered by Hopkins equipment and process patents Nos. 2,107,943 2,151,914; 2,151,915; 2,174,-175; 2,191,469; 2,191,470; 2,191,471.

Inasmuch as the Hopkins process is essentially a continual building-up of a slab of metal, and since this building-up can take place without interruption in a metal or ceramic mold rather than alongside a carbon steel ingot, it also can be considered a running-mate with all the other machines and procedures detailed herein.

In the photograph reproduced on page 55 herein, the unit is shown in operation while facing a carbon steel slab with stainless steel. But the functioning of the machine would be essentially the same in a metal mold. What makes this practice so very unique is that molten metal is not brought to the machine from a conventional refining unit, but rather is produced right in the mold by what is essentially a precision electric arc furnace, continuously fed with exact pre-determined quantities of raw materials which melt to form an alloy steel under a carefully controlled refining and protective slag. A moderate-sized machine can easily melt, refine and cast even the most complex of alloys at a rate of over one ton per hour, and this pace can be stepped up considerably without much difficulty.

The working head of the Hopkins machine operates under a slag blanket. The head is made up of a number of carbon steel tubes which also function as electrodes, the result being a multiple arc furnace. Down these tubes there is a continuous and precise feeding of steel constituents. The feeding equipment is made up of a number of metering machines, all controllable from a central operating panel, each meter being connected with a hopper containing a particular raw material. One hopper, for instance, may contain powdered ferrochromium; another, powdered ferrosilicon; another, ferromanganese; another, ferrocolumbium; another,

ferrophosphorus, etc. Iron powder also can be fed into the working head, to supply the iron constituent of the alloy.

There is practically no limit as regards the complexity of alloy constituents that can be metered into the system at one time, although no little skill is obviously required in determining metering rates, as each of the ferroalloys carry fractions of various elements into the system, the carbon steel contributes fractions of various elements, and each ferroalloy has a different rate of recovery. Slag constituents are usually fed by hand as required. Electrical energy naturally varies with the alloy being cast and the speed of the casting.

Steel made in this manner is very uniform. Furthermore, many analyses can be so produced that are difficult or well-nigh impossible to produce by conventional refining and metal-working methods. And the unit can, in the confines of one small room, convert raw materials to a semi-finished product that can go directly to a rod or sheet mill, or to the drawing bench. Here again, because of compactness and small capital investment a means is offered for remote operation on a scrap economy, or operation on complex alloys or short-run orders as a supplement to mass-production equipment handling bulk orders of standard analyses or sizes.

Alcoa (DC) Process:

Based solely on the criterion of tonnage of commercial metal produced, the Alcoa DC (direct casting) equipment is by far the most successful in operation in this country and has long been the object of a lively multilateral interest. Every ounce of aluminum and magnesium extrusion rounds and sheet ingots produced by the Aluminum Co. of America, with the exception of the simple 2S and 3S analyses, pass through this type of continuous casting unit. And, the only reason the comparatively pure metals 2S and 3S are still cast in tilt molds rather than in the DC machine, is that the excellent metallurgical features of DC casting is of little moment in the casting of pure metal.

Large tonnages of aluminum and magnesium similarly are handled in Alcoa-licensed machines in the plants of Extruded Metals, Revere, Bohn and Tube-Turns. Thus, it is apparent that the bulk of the country's light metals has passed from conventional casting equipment into continuous casting machines during the past several years. This constitutes quite a radical change, indeed, in production technique in a very important segment of the metal working industry. And, surprisingly enough, all this has taken place with nary a trace of a panegyric.

A sequence of photographs showing the passing of metal through the DC unit is shown on pages 56 and 57. In the particular instance recorded, the machine is casting 11-in. round billets in the 17S analysis, in lengths approximately 10 ft. long which are subsequently cold-sawed into extrusion length billets. This particular DC unit is producing at a rate of about 25,000 lb. of metal every 8-hr. turn, but this output can vary considerably depending on ingot size, number of molds being poured simultaneously, and analysis of metal being poured.

In the case of the machine shown, the 17S alloy has a furnace temperature of 1375 deg. to 1385 deg. F., and passes down a runner to a cast-iron distributor pan, equipped with four cast iron nozzles, individually controllable, each of which feeds a casting chamber. Metal temperature in the pan is, say, 1270 deg. to 1325 deg. F., and a metal head of about 5 in. is maintained in the pan.

The molds are simple aluminum (53S) tube sections 10 in. in length, set into a steel plate framework. On occasion 2S alloy is used to make the molds, and this analysis stands up to heat erosion better but will not take the bumps and tears of 52S. Copper and brass molds likewise have been used, but here again mold performance, particularly as regards tearing, does not equal the 52S aluminum analysis. About one-quarter of the heat of fusion is extracted through the mold wall, which is cooled by water sprays or jets. The remaining heat is extracted by multiple water sprays directed around the Periphery of the ingot shell.

A hydraulic platform underneath the molds drops down at a speed of about 3 in. per min. carrying the four casts with it. The entire cast (or drop) takes about 40 or 50 min. at which time the ingots are some 10 ft. or more in length, depending on the size of the particular furnace heat. At the end of the cast, the distributer pan is removed, the platform is lifted sufficiently to loop crane slings around the ingots and lift them from the pit. Subsequently the platform is again lifted to floor level, the distributer pan again set in place, and everything readied for another cast. Of course, if so desired, the platform arrangement could be replaced by pinch rolls and automatic cut-off saws in much the same manner as the Junghans (Rossi) arrangement. But since the speed of casting of each individual ingot is far lower than for the Rossi machine, such automatic cut-off equipment would be considered more of an ostentation than a practical operational adjunct.

Sometimes the molds are greased with a solid lubricant (not liquid), but this practice varies considerably from plant to plant. Of all the simple and complex aluminum alloys cast, the 24S analysis is the most critical to cast in the DC unit (which is also the case in the Junghans machine). Aud the avoidance if internal cracking and coarse constituent distribution are tied sensitively to the rate of cooling, speed of drop, and location of cooling sprays. One of the important problems in this machine, as in the case of all light alloy casting procedures is that of securing and maintaining of clean metal. But even more important, particularly when dealing with the more complex alloys, is the securing of the metallurgical structure desired. Here is where the method and degree of cooling, speed of pouring, and subtle control of all the other variables come into play to determine homogeneity, fineness and orientation of grain structure. All these factors rule whether one casting process may be superior to another. It is also equally true that the fund of practical experience in the hands of one group of technicians may be of considerably more importance in the final successful functioning of a particular machine, than, say, the design of the unit itself.

It is the backlog of experience and "know how" that bolsters Alcoa's role in the technology of continuous casting. In fact, Alcoa's patent (W. T. Ennor, No. 2,301,027, issued Nov. 3, 1942) covers not machine construction but explores all the delicate nuances of temperature gradients and operational technique.

Well over 60 DC units are in continuous commercial operation in this country. The mold sizes vary from 8 in. to 16 in. in diameter for round extrusion ingots; sheet ingots vary in cross section from 6 x 22 in. to 12 x 48 in.; and squares for blooming mill work vary from 8 x 8 in. to 18 x 20 in. in cross-section. Some of the older units cast in 90 in. lengths, whereas the newer units cast in lengths in the neighborhood of 140 in. These sizes apply for both aluminum and magnesium, although magnesium sheet ingot cross-sections are usually of the smaller size mentioned above. In magnesium, emphasis on round castings for extrusion is expanding considerably with the growing tendency to pre-extrude all strip billets, a practice for years common with I. G. Farbenindustrie in Germany.

Several years ago Alcoa experi-

mented extensively with screw-type pumps immersed in the magnesium furnace for pumping the metal over to the DC casting unit. The Germans have used this technique for some years, but Alcoa found that pump maintenance was so troublesome and costly that this feeding practice was temporarily discarded. However, in light of development of better pump materials and designs, the question of employing submerged pumps is now being re-examined. The author understands that Dow Chemical Co. likewise is experimenting with a submerged pump system for transferring magnesium from the furnace to continuous casting equipment.

As already mentioned, Extruded Metals Corp., Bohn Aluminum Corp. and Tube-Turns, Inc., have Alcoa licenses and machines in commercial operation on aluminum. Revere Copper & Brass, Inc., has a DC machine and a license for both aluminum and magnesium, and it is understood that this company has intention of becoming the largest magnesium sheet producer in the country. As regards Reynolds Metals Co., its continuous casting equipment has marked physical resemblance to the Alcoa DC equipment, but operational variations likely exist which are not known to this writer.

The fact that considerable heat is extracted from the molten metal in the DC process in a downward direction through the semi-solid metal, has already been mentioned. This, of course, is one reason for the slower rate of operation as compared with the Junghans and Williams types of machines, wherein the bulk of the heat is rapidly extracted laterally. In this respect, the Alcoa process resembles the Eldred and Poland (A.S.&R.) technique, although the latter two methods particularly accentuate longitudinal heat extraction by employing heat-resisting graphite molds rather than heat-conducting metal molds. Whether essentially longitudinal or lateral heat extraction, or some combination of the two, the final result is an infinite number of possibilities as regards casting speed, and orientation size and uniformity of crystal disposition in the cast ingot.

Any possible interference between the Alcoa process and the Eldred patents was laid to rest several years ago, when the Aluminum Co. of America and Eldred's licensing company, the Continuous Casting Corp., signed an agreement. This was some time prior to the acquisition of all Eldred patents by the American Smelting & Refining Co. That A.S.&R., in association with Chase Brass & Copper Co., secured the B. E. Eldred patents 1,868,099; 2,048,733; 2,048,734; 2,055,980; 2,135,465 to bolster and complement their patent structure (i.e., Poland-Lindner 2,136,394; Poland 2,131,070; Lindner 2,157,550; Betterton and Poland 2,195,809, seems like a desirable move inasmuch as this writer in the 1940 article on continuous casting pointed out the marked similarity of equipment, technique and metallurgical characteristics of metal produced.

Junghans (Rossi) Process:

As the writer described in great detail, in the April 4, 1940 issue of THE IRON AGE, the Junghans (Rossi) method of continuous casting is a highly orthodox unit in which casting of large billets may continue uninterrupted for days at a time, the metal being cut into billet lengths by means of a flying saw while in motion. In 1940 only one American company, the Scovill Mfg. Co., had a Junghans machine in operation, and it had already cast some 60,000,000 pounds of commercial brass, mostly in 7⅞-in. round sizes. This figure is currently approaching 400,000,000 lb.

In April, 1940, James Booth, Ltd., Birmingham, England, had just initiated production in a larger Junghans machine, casting aluminum alloys, mostly extrusion rounds up to 16 in. in diameter. Since 1938 or so, Siegfried Junghans had a unit working continuously at the plant of I. G. Farben Aktiengesellschaft, Bitterfeld, Germany, for aluminum alloy ingots in rounds up to 20 in. in diameter, and rectangular sheet ingots of approximately equivalent cross-section. At Ulm, Germany, Wieland A.G. had two units in operation, one an aluminum-brass machine primarily for 8-in. extrusion rounds for condenser tubing, the other for 24x4-in. cartridge alloy sheet ingot. Wintershall A.G., Kassel, Germany, had a machine casting magnesium alloys, and Junghans himself had a semi-commercial and developmental unit at Stuttgart.

Although most of the German plants mentioned have been bombed repeatedly over the past six months, some information coming out of the country via Switzerland since the war began leads to the belief that there has been great expansion in Junghans installations all over Germany, designed primarily to supply light-metal extrusion rounds for the aircraft industry, and cartridge brass rolling ingots for the ordnance plants. Also, some information so far unconfirmed, has it that some non-ferrous composite castings have been made; also that certain alloy steels are being handled in Junghans units, and even that some ferrous metals have been so turned out in tube form.

Since 1940, a number of larger and better engineered Junghans-Rossi machines have been built in the United States, for use primarily in the brass industry, whereas it has already been demonstrated that the Alcoa D.C. process dominates the light-metal field as the natural result of Aluminum Co. of America's long supremacy in such production. In addition to the original Scovill unit working on extrusion rounds up to a maximum 10 in. in diameter, the same company has since 1940 installed a larger machine primarily for brass sheet slabs up to a maximum width of 24 in. A neighboring company, the Bridgeport Brass Co., has installed three Junghans-Rossi machines, one for slabs up to 30 in. wide, and two for extrusion rounds up to 10 in. in diameter. The very energetic Extruded Metals Corp. at Grand Rapids, Mich., over a year ago initiated production in a unit for aluminum rounds up to 14 in. in diameter, and under the direction of the president, John Barrett, has conducted some very informative and valuable basic research on the continuous casting of light metals.

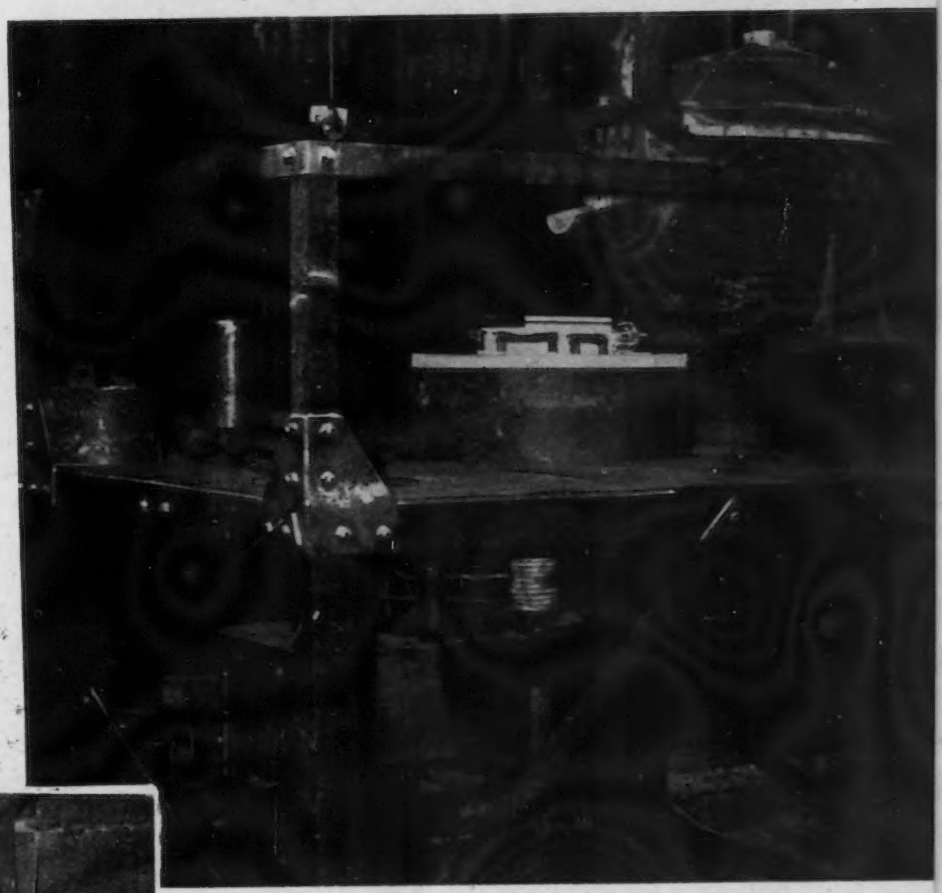
The sequence of photographs shown on pages 62 and 63 deal with the Extruded Metals Corp. unit working on aluminum alloy extrusion rounds. Delivery speed of this machine is anywhere from 5 to 20 in. per min., equivalent to some 100,000 or so pounds of aluminum alloy billets per 8-hr. turn. This is about four times the output of the Alcoa DC unit previously described herein, which is in operation at the Extruded Metals plant adjacent to the Junghans equipment. This comparison of the two methods, however, is rather meaningless, as the two machines vary considerably in size and capital expenditure involved, and each can handle a great variety of ingot sizes and analyses of metal, all of which has a definite bearing on the individual rate of output. But, since the Junghans-Rossi machine delivers a particular analysis of metal in a particular size at a considerably faster rate than an Alcoa DC mold, it is obvious that cooling of the molten metal is taking place much more rapidly.

As new Junghans-Rossi machines are developed, the casting speed is slowly rising. Scovill is now casting 8-in. diameter brass billets at the rate of 16,000 lb. per hr., or about 360,000 lb. per day, and this rate is maintained with deadly constancy for days

Bethlehem Unit

. . . First pictures of the 1941 experiments by Bethlehem Steel Co. in continuously casting 4-in. steel rounds in a small test unit (right) at the Lebanon, Pa., plant. This exploratory investigation is typical of others quietly conducted by various producers.

SURFACE condition of the continuously cast steel was poor (above), including fissures, break-throughs and laps. Thermal cracks were particularly severe for analyses above 0.30 carbon. Optimum speed for this experimental lay-out (right) was 10 ft. per min.



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A 300-LB. arc furnace delivered steel to a reservoir (left), wherein temperature was maintained by Globar units. Pinch rolls pulled the cast steel from the mold (right), the latter being of copper and water-cooled by means of copper tubing fastened to the outside wall. Thermal deterioration of the mold was no problem.

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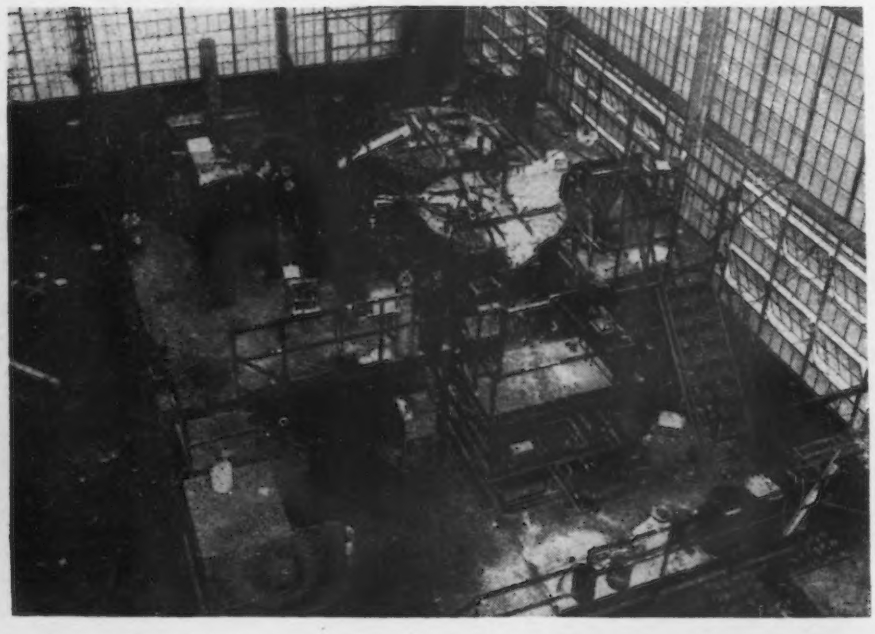
Junghans (Rossi) Unit



. . . First views of the 14-in. Junghans machine at Extruded Metals Defense Corp., Grand Rapids, Mich., sometimes known as the Rossi machine after the owner of world (excluding Germany) patent rights. This is the largest (and newest) machine for rounds in the U. S., although a 16-in. unit has long been in operation in England. Junghans' continuous casting machine is orthodox in that with an aluminum or magnesium alloy cast once started it may progress for days without interruption, the solid ingot being automatically cut into billet lengths by a flying (sic) saw.

ABOVE

TOP view of the Rossi machine, showing the two electric holding furnaces to the rear, with electrically heated feeding tubes leading to the oscillating casting mold just in front of the control panel.

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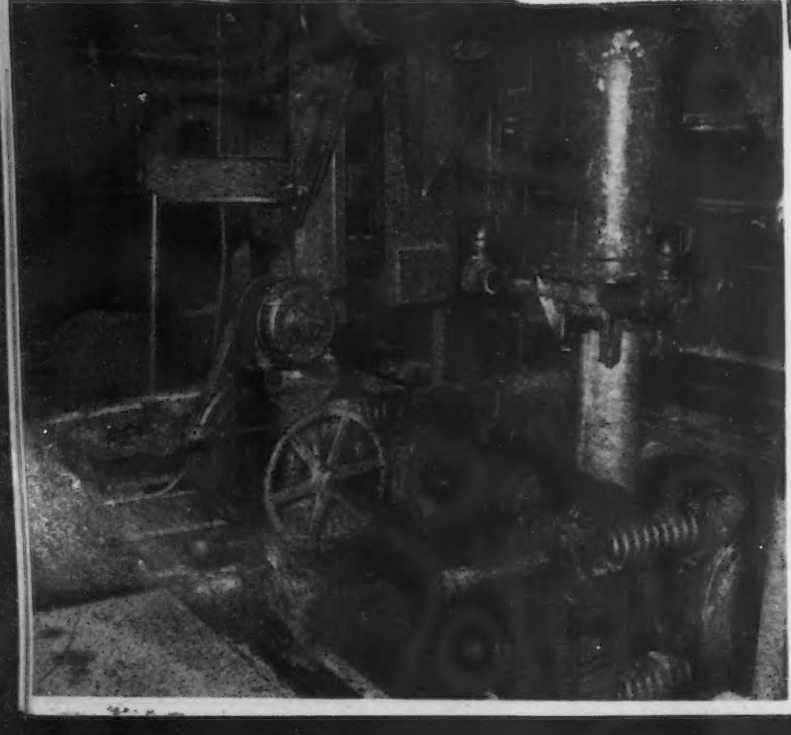
A LADLE of molten aluminum alloy has come via crane from the melting furnace and placed on the tilting platform in the background, to fill one holding furnace while metal from the other furnace is forced by gas pressure through the feeding tube into the mold chamber. The proud gentleman in the back, with hat, is Irving Rossi.



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LEFT

UNDERNEATH the casting platform, the pinch rolls pull a solid 14-in. round of aluminum alloy out of the secondary water spraying chamber at top of the photograph. Delivery speed ranges from 5 to 20 in. per min. A tight fitting round rubber squeegee keeps water from escaping from the spray chamber and also dries the metal surface, which here is quite cool. The bulk of the heat extraction takes place rapidly in the mold chamber.

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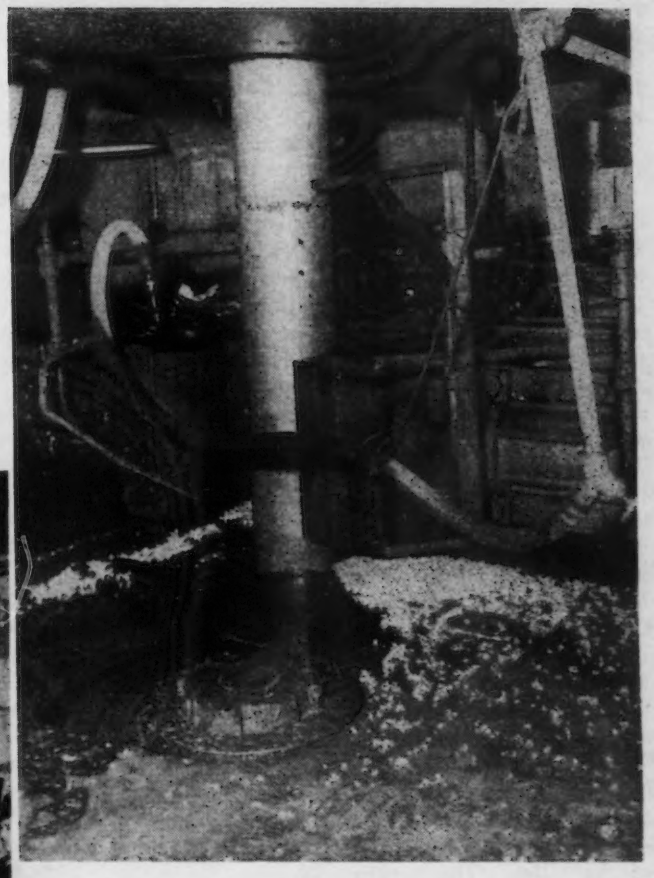
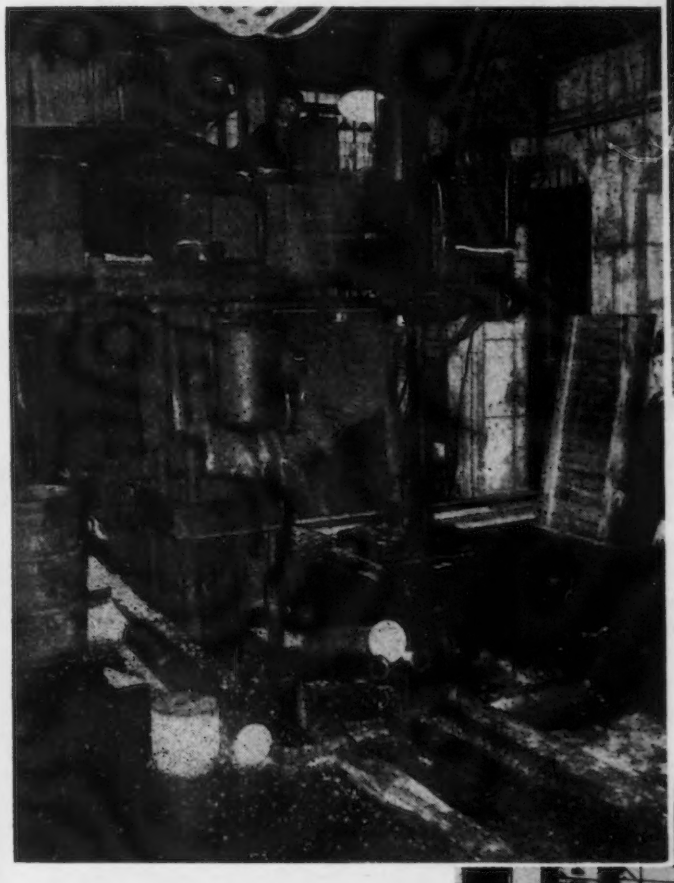
RIGHT

UNDERNEATH the pinch rolls is the cold sawing section. This saw unit, especially designed by Rossi Continuous Casting Co., travels down with the metal, with clamps automatically engaging, and the saw cutting in any predetermined length. All saw movements are automatic and follow consecutively once the operator throws a switch which engages the saw to the billet.





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LENGTHS of billet, following cutting, drop down onto a chute which directs the billet onto the floor, where a workman piles them. A billet is shown here just as it is about to leave the chute to flop over onto a floor trough. The only metal wasted is the saw chips, shown here scattered over the floor, which are swept up for remelting.

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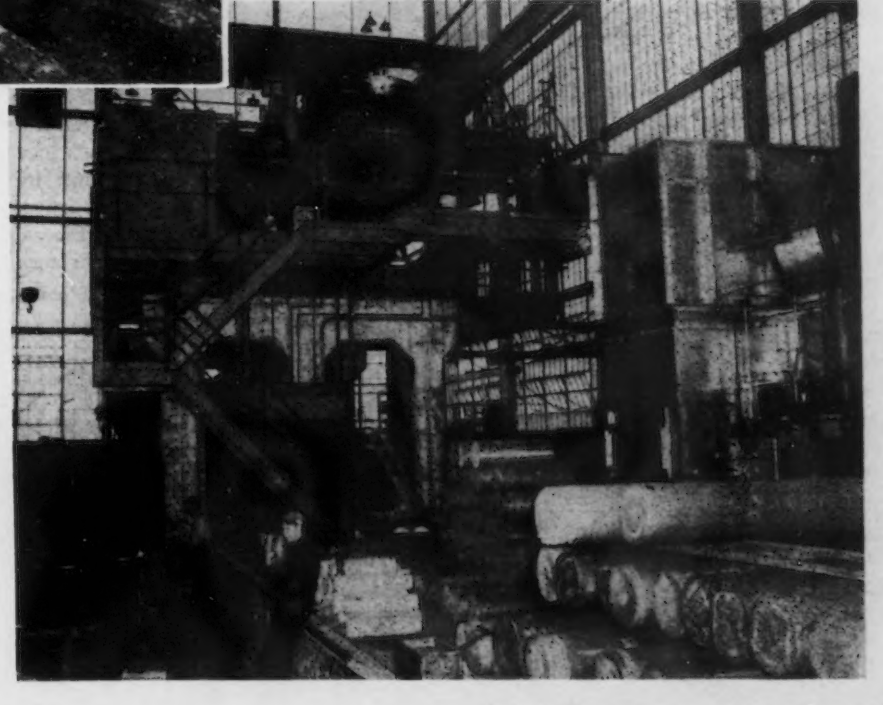
THE Rossi machine is rather impressive in size, as shown here in side view. In the foreground are long ingots of metal from the Alcoa D. C. machine; farther back are the sawed billets from the Rossi machine. And just so no casting method is slighted, at the extreme left, on a lower level, is an old-fashioned casting turntable, which carries small water-cooled billet molds.



on end. At the Bridgeport Brass plant in Indianapolis this hourly rate has been greatly increased though not for such extended periods. The rates for aluminum run about 40 per cent higher. Each machine normally requires three men for operating it.

As has previously been described, the Junghans mold is ordinary commercial drawn copper tubing, with about ⅛-in. wall section and about 10 in. long. When casting aluminum, an aluminum-alloy mold may be used, much in the same way as does the Alcoa machine. The mold of the size desired is placed in a water jacket, a pack seal being used top and bottom. The cooling water does not feed through this jacket under high pressure, but flow is altered occasionally during casting and, of course, likewise is varied considerably with casting speed or with size of metal section being cast.

The conspicuous and unique characteristic of the Junghans machine is that the entire mold, water jacket and all, moves down at the same speed of the emerging billet for a distance of several inches, and then snaps back to its original position, the snap-back speed being about three times the speed of the billet. The function of this movement is to prevent a constantly changing section of the mold wall to the molten metal, which in turn facilitates freezing a skin onto the molten metal. The infrequent relative movement between mold and metal also tends to minimize skin ruptures. Of course, a great deal of investigation has been given to establishing optimum figures for amplitude of the mold cycle and speed of snapback for different types of metal being cast, cross-section of ingot being cast, speed, etc.

After the cast ingot leaves the mold (or, rather the mold moves upward away from the cast metal), the metal obviously requires considerable additional cooling. This takes place in a circulating body of water, fully enclosed and at the bottom of which is a rubber squeegee seal, which prevents water from running down the ingot and messing up everything below the casting floor. The ingot, as it emerges from the squeegee, is both cool and dry. This secondary cooling arrangement is considerably better than the open sprays used on the Scovill machine which was described in 1940. Another improvement made on a recent machine is the discarding of two holding furnaces for the molten metal, in favor of one, and the use of gravity feed rather than gas pressure feeding through U-tubes, all of which is a trend toward greater simplification and less expense and maintenance.

As shown in the photographs on page 62, the cast ingot passes from the pinch rolls to a lower platform level, at which point a specially designed flying saw slices off the metal in accurate billet lengths, which drop down a skidway to be manually piled.

The structure of the cast metal from the Junghans-Rossi machine is fine-grained, uniform, and controllable in orientation within fine limits by means of adjustment and variation of speed, intensity of cooling, and balance between mold cooling and lower chamber cooling. Long lengths which are perfectly straight attest to the uniformity of cooling and crystallization.

All patent rights to the Junghans equipment throughout the world, excepting Germany, are owned by Irving Rossi, 40 Wall Street, New York. Junghans has been a prolific inventor, and has a multitude of patents covering the successful machine described and appurtenances thereof, and also a number of transcendental whimsies. While many of the foreign patents are of little moment, the numbers of American patents may be of interest, and are as follows: Nos. 2,135,183; 2,135,184; 2,218,171; 2,225,414; 2,225,415; and 2,225,416.

Of the processes at present commercially successful for casting nonferrous metals, several use multiple mold chambers and cast through each at a very slow rate, whereas the Junghans-Rossi machine casts at a very fast rate through a single mold chamber. In the former, the slow speed permits a great deal of the heat to be extracted longitudinally through the metal itself by means of under-the-mold water sprays; and, even though the freezing metal is in constant motion against the mold wall, the relative between the two is so slow as to not form folds and laps. Furthermore, the slow speed permits pretty accurate control temperature gradients, through intensity and location of below-the-mold water sprays.

In the Junghans-Rossi process, however, all the metal passes through one mold chamber, and at a speed that may approach 20 in. per min. This imposes a very severe set of casting conditions.

The Junghans-Rossi mold is relatively quite short, on the order of 10 in. But, more important, due to the method of oscillating the mold, so that the whole mold moves downward at the same speed of the ingot and returning upward at a much faster rate, there is no relative movement between the billet and the mold for the greater part of the casting period. Furthermore, the ability of the mold to freeze a skin on the liquid metal is greatly increased because, due to the mold oscillation, the molten metal line of highest heat intensity is constantly being projected against a different (and cooler) section of the mold. As the area of maximum heat application moves, it gives the previous area of application an opportunity to cool. This is also an argument in favor of making the mold stroke as long as the design of the machine permits, for the longer the stroke the longer the time interval before the maximum heat application returns to a given point and the more time for this point to cool.

The cooling process once begun must continue. This is especially true with respect to the surface. The cooling of the metal (and the resultant freezing) must proceed with an increasing tempo, not only because any interruption of the cooling process has a detrimental effect on the interior of the ingot but because it will have a similar effect on the surface. Shortly after the billet is formed, it shrinks away from the surface of the mold. In the Rossi machine the vertical distance of contact at times may not exceed 3 in., and when casting at a rate of, say, 18 in. per min., the ingot loses contact with the mold in about 10 sec. And, it is during this period that the ingot shell must attain such structural strength as to hold firm during subsequent cooling operations and withstand any frictional effect of the mold surface snapping-back to its starting point.

Only a relatively small amount of heat is absorbed by the mold by radiation during that period while the ingot is still within the mold but with the ingot shell shrunk away from the mold wall. Some additional cooling takes place by water working up into this area from the water chamber located just directly below the end of the mold. However, all this cooling may not be enough to stop the interruption of the cooling process, and it is only the high speed of the ingot down into the cooling sprays that carries it through this short critical zone and prevents the heat from the molten interior from flowing out and softening the shell, with resultant bleeding or spill-outs.

In the high-speed Junghans-Rossi machines, this short period of loss of contact with the mold surface has been one of the most critical of operational problems. In the case of aluminum alloy ingots, the exudations due to ingot shell disintegration are composed of an alloy of aluminum with a lower melting temperature than the alloy of billet being cast. In brass this disintegration may take

the form of an excess of zinc vapor being given off which is deposited on the mold surface or on the ingot itself. Coolant working up into this gap from the water chamber minimizes any interruption of the cooling process and opens the way to the higher speeds of operation.

The ability of the mold to absorb heat during the freezing of the molten metal is related to its ability to rapidly transfer the heat it has absorbed to the coolant on the other side. By placing cooling fins or vanes on the coolant side of the mold it is possible to increase the heat transfer capacity of the mold to more than double. The coolant should be applied to the inside mold surface so that its action will be to wipe away the heat as it reaches the coolant side. The water should be applied tangentially to the inside mold surface in order that the entire volume of coolant circulates around the outside of the mold. Quiescent pools are to be avoided.

In the Rossi machine the molten metal is introduced into the mold underneath the surface of the metal pool, and when brass is being cast a reducing atmosphere is flooded on the top of the molten metal to minimize oxidation. By means of a distributor underneath the metal surface, the incoming metal is flowed radially over the area of the ingot in such a way as to reduce turbulence to a minimum. Furthermore, such distribution assures a homogeneous metal and shortens the time during which the metal is in motion and begins to cool and consequently reduces the possibility of segregation. The radial pouring also projects the incoming metal against the cold surface of the mold and increases the rate of cooling. All mold lubricants used so far leave a deposit of carbon on the mold face while burning, and for this reason the addition of lubricant around the edge of the molten metal pool is as sparing as possible. This cuts down the excessive formation of a carbon deposit which would roughen the mold surface and encourage sticking and also would act as an insulator to reduce heat transfer.

All these factors enable the Junghans-Rossi machine to handle large sections of non-ferrous metals at high speed, the surface of the ingots being smooth, free from laps and folds, and with no bleeding of eutectic. Furthermore, the metal structure in the interior of the ingot is free from shrinkage crevices and porosity, and segregation is minimized. And, the crystal structure is fine and homogeneous in both the lateral and longitudinal directions.

A.S.&R. (Poland-Eldred) Process:

At the American Smelting & Refining Co. plant, Perth Amboy, N. J., an experimental - commercial continuous casting machine has been in operation for some four years, turning out large tonnages of oxygen-free (phosphorized) copper billets up to 3 in. in diameter, which are sawed into 50-ft. lengths for use by A.S.&R., and Chase Brass & Copper Co., primarily in the production of seamless tubing. Surface condition of this metal is very smooth and free from flaws, the metal is very dense and uniform, and in general it is a very high quality product superior to that produced in prior conventional equipment. In fact, the operation is so satisfactory that A.S.&R. will likely install many more similar casting units in a new plant within the next year.

Back in 1940 when a previous report was given on this process, B. E. Eldred had several experimental machines in operation turning out pretty much the same type of metal. Even though Eldred had cast metal section up to 6 in. in diameter, his process was like the A.S.&R. method in that attention was concentrated in metal sections 3 in. in diameter or smaller. Since 1940, however, A.S.&R. and Chase have purchased all the Eldred patents to add to their own patent structure. (See p. 60). Insofar as the writer knows, Eldred's original experimental machines have been scrapped.

Both the Eldred and A.S.&R. (Poland) machines were described in detail in the previous article in THE IRON AGE, April 4, 1940. Both processes specify the use of graphite molds with no lubrication, and because of the use of thick graphite molds the heat transfer was very slow. Thus, the casting rate is equally slow, being on the order of 6 or 8 in. per min. maximum. A curious characteristic of the Eldred and the Poland patents is that they specified diametrically opposite modes of thermal transfer from the molten metal to the coolant. Whereas Eldred particularly specified withdrawing the heat down through the congealing metal, Poland equally specifically designated withdrawing the heat through the mold walls and not through the congealing metal. In any case the difference in opinion is of little moment now.

Because of Eldred's longitudinal heat withdrawal, the crystal orientation of the metal was longitudinal, and because of the slow heat withdrawal the crystal sizes were sometimes enormous. In one instance a copper rod was produced as a single crystal some 32 ft. in length. All this favored the production of metal that was gas-free and very dense, and frequently with exceptional mechanical properties. And, often the metal surface may be so perfect as to make unnecessary a scalping operation prior to subsequent hot or cold working. The A.S.&R. machine back in 1940 was turning out metal with equally good physical and metallurgical characteristics.

A.S.&R.'s machine is essentially a refractory (graphite) chamber holding a sizable quantity of molten metal, with automatic temperature recording auxiliaries for holding the metal within close limits and with facilities to protect the metal against oxidation. In the bottom of this chamber are set four graphite dies along with their individual cooling arrangements. The continuously cast rods are individually withdrawn from these dies and either reeled or cut into lengths by saws. The machine works continuously, day and night, and if after several hundred hours of service a particular graphite die should wear it can be removed and a new one replaced without interrupting the casting in the other dies. The multiple die arrangement of course overcomes the disadvantage of the very slow production of a small cross-sectional cast of metal from each die, and the unit as a whole has a most respectable hourly output, on the order of several thousand tons monthly.

The machine is not in the least temperamental in operation. Naturally, there are innumerable fine points of die design, and inter-relationship between cooling location and speed, and casting speed which have by trial and error been built up into a volume of plant "know how," all of which is a major factor in successful operation of the equipment. A.S.&R. quite understandably shows little inclination to discuss this "know how" publicly.

Williams-Republic Process:

All the machines so far described have dealt with the continuous casting of non-ferrous metals in ingot or billet form. Whereas the Junghans-Rossi machine has been used in Germany for the casting of steel, surprisingly enough no effort so far has been made to give it a whirl for steel in this country.

In the continuous casting of steel ingots or billets in the United States, by far the bulk of experimental work has been carried out by the Williams Engineering Co. of Latrobe, Pa., under the direction of Edward R. Williams, president of Vulcan Mold

(CONTINUED ON PAGE 138)

Heat Treating

By WAYNE MARTIN
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Sperry Gyroscope Co., Brooklyn

BERYLLIUM copper is a relatively new alloy and has found greater application in the United States than in any other country. This factor is a most fortunate circumstance, for by proper use of this metal certain things can be done in building military equipment that would otherwise not be possible.

Beryllium copper has many good qualities. It can be formed or machined in the soft state and then by a simple low temperature heat treatment, hardened to about 400 Brinell with an ultimate strength of about 200,000 lb. per sq. in. In this condition it will have good electrical conductivity—about 25 per cent that of copper. It has excellent wear characteristics against hardened steel in places where there is a relatively small amount of motion. Under such conditions it often operates well under conditions of poor lubrication and sometimes at somewhat elevated temperatures. Most important is that it can be made into an excellent spring. Its good spring properties are derived from its low drift rate under load, its ability to maintain its

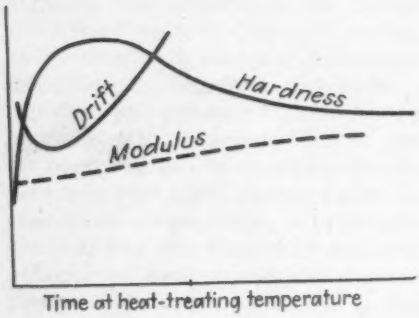

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FIG. 1 — Precipitation hardening curve of beryllium copper alloy given a proper solution anneal. Precipitation of the gamma phase, a 12 per cent beryllium compound, in very small particles produces maximum hardness, and strength. Larger gamma particles, caused by prolonged heating, reduces hardness and strength. Courtesy of R. W. Carson.

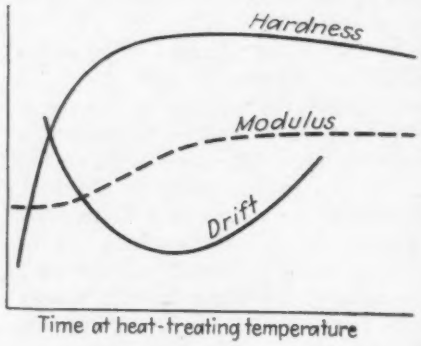

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FIG. 2 — Precipitation hardening curve of beryllium copper improperly solution heat treated. Excessive grain boundary precipitation causes a rapid falling off from peak hardness. Rate of drift is never low and modulus of elasticity increases very slowly. Courtesy of R. W. Carson.

BELOW

FIG. 3—Microstructure of an as-cast 3-in. diameter billet of 2.0 per cent beryllium and 0.3 per cent cobalt. The light areas are beta constituents, a eutectic composition containing 6 per cent beryllium, and were the last to freeze. The light mottled zones are of low beryllium alpha solid solution and were the first to freeze. Dark areas contain 2 per cent beryllium and appear dark because of gamma precipitation. At 75 diameters.

BELOW

FIG. 4—Microstructure of beryllium copper of the same composition as in Fig. 3 but cast in a 1-in. diameter chill mold. Low beryllium alpha rods are long and narrow and beta particles are very small. At 75 diameters.

Beryllium Copper

high endurance value under conditions of corrosion that would bring a steel spring to a lower value, and in some cases to its low modulus of elasticity.

Like in any other metal or alloy, certain troubles are encountered in the production and use of beryllium copper alloys. Beryllium copper can be melted under much the same conditions as other copper-base alloys. The 2 per cent beryllium alloy is hot workable at temperatures from 1475 deg. F. to about 1000 deg. F., but it must be considered as a very tender hot working alloy. Small variations in conditions under which the billets are cast effect its hot working properties to a marked extent. These properties are also affected by extremely small amounts of certain impurities.

For additional data on beryllium copper, see "Predicting Spring Performance of Beryllium Copper Wire and Strip," by H. G. Williams, THE IRON AGE, *July 8, pp. 62-67.*

To obtain best hot working properties, beryllium copper must solidify during casting at a relatively high rate. This requires a low pouring temperature and a slow rate of pouring. Under these conditions refractory beryllium oxide defects often form on the surface of the cast billet, which if not completely removed will cause surface laminations in the final rolled or drawn product. Billets must be cast sound, for any pipe in the billet as cast will not weld during hot rolling and will result in center porosity in bars or center laminations in strip. Contaminations of lead, tin, calcium and magnesium will cause hot shortness if present in quantities of a few thousandths of a per cent. After hot rolling, the alloy is given a solution anneal at about 1475 deg. F., followed by quench in water. In this condition it will have a hardness of from 100 to 130 Brinell and can be cold rolled or drawn up to about 70 per cent reduction in area, at which time it must be given another solution anneal and quench to soften it for further cold reduction. It can be bright annealed in dry atmospheres of hydrogen, cracked ammonia or cracked city gas having a dew point of around —40 deg. F. With hydrogen or cracked ammonia atmospheres having a high dew point, a clean red surface is often obtained. This is probably due to the formation of a thin layer of beryllium oxide which has been selectively oxidized before the oxidation of copper. This type oxide is very difficult to remove and has a very abrasive action on forming dies. When annealed in an atmosphere consisting of the products of combustion of city gas, a heavy black scale of copper and beryllium oxide is formed. This is loosely adherent and is easily pickled off.

The precipitation of beryllium copper takes place at temperatures of 525 deg. F. to 700 deg. F. In this temperature range it is believed the cold work in the material undergoes recrystallization. Properly made material can be formed and maintained to very close tolerances during this heat treatment. During the precipitation hardening operation the material

. . . The excellent properties of beryllium copper depend to a large extent on its proper heat treatment. Effects of solution anneal and precipitation hardening on the physical properties and microstructure of the alloy are discussed in detail. The advantages of ternary over binary alloys are also evaluated.

FIG. 5—Hot rolled structure of a 1-in. diameter rod rolled from a 3-in. diameter cast billet. Beta segregation has become beta stringers which are difficult to dissolve in solution heating because alpha solid solution surrounding them has become saturated. At 75 diameters.

FIG. 6—Microphotograph of the same rod as in Fig. 5 but hot rolled to a ¾ in. diameter, annealed and quenched. Light beta stringers are surrounded by light areas of saturated alpha solid solution which has formed from beryllium dissolving out of the beta stringer during previous heating. at 45 diameters.

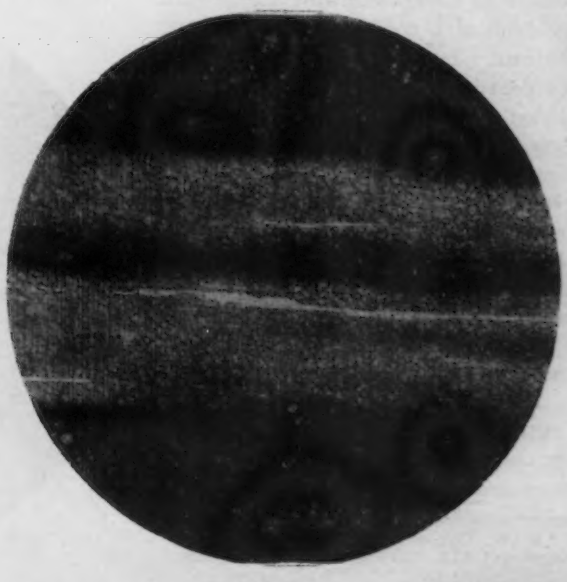

FIG. 7—Shown here is a beta stringer which has remained in a hardened finished part fabricated from cold drawn ¼ in. diameter rod. These beta stringers cause the material to work harden very quickly, making cold forming operations difficult. At 500 diameters.

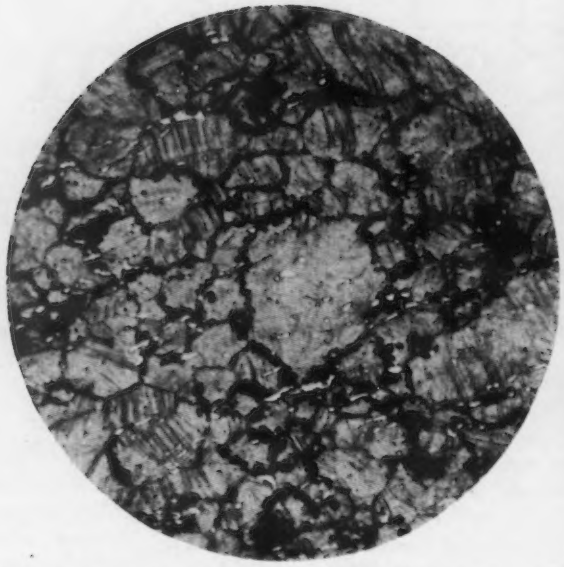

FIG. 8—Precipitation of gamma solid solution in the grain boundaries, as illustrated here, causes severe warping during heat treatment. At 500 diameters.

becomes stress relieved, and this probably accounts for its excellent dimensional stability under load. To obtain optimum properties, the heat treatment must be carefully controlled.

Solution Anneal

The heat treatment is carried out in two steps, both of which are equally important. The first occurs at the rolling mills. An alloy of 1.80 per cent to 2.20 per cent beryllium is heated to 1400 deg. or 1450 deg. F. and held at this temperature until nearly all of the beryllium is in a state of super-saturated solid solution; that is beryllium atoms space at random among copper atoms in the space lattice of copper. The metal is then quenched in water and remains as super-saturated alpha solid solution at a hardness of around 100 Brinell. It can be precipitation hardened directly from this soft condition to around 380 Brinell. However, maximum elastic properties are developed if a certain amount of cold reduction of the material is applied between the annealing operation and the final precipitation hardening treatment. Therefore, strip or wire is usually rolled or drawn to final size after the solution anneal and sold by the rolling mill at a hardness of 160 to 200 Brinell. After forming, the precipitation hardening heat treatment is applied. Properly made alloy will harden at a given temperature over 525 deg. F. to about 400 Brinell; and then with prolonged time at temperature, will begin to soften.

The hardening is due to the precipitation of the gamma phase, a 12 per cent beryllium compound which forms in very small particles. If the heating is prolonged, the gamma particles will coalesce into larger ones and strength and hardness fall off. A typical good precipitation hardening curve is shown in Fig. 1. If the temperature is at 600 deg. F., maximum hardness is obtained at about 1 to 2½ hr. If, however, the temperature is at 700 deg. F., maximum hardness is usually obtained at 15 to 20 min. At this elevated temperature, a greater degree of stress relief is obtained; and as a result, the short time higher temperature treatment is preferable. During this heat treatment, the modulus will increase from 15,000,000 lb. per sq. in. to 18,500,000 lb. per sq. in.; and the drift rate (room temperature creep) will drop to about 30 per cent of its value as cold worked and then will increase with further heating. Electrical conductivity will increase from about 16 per cent to 25 per cent that of copper at maximum hardness; and with prolonged heating, will increase to about 31 per cent at a time when the hardness has dropped off and the drift rate has increased. Material properly made will respond to heat treatment in such manner as to obtain maximum hardness, tensile strength, modulus and minimum drift rate.[1]

If material is improperly solution

FIG. 9—This 0.072 in. wire was cold drawn and then hardened. Cold work after annealing tends to retard grain boundary precipitation. At 500 diameters.

[1] R. W. Carson, Vol. 37, Part II, 1937, pages 661-673, "Measuring Elastic Drift."

FIG. 10—Grain boundary precipitation in a binary alloy of 2 per cent beryllium and the remainder copper. At 45 diameters.

FIG. 11—Ternary alloy containing 2 per cent beryllium and 0.3 per cent cobalt shows no precipitation in the grain boundaries in the as-cast condition. At 45 diameters.

heat treated, a precipitation hardening curve such as shown in Fig. 2 is often obtained. Here peak hardness is reached in a short time and then falls off quickly. The drift rate never reaches a very low value and the modulus increases slowly. With this type response to heat treatment, it is not possible to obtain optimum spring properties. This is caused by insufficient solution, resulting from too low a solution temperature or too short a time at temperature. It can also be caused by non-uniform precipitation of the gamma phase.

Good and bad results obtained from beryllium copper often result from the past history of the material, and a study of micro-structure can be used to a certain extent to interpret these results.

Microstructure of Cast Metal

The normal cast structure of beryllium copper contains three or more phases. The structure of a 3 in. diameter billet is shown in Fig. 3. The sharp light areas are beta constituent, a eutectic composition containing about 6 per cent beryllium. This was the last metal to freeze. The light mottled zones in between are of low beryllium alpha solid solution. This was the first metal to freeze and contains so little beryllium that only slight precipitation of gamma has occurred on cooling. The dark areas around the beta particles contain about 2 per cent beryllium and appear dark as the result of gamma precipitation which occurred on cooling. The three small particles looking like Turkish characters are beryllium cobalt intermetallic compound. If the rate of solidification is greater, a finer cored structure is obtained. Fig. 4 shows the cast structure of metal of the same composition but cast in a 1 in. diameter chill mold. Here the low beryllium alpha rods are long and narrow and the beta particles are very small. A casting with such a fine structure containing 2 per cent beryllium can be made into a nearly homogeneous alpha solid solution by single heating at 1475 deg. F.

Cast structures resulting from a solidification rate considerably slower than that applied in the structure shown in Fig. 3 will have very large beta segregations. These segregations add to the difficulty in hot working and also remain undissolved as the billet is hot and cold reduced toward its finished condition. The hot rolled structure of a 1 in. diameter rod rolled from a 3 in. diameter cast billet is illustrated in Fig. 5. Here the beta segregation has become a beta stringer. Large beta stringers are difficult to dissolve in solution heating because the alpha solid solution about them becomes saturated.

Fig. 6 shows the same rod as in Fig. 5 after it had been hot rolled to ¾ in. diameter, annealed and quenched. The light beta stringer is surrounded by light areas of saturated alpha solid solution which has formed from beryllium dissolving out

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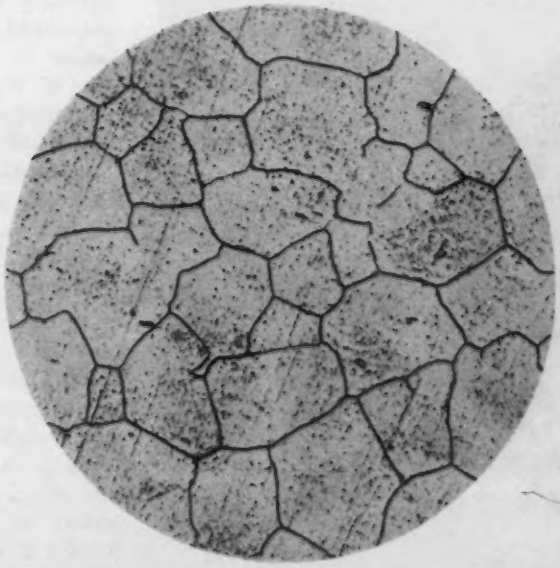

FIG. 12—Grain size of a 2 per cent binary alloy solution annealed for ½ hr. at 1475 deg. F. Photomicrograph above is of 0.050 in. strip at 75 diameters.

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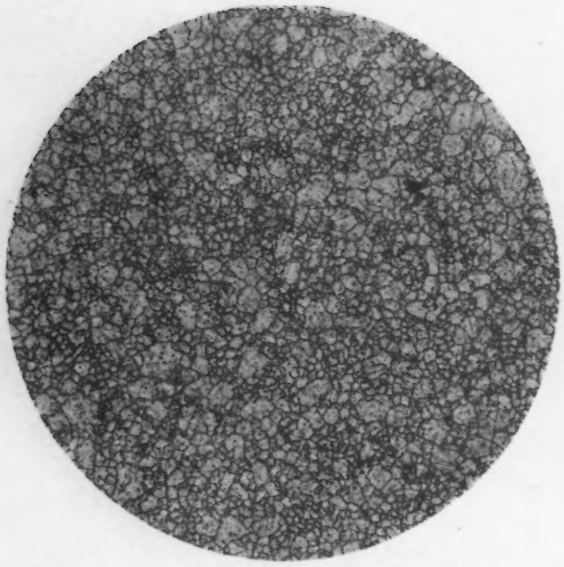

FIG. 13—Grain size of ternary alloy annealed under the same conditions as in Fig. 12, showing grain refining effect of cobalt additions.

FIG. 14—Fine grained strand anneal material shows the best response to heat treatment and allows for close dimensional control during hardening. At 75 diameters.

of the beta stringer during previous heating. No more solution of the beta stringer can take place until diffusion of beryllium from the light saturated alpha area into the dark unsaturated alpha area has occurred. Fig. 7 illustrates a beta stringer remaining in a hardened finished part fabricated from cold drawn ¼ in. diameter rod. These beta stringers cause the material to work harden very fast and often result in difficulty in cold forming operations.

Beryllium copper can be held to a very close dimensional tolerance during heat treatment if the hardening operation is carried out in fixtures. In some cases, however, severe warping occurs. This is usually the result of gamma precipitating on the grain boundary, as illustrated in Fig. 8. The cause of this structure is the subject of considerable controversy. We feel that it results from the solution heat treatment of large coils, in which case the rate of heating through the precipitation hardening zone is very slow and the cooling rates during the quench is low due to the large mass of the coil. It has been our experience that strip or wire quickly solution heat treated and quenched in a single strand will not show precipitation on the grain boundary after the hardening operation. Cold work after annealing tends to retard precipitation on the grain boundary. The structure obtained after hardening of wire properly strand annealed is shown in Fig. 9. This material showed the type hardening response as that in Fig. 1 and was very satisfactory.

In this country all of the 2 per cent beryllium copper alloy sold is as a ternary alloy with small additions of colbalt or nickel. In Germany, binary alloy was used before the war. When properly processed, good results can be obtained with either the ternary alloys or the binary alloys. Certain advantages are offered by the use of the ternary alloys. The mechanical properties obtained from heat treating castings of binary alloys in the 2 per cent range are usually very low. This was found to be the result of a gamma precipitation on the cast grain boundary which causes fracture to occur on overloading along the cast grain boundary, showing a large grain cast structure. Fig. 10 shows the grain boundary precipitation in a binary casting. Ternary alloys of nickel, cobalt or iron usually are free from such structure. The absence of this cast grain boundary precipitation seems to be tied in somehow with the presence of the small intermetallic compound of beryllium with nickel, cobalt or iron, which are shown in Fig. 3. Fig. 11 is a low power micrograph of a ternary alloy containing cobalt and shows no cast grain boundary precipitation. Tensile strength as high as 165,000 lb. per sq. in. can be obtained from heat treated castings having this type structure.

In wrought alloys, nickel, cobalt and iron additions act as grain refiners during solution annealing. The grain refining in effect probably is the result of restriction to grain growth caused by fine particles of the intermetallic compound of nickel, cobalt or iron. The grain size of binary 2 per cent alloy solution an-

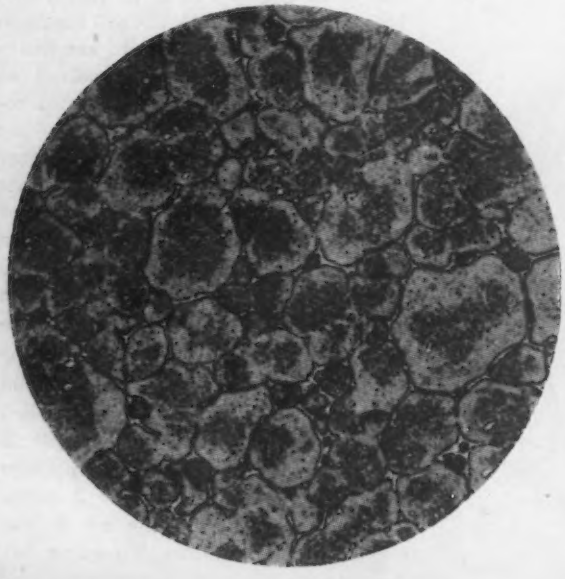

FIG. 15 — Overheated wire showing the formation of beta constituent at the grain boundary. Such burned material should be discarded. At 100 diameters.

nealed for ½ hr. at 1475 deg. F. is shown in Fig. 12 while Fig. 13 shows the grain size of ternary alloy of 2 per cent beryllium and 0.3 per cent cobalt annealed under the same conditions.

The control of grain size can be accomplished in strand annealing of binary alloys, and the use of a grain refiner is not so necessary if the final solution annealing operation is carried out as a well controlled strand heating process. To obtain best response of heat treatment combined with the maintenance of very close dimensional tolerances during hardening, fine grained strand anneal material as shown in Fig. 14 is preferable. In this case, unusually high elastic properties were developed by applying a 60 per cent cold reduction between the strand annealing operation and the precipitation hardening heat treatment.

If the alloy is overheated to about 1600 deg. F. during solution annealing, beta constituent begins to form at the grain boundary, as shown in Fig. 15. Such material is burned and should be discarded. One contributing factor to poor hardening properties not shown by microstructure is too low a quenching rate after solution heat treatment. This can usually be detected by conductivity measurements, the values being somewhat higher than obtained with the proper rate of cooling.[2]

To sum up, the best beryllium copper is obtained by using a fast rate of solidification during casting. This requires cold pouring and preferably small size molds. If this is not consistant with casting shop practice, considerable care need be exercised by the rolling mill during the hot working operation to insure that all beta stringers from the cast structure are dissolved. The final solution annealing carried out by the rolling mill need be of such a quality that the metal after hardening will show little, if any, grain boundary precipitation and good uniform response to heat treatment. Good results have been obtained by batch annealing of coils over a period of years, but strand annealing offers many advantages.

[2] R. Carson, Metals & Alloys, Dec., 1943, p. 1315, "Making Beryllium Copper Behave."

Conveyors Aid Reconditioning of Tool Sets

A TOOL control system, designed to increase the efficiency in grinding, inspecting, storing, maintaining, salvaging and disbursing of cutting tools, has enabled the Grand Rapids Stamping Division of Fisher Body to maintain high machine production, consistently raise the quality of the finished product and decrease the amount of scrap and deviations as well as increase the life of cutting tools.

The system is a recognition of the fact that cutting tools will last much longer and perform better if they are regularly inspected and sharpened. To accomplish this goal, the plan provides that sets of tools be scheduled to the machines according to the operation to be performed on those machines. Each tool set comprises the entire complement of tools necessary to complete an operation or series of operations at one machine, such as a radial drill. The sets are stored and transported in compartmented wood trays. The length of time which a set of tools remains on a job is determined by an actual performance check which governs the replacement cycle. Grinding and disbursement cribs, along with the tool bank storage, are centrally located within easy reach of all machine areas. Dispatching of all tools to and from machines is controlled by the production scheduling department and deliveries are made by routed trucks on a regulated schedule.

Tools returned from a job are received at a window of the grinding room and are placed on a power-driven slat conveyor which feeds them to a roller conveyor, in front of which is an inspection bench. Here damaged, broken and dull tools are removed and a tool replacement slip bearing the codes numbers of the tools is placed in the container, which is identified by operation number.

The boxes are then pushed on a second roller conveyor at 90 deg. to the first. Two attendants pull them off to a bench and replace from finished stock the tools withdrawn in the first section. This replacement section can be seen in the background of the photograph. Loaded trays are pushed on a second power-driven slat conveyor, parallel to the first and serving the disbursement crib. Two attendants remove the trays and place them on storage racks on both sides of the conveyor. Tool sets withdrawn from the racks for disbursement are again placed on the conveyor and carried to the disbursement bench. The end of the line is a short section of roller conveyor onto which the trays are discharged. The entire conveyor system is U-shaped and roller conveyors and power-driven slat conveyors are used in tandem.

Dull tools, after being removed from the sets, are ground and honed, rigidly examined, sealed and replaced in the bank stock to wait future use. The bank stock and the tool set storage areas are separately screened. The tool control system has enabled the Grand Rapids Stamping Division to maintain high production sharpening of precision cutting tools as well as conserve tools and reduce lost time in manhours and machine hours on the production operations.

HERE is shown the mechanical conveyor that carries filled tool sets from the bank stock area, where individual tools have been placed after grinding, to the disbursement crib for storage until needed on a job.

Lubrication in Deep Drawing

. . .What occurs on the die and metal surfaces in deep drawing, and the part that lubrication plays under the pressures and temperatures encountered in this operation, are investigated in this article by Crowther, Liddiard and Marwood, from the British Sheet Metal Industries.

UNTIL recent years the quality of lubricants was judged either by "feel" or by the more certain test of trial on the actual operation in the press. For deep-drawing, the lubricant is so used that existing data or testing equipment such as serves for ordinary lubrication are not applicable. Actual working conditions are so variable that the results are not reliable or reproducible. However, methods of testing are being developed which give comparative information on certain characteristics, though not of the lubricant as a whole.

Blanking can be performed successfully on most metals without much attention to lubrication; mere passing of the strip through oil rollers is often quite sufficient. This also applies to the production of small simple shapes, particularly when the work does not pass through the die but is ejected in the direction of the punch. In drawing, however, the presence of oil or something "oily" does not guarantee success; quality and suitability of the lubricating medium will be the deciding factors.

The art of deep drawing involves so many factors that it is never a simple matter to isolate immediately the cause or causes of difficulties when these arise. It is probable that in many cases a thorough investigation into the lubricant employed would produce immediate and profitable results. Good metal will not draw well with a poor lubricant, but it can be shown that in many cases a poor metal can be drawn when the lubricant is capable of taking on the additional burden. In deep drawing or other operations where similar extreme pressures exist, the pressure developed and, more particularly, the temperature produced so decrease a film layer of lubricant depending only on viscosity, as to produce metal contact rapidly.

This breakdown of fluid lubrication under these conditions is influenced by the distribution of this pressure rather than by the total pressure operating, as will be seen later. It does not appear, incidentally, to be influenced greatly by the relative speeds of the moving surfaces. To summarize, there are three main influencing criteria which result in a completely different form of lubrication from that required, for example, in lightly loaded bearings and described as fluid lubrication. These differences are: The total operating pressure; the distribution of that pressure; the temperature rise.

The situation, therefore, which exists during the actual deep drawing operation between the surfaces of the punch, cup, and die would more accurately be described as boundary lubrication, since the film of oil or lubricant remaining will be at most a few molecules thick, while in unfavorable conditions it will be so extended as to break and produce metal-to-metal contact with fouling of the punch or die.

It might be helpful at this stage to examine the conditions which exist in deep-drawing operations; these support the view that boundary lubrication is, in fact, the only condition which can exist. In the first place it is essential to realize that the metal of the die and that of the blank or cup to be drawn are not plane surfaces. They may be polished according to engineering standards, but even with the low-power of a microscope they are seen to be uneven, with pits and peaks covering the surfaces of the metal. Even the most highly polished surface obtainable would still be covered with considerable undulations in terms of molecular dimensions, and high-pressure lubrication is concerned with molecular forces.

Hence when two metal surfaces are placed in contact they will meet only where the peaks of the undulations project, and the *actual* area of contact is therefore an extremely small proportion of the *apparent* area of contact. Dr. Bowden, of the Laboratory of Physical Chemistry, Cambridge University, has indicated that in an apparent area of one sq. ft. of highly polished metal surface, the actual area of contact amounts to only 0.0001 sq. cm.

Before considering the situation at these regions of contact it is necessary to consider the condition of the

molecules at the surface of the metal. The molecules of any material, whether solid or fluid, have a surface attractive force which will extend outwards from the air-metal interface. Within the body of the metal this molecular attraction is represented by the force of cohesion when the molecules themselves satisfy the attractice forces of their neighbors. These forces of attraction are a result of the proton and electron arrangements within the atoms, and at the surface, where the mutual forces are uneven, a zone of attraction exists, pulling and holding other materials to the metal.

Oxygen Film Produces Adsorption

Oxygen from the air may be attracted to the surface, and a thin layer of the gas will be held on to the metal surface, producing the condition known as adsorption. It is on this physical principle that boundary lubrication depends, making deep drawing possible. The region of attraction is very limited, and at the most is only 1 to 3 Angstrom units thick. The rate at which the attractive force falls off as the distance increases from the molecules at the surface is very great, and beyond the distance stated above is negligible.

Air, water, grease, in fact anything which is available, will be attracted towards the metal surface, and will give some degree of protection to it. Two metals coming into contact are almost bound to have adsorbed layers, and at first, if there is no pressure, there will be no actual contact between the metal molecules. But this is largely conditioned by the degree of attraction involved, since materials which are only loosely adsorbed will soon be displaced by others more readily attracted by the surface molecules of the metal. For example, an adsorbed surface of oxygen would most probably be immediately displaced when metals came into contact, since the metal-to-metal attractive force would be greater.

Molecular Fusion

Provided, then, that the adsorbed layer is not mechanically disrupted, it will remain intact until some other material for which the metal surface molecules have a greater affinity comes within the zone of attraction. When this condition arises the initially adsorbed material will be displaced in favor of the latter. Molecular fusion occurs, the binding forces being a result of the electrical charges within the atoms. If the new material which becomes adsorbed is another metal, this molecular fusion is tantamount to welding. In other words, at the areas of true contact, fusion of the two metals occurs, inducing the state of friction. In deep drawing, one of the surfaces (that of the die) is fixed, the other (that of the surface of the metal being drawn) is moving. Hence it is to be expected that with sufficient load the welding which develops at the metal contacts will immediately be disrupted; the greater the number of such contacts, the greater the load required to disrupt, and thus to maintain continuous movement of the work.

If the metal surface is rough, the drawing load will be localized in a number of very small areas, resulting in extremely high pressures at these places. Under these circumstances the possibility of rupture of the lubricant will be greatly increased.

This leads to the conclusion that it is preferable to draw a metal the surface of which is smooth.

In most cases the retention of this smooth surface throughout various operations is not possible, as it is destroyed by annealing in an oxidizing atmosphere and by subsequent pickling. With bright annealing, however, the smooth surface can be retained through many operations.

There is yet a further factor to consider—that of the temperature which develops at the area of drawing and which is a probable cause of many drawing problems. It has been shown in a series of experiments by Bowden that when one surface slides over another there is considerable temperature increase with increasing load. Temperatures may easily reach the melting point of one of the metals even at comparatively low loads. He and his co-workers were able to show that the material which had the lower melting point is the one which will be polished, the other being little affected. If the temperature developed reaches the melting point of one of the metals it will remain at that temperature, and that metal will be polished. This has a very important bearing on deep drawing, since a melted metal surface will flow into the undulations of the higher melting metal and result in a greater area of actual contact. This material upon resolidification takes on a new form, previously crystalline metal becoming amorphous and depositing in the pits between the melting peaks. It forms what is known as the Beilby layer, and in such a form alloying of metals occurs more regularly. It has been shown, however, that temperature and not hardness is the controlling factor, and even soft metals can polish harder metals, provided the former have a higher melting point.

It is useful at this stage to consider the "stick-slip" theory which has been put forward by Bowden and successfully demonstrated by him and his coworkers. Two metals sliding over each other do so in an action which is not continuous, but takes the form of a "stick-slip" motion. In other words, the motion of the one metal over the surface of the other is intermittent, pausing, then moving, pausing again, etc.

Stick-Slip Theory

The frequency of the cycle of slipping and sticking varies with the metals in contact, and it appears to be influenced by the melting points of those metals. Thus with hard metals in contact with each other the frequency is large and regular. With a softer metal in contact with a hard metal there is a similar frequency, but larger differences in the friction are to be noted.

These workers have gone so far as to suggest that the frequency of the "stick-slip" cycle may be responsible for inducing vibrations in the machinery itself on the principle of resonance. More recently Bowden and Leben claim that this "stick-slip" action is more prominent with mineral oils, and is inclined to disappear with fatty materials, particularly as the chain length of the molecule increases. In other words, the "stick-slip" motion only appears with non-adsorbed or weakly adsorbed lubricants.

The important point is that a higher rate of wear is to be observed with "stick-slip" sliding than with continuous sliding.

A further interesting observation was made by Bowden and Hughes, who stated that the co-efficiency of friction of two absolutely clean surfaces sliding upon one another is often 20 times as great as when the surfaces are cleaned by normal methods. They consider that a film several molecules thick must appear between the metals before the normal co-efficiency of friction is to be observed.

Basic Lubrication Requirements

The basic requirements for successful deep-drawing lubrication can now be stated. These may be enumerated as follows: (1) The area of actual contact between the metals must remain very small; (2) the metals should be prevented as far as possible from coming within the zone of attraction of each other; this might be

done by employing a material for which each metal has a greater affinity than it has for the other metal; (3) the temperature must be kept to the minimum by, for example, the presence of sufficient low melting metal.

Consider the practical developments of this summary. It has been suggested above that if a material could be found for which the metals have an attractive force greater than that which they have for each other it could prevent metal-to-metal contact. Such materials are to be found and are used in deep drawing lubrication, one example being a long chain fatty acid, when the attractive force is due to the acidic grouping at the end of its chain. It is an essential requirement that the successful material shall have some combining group within its structure, but this is not a question of unsaturation, since stearic acid, a fully saturated acid, is an excellent drawing medium, provided pressures are not too extreme.

The paraffin hydrocarbons are not suitable, since they have no combining group, and while they are readily adsorbed on to a metal surface, they are easily displaced by another metal surface. Other straight mineral oils, including the naphthenic mineral oils, suffer from the same defect. Since these latter contain cyclic groupings, they are unsaturated and also cannot form a film of laterally oriented molecular chains on the metal surfaces. They may therefore be expected to have even less lubricative effect than the paraffin hydrocarbons which are capable of forming such chains.

The long chain fatty acid referred to above will be oriented upon the metal surface in such a way that the hydroxyl grouping is directed to the metal, and the long chain of hydrocarbon groupings away from it. This latter will protrude for some 20 to 30 Angstrom units from the metal, and hence beyond the zone of attraction of the metal surface molecules. It will not be absolutely vertical, since the polar groupings will force the non-polar chains farther apart from each other than would otherwise be the case and their lateral forces upon each other would not be so effective. Hence they will take up an angle to the vertical if the polar grouping is not too large in view of the repelling forces which will operate on the non-polar part of the molecule. It will then keep other molecules, including those of other metals, at a sufficient distance from the first metal to prevent fusion, and this quality is amplified by the fact that the other metal will bear a similar film. There is most probably some bending of the long chain, and this will be more pronounced at the greater pressures. Fusion of the long chains will also develop, but the linkage produced will be weaker than that between the hydroxyl grouping and the metal, so that when the metal moves on a break will occur at the bond of the hydrocarbon groups, this fracture being produced with a comparatively small loading. This theoretically ideal condition is, however, qualified by a further factor—the extreme pressures occurring in deep-drawing operations. These are sufficient to force the metal surfaces so close together that the adsorbed film is squeezed out and the metals are brought within each other's zone of attraction.

It must be remembered that these pressures, although usually judged as operating over the whole apparent area of contact, are really operating over the very minute area of actual contact; and under these conditions the load per unit area is extremely high. As a direct result of this the temperature increases until it reaches the melting point of the lower melting metal, and will then remain stationary; this temperature will cause a flow of the metal, to give greater area of contact, and thus a greater distribution of this high temperature. Under extreme pressures, then, seizure will result, being at first apparent as scoring and then as seizure between tools and work. Simple long chain fatty acids under these conditions are quite unsuitable, and the problem is therefore more complex than might at first appear.

It has been previously stated above that if a metal can be used which melts at a lower temperature than the metal of the tools or of the drawn work, the temperature will remain at this lower melting point, provided there is sufficient of the selected metal remaining in the solid form. Once it has all liquefied, the temperature will again commence to rise. Physical considerations, such as viscosity, melting point, boiling point, etc., limit the choice, but certain metals have proved extremely successful, for example, lead and tin.

Other methods are employed to overcome the problem, one being the employment of a protective film often inorganic in character, such as the chloride and sulphide films on the metal surfaces.

A further method makes use of solid adjuncts. These, being solid, have internal and cohesional forces which show considerable resistance to disruption of the metals. Most of these solid lubricants have crystalline structures, and the crystals may be disrupted. The more successful of these solid lubricants show easy cleavage of the crystal along one plane parallel to the direction of movement of the metal surfaces. The general methods of lubrication are summarized in Table I, which is designed to indicate relatively the physical forces upon which lubrication depends.

Under ideal conditions, the film of lubricant will be continuous and unbroken over the whole surface of the metal, particularly, that is, as far as the outside of the cup is concerned.

When breakages of the film occur, difficulties result which may take the form either of scoring down the side of the cup, or of tearing at sharp corners where, by reason of the break in the film, the metal has ceased to flow freely and has piled up until it is torn by the force over the die edge.

It is a short-sighted policy to omit lubricant from the punch and inside of the cup. This is often done, since

TABLE I

Types of Lubrication

(1) No lubrication.	Very light loading (cart wheel on the road).
(2) Lubrication:	
a. Fluid lubrication.	
1. Simple fluid buffer with non-oriented molecules.	Light loading.
2. Long chain molecules showing orientation.	Medium loading (gear wheels, light pressings).
b. Boundary lubrication.	
1. Polar chains becoming adsorbed at polar head, with oriented chains.	Heavy loading (deep drawing of thin metals).
2. Use of protective films.	Extreme loading (deep drawing of heavy gauge metal, or hypoid gears).
3. Use of lower melting adjuncts.	
4. Use of solid adjuncts.	

it is possible to draw the metal like this with apparent success. The first and most obvious difficulty is in removing the cup or tube from the punch, particularly when the wall is thin. A more lasting effect is the excessive wear of the tool. On considering the condition, it is apparent that similar forces are in operation on both punch and die, although the greatest movement takes place on the die surface. The increase in temperature of the tool in question is offered as further evidence of the need for overall lubrication.

These remarks apply also to reforming operations, although it is rare in such cases to find lack of lubricant. The authors have experience of instances where in severe reforming operations fouling of the punch has been caused by inadequate lubrication.

Various measures may be taken to amplify resistance of the lubricant to extreme pressures. It will be sufficient if it be remarked here that under the extreme conditions of boundary lubrication present in the deep-drawing operation, the relationship between the lubricant and the metal will depend very largely upon the affinity of the lubricant for the metal, producing an adsorbed film of lubricant upon the metal as a result of atomic linkage between the substances.

Hardening and Brazing in Tocco Unit

A SIMPLE change in design of a Tocco induction fixture made possible a rapid "three-in-one" heat-treating operation that is saving steel and relieving forging facilities for a midwest automotive manufacturer producing diesel engines for Army tanks. Used on vital engine balancer shafts, the Tocco induction treatment hardens a bearing surface and a thrust face while brazing a collar to the shaft. The entire three-way operation is done simultaneously in 41 sec.

Originally, the bearing end of the balancer shaft was machined down to size from bar stock which is the same diameter as the collar which forms a thrust face at the end of the shaft. It was necessary to copper plate the end and to carburize the piece.

A second method for producing the shaft was introduced specifying hot upsetting from nominal diameter stock, machining the piece, Tocco hardening the bearing surfaces and grinding to finish.

Then a third production procedure was adopted by redesigning the Tocco inductor to include brazing a separate collar to the shaft, as shown in Fig. 1. It is this current operation that has effected savings in material and time. Although the hot upsetting process used in the second method described effected an economy in steel, the current use of a separate collar has helped to alleviate critical forging facilities and save on machining time as well. Furthermore specifications calling for Tocco hardening eliminated carburizing material, the time required for packing, and several previous operations.

The collars are now turned out quickly on a screw machine, carburized separately, and then positioned on the shaft preparatory to heating with the brazing material placed in a groove in the collar. The collars are 2 1/16 in. in diameter with a face 9/32 in. deep. Heat for hardening the bearing surface, which is 1½ in. o.d., and 2⅞ in. wide, reaches 1550 deg. F. At the same time, the thrust face adjacent is also heated to that temperature in order to penetrate to the silver solder for the brazing of the collar. The water quench does not affect the braze, as the inductor is designed to act as a shield.

Thus, as the bearing surface and the thrust face are hardened, the collar is brazed uniformly to the shaft. The entire application requires only 41 sec.

A hardness of 56 to 58 Rockwell C on the thrust face and 50 to 55 Rockwell C on the bearing surface is effected, and there is no distortion. The Tocco machine shown in Fig. 2, on which these operations are performed, is a standard 80-kw. two-station unit.

FIG. 1—Cross-section showing the three areas on the balancer shaft which were treated in one 41-sec. operation. A bearing surface and a thrust face are hardened while a collar is brazed to the shaft.

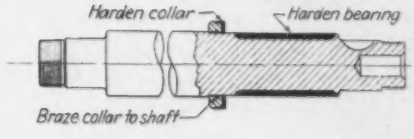

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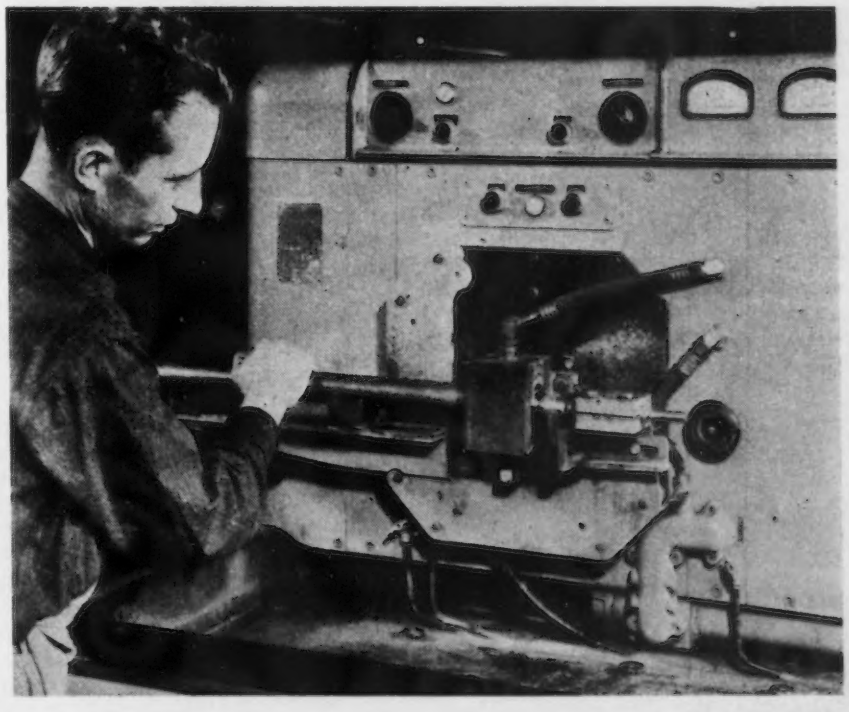
FIG. 2—Operator inserting balancer shaft in the Tocco inductor block for hardening of two bearing surfaces and the brazing of a collar to the shaft in one 41-sec. cycle. The small block at the end of the shaft is merely a steady rest.

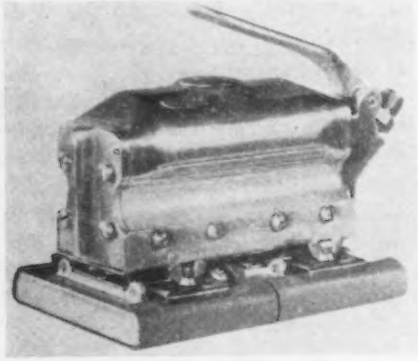


New Equipment . . .

. . . . Finishing

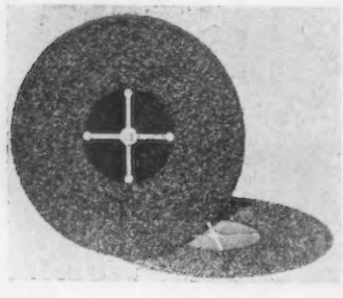
. . . Recent developments in cleaning and polishing machines, corrosion control material, protective coatings and industrial paints are described and illustrated in the following pages.

DESIGNED and built for hand sanding and finishing operations, the sander manufactured by *Sundstrand Machine Tool Co.*, Rockford, Ill., is available in a light weight Model 1000. It has a speed of 3500 oscillations per min. and can be equipped with different types of sandpaper attachments for large or small, wide or narrow, flat or curved abrading surfaces on metal, wood, plastics or composition. The machine is controlled by a palm lever fitted at top of the machine housing. When gripped, the reciprocating action of pads starts and stops automatically upon release.



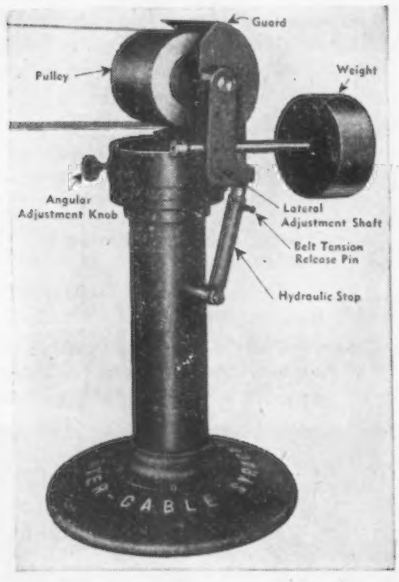
Abrasive Sanding Disks

THE abrasive sanding disks manufactured by *Fibre Abrasive Corp.*, 1129 East 74th Street, Chicago, are made of aluminum oxide grit firmly bonded with a special heat-resisting resin to a chemically treated, super-pliable fiber back. The "Marvel" disks are said to be extremely hard and tough and require less cleaning and replacement than conventional glue-bonded disks. They are available in diameters ranging from 6 to 30 in. and in all grit numbers.



Backstand Idler

TO adapt grinding and polishing lathes to abrasive belt grinding, the *Porter-Cable Machine Co.*, Syracuse, N. Y., has developed the Model ABS backstand idler, which makes possible the use of an endless metal cutting abrasive belt. The unit is recommended for grinding welds, flash, generating radii, flat and edge work, cleaning up, polishing, etc. Belts up to 6-in. width can be used.



Magnetic Polishing Lathe

THE Lima Electric Motor Co., 2801 Findlay Road, Lima, Ohio, has put on the market a magnetic polishing lathe designed to eliminate the difficulties encountered in holding odd shapes or sections. It holds parts from 1½-in. diameter up on a magnet chuck and leaves no marks on highly finished parts. The unit is furnished with either single or two-speed motor. A self-contained rectifier unit supplies d.c. current to the chuck. Interchangeable faceplates and register plugs make it adaptable to various types and sizes of work. It can be supplied in either pedestal or bench type.

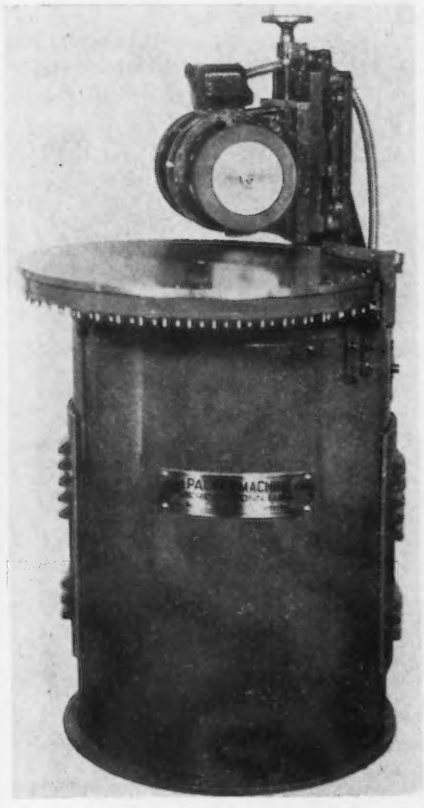
Polishing Lathe

A COLLET head lathe unit for polishing, finishing, filing and burring operations has been announced by the *Reynolds Machinery Co.*, Prov-

idence. Any standard motor may be used and a single lever control for starting, stopping, applying brake and opening and closing collet is provided. The machine uses a No. 5c Rivett collet. The spindle nose is threaded to provide for use of a 4-in. chuck.

Deburring Machine

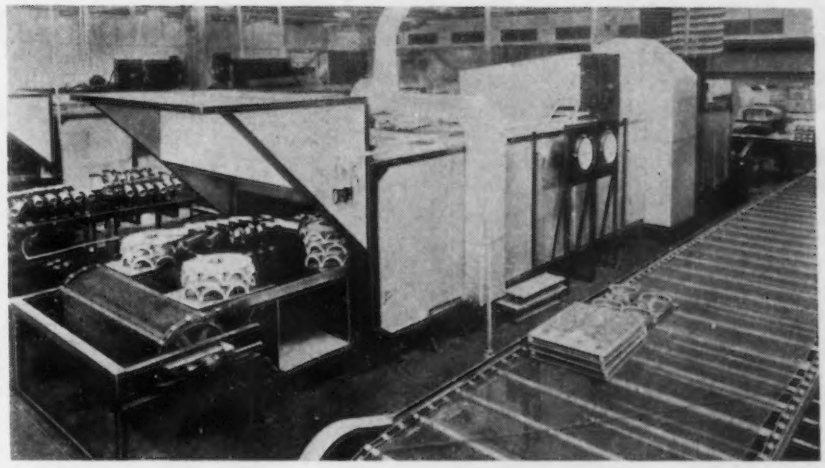
THE No. 7 Packer-Matic machine has been developed by the *Packer Machine Co.*, Meriden, Conn., for continuous rotary grinding, deburring, polishing or buffing. Its construction is rugged and compact with built-in flexibility for a wide range of



sizes. A second head or wheel can be attached for producing multiple operations. Attachments are provided for automatic discharge of work and hopper feeds can be used wherever practical. Wheels may be mounted either in vertical or horizontal positions.

Paint Baking Oven

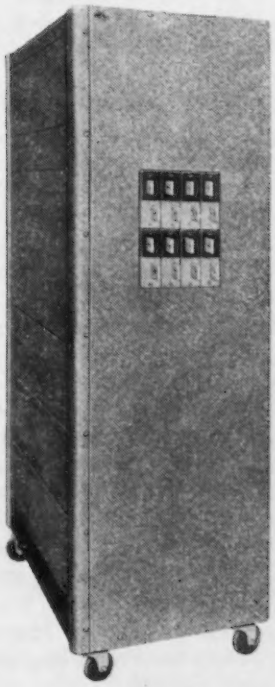
A CONVEYOR type oven for baking paint on miscellaneous aluminum alloy parts of different sizes and weight has been built by the *Gehnrich Corp.*, 35-10 Skillman Avenue, Long Island City, N. Y. The dual panel steel insulated oven houses a flat screen belt continuous conveyor 40 ft. long x 5 ft. wide, which is supported on cross flights fitted into heavy duty roller chain driven by



sprockets through a speed reducer and a variable speed drive. Heated air at 150 to 225 deg. F. is supplied to the oven in sufficient volume to volatilize the paint solvents. The temperature is held within close limits by automatic indicating and recording controllers and heating protection is provided by safety switches for shutting off heating load and motor circuit in the event of power or fan failure.

Plating Rectifier

THE Model 86 multi-plater, put on the market by *W. Green Electric Co., Inc.*, 130 Cedar Street, New York, is claimed to incorporate in one cabinet mounted on caster wheels, eight separate selenium rectifier sections, each with a capacity of 6 volts 500 amp. d.c. These sections, with separate input and output terminals, may be interconnected in several hundred different combinations, to con-



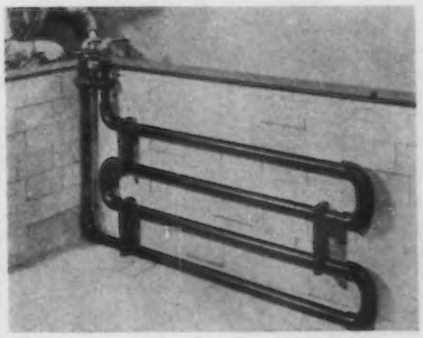
vert either 220 or 440 volt 3 phase a.c. to d.c. power for electro-plating, electro-cleaning, chromic or sulphuric acid anodizing, etc., in tanks, barrels or automatic machines. It is claimed the unit will deliver 4000 amp. at 6 volts and can be adjusted to deliver 2000 amp. at 12 volts, 1000 amp. at 24 volts, or 500 amp. at 48 volts.

Plating Solutions

A SPECIAL alkaline zinc plating solution has been developed by the *Hanson-Van Winkle-Munning Co.*, Matawan, N. J., with which is used S-B addition agent for producing satin-bright to bright depositions, the degree of lustre depending on the choice of operating conditions. Several lead solutions have also been developed, among which is an improved concentrated Protecto lead solution. A working solution is obtained by adding three parts of water to one part of concentrate.

Carbon Heating Coil

A GRAPHITIC carbon heating coil for heating tanks containing acid cleaners used to prepare aluminum aircraft parts for spot welding has been developed by the *Heil Engineering Co.*, 12901 Elmwood Avenue, Cleveland. It is claimed that the coil, which is made in standard sizes and in any shape for a wide variety of uses, is impervious to chemical action and has a heat conductivity between



that of steel and copper. Steam jets of the same material can be supplied for direct introduction of steam to perform both heating and agitation.

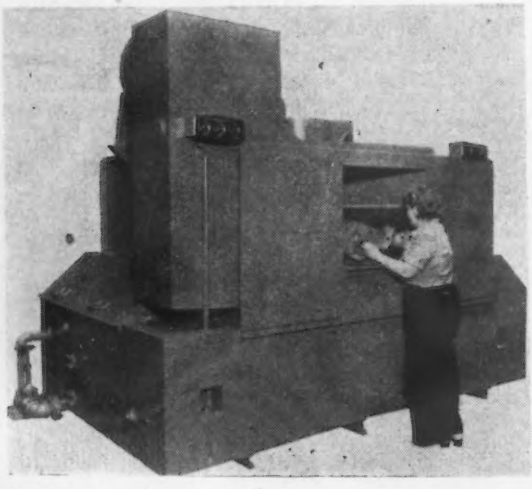
A new type of "sawtooth" extruded lead anode for electroplating has also been developed by the company. The multi-angled surface is said to give 50 per cent more area than a flat anode. One side has ten edges and the other side has a central spine ½ in. thick running down the center. The spine connects directly with the hook, providing greater current carrying capacity from top to bottom.

Plating Rack Covering

MADE from Koroseal, a plasticized polyvinyl chloride thermoplastic material, two new products for covering plating racks are announced by the *B. F. Goodrich Co.*, Akron. Koroseal Tape RX can be used for practically all kinds of plating service, since it is resistant to all plating solutions, including chromic, alkali and acid dips. Koralec RX is a solution of Koroseal. In some applications the two can be used together, with the tape being applied after the rack has been coated with the solution, while in other cases they may be used separately.

Cabinet Washing Machine

THE segmented cabinet washing machine, manufactured by the *Industrial Washing Machine Corp.*, New Brunswick, N. J., consists of a large mesh turntable which rotates slowly. Surrounding it is the housing, which is portioned off into various combinations for washing, rinsing (or slushing) and drying. The parts to be cleaned are placed either directly upon the mesh or on the fixtures. As the turntable rotates it carries the work through the cleaning operations and returns it to the loading point.



Cleaning Tank

TWO hot liquid dip tanks in one portable unit feature the Twin Dipmaster developed by the *Aeroil Burner Co.*, West New York, N. Y., which enables the operator to clean and rinse metal parts without the necessity of carrying them to a second tank for hot or cold rinsing. Two removable immersion tube heating units deliver all the heat in the cleaning solution and rinse water. The company has also developed the Waxmaster tank units, in which metal parts may be dipped in a heated wax compound for protection against salt water, high humidity, moisture and long-time storage.

Anodizing Racks

A COMPLETE line of standard racks and fixtures for use in the anodizing of aluminum parts such as sheets, skins, tubings, castings, bar stock and a variety of small items has been brought out by *George L. Nankervis Co.*, 5408 Commonwealth Avenue, Detroit. Special features can be developed to specifications.

Zinc Anodizing Bath

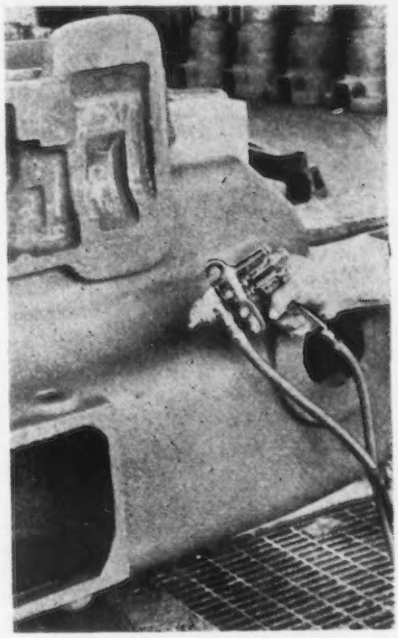
AN easily controlled means of increasing the rust-resistance of zinc coated steel parts and of retarding the formation of white zinc corrosion products has been developed by *United Chromium, Inc.*, 51 East 42nd Street, New York 17. It is applicable to zinc plated on any metal and in some cases to zinc-base die castings. Parts finished in Anozinc baths have stood up in excess of 200 hr. under the Army-Navy salt spray test. It is available in a dark, semi-lustrous black and a brassy, slightly iridescent yellow. Improved appearance and longer life are claimed.

Metal Coating

A NON - ORGANIC coating for metal in a broad range of colors has been brought out by the *Pemco Corp.*, Eastern & Pemco Avenues, Baltimore, under the name of Poroseal. It is not a paint, although it can be used in one or two coats on sheet steel and malleable or cast iron either by spraying or dipping. It is claimed to be highly resistant to corrosion, acids, solvent, heat and abrasion and is non-toxic, homogenous and odorless.

Machine Tool Finish

THE research laboratories of the *Sherwin-Williams Co.*, Cleveland 1, have developed a new "pebble" finish for machine tool surfaces which not only uses less finishing materials



but can be applied in ⅓ to ½ less time. It is said to be possible to finish a machine tool in three operations instead of seven. The pebble finish effectively hides scratches, grinding scars and other surface defects.

Plastic Dye

TO fill the need for a dye that could be easily, quickly and effectively applied to plastics such as Lucite, Plexiglas and Tenite, which would remain full toned and permanent without wearing or rubbing away and would preserve the plastic's original gloss and hardness, the *Technical Color Div.* of the *Krieger Color & Chemical Co.*, 6531 Santa Monica Boulevard, Hollywood, Cal., has developed Lucidip. Twelve colors are available and the different colors may be intermixed to form special colors or blends.

PARISH STAMPINGS

The railroads of the country have proved themselves miracle workers in the transport of war goods. An equally remarkable accomplishment is heralded for the post-war economy.

Soon to be on the drafting board are designs for rolling stock that will make possible transportation of passengers and freight at the lowest per mile cost ever known.

Steel, as always, will be the basic element in this further advance; for steel, properly alloyed, or properly surface protected, provides resistance to the elements beyond that accomplished by any other material.

Steel also provides resistance to fatigue, to shock, to temperature changes, that is bound to make it the reliance of the future just as is has been of the recent past.

Pressed Metal Parts and stampings will be used by the railroads, and by numerous other industries of the country because of their low cost, their broad range physical characteristics, their aid in the creation of beauty, and for their other well known qualities that has called for the tonnage in the past.

Parish Pressed Steel engineers will be found cooperative and helpful. Why not call on us while your plans are in the preliminary stage.

★

METAL STAMPINGS

★

MODERN DESIGN AT LOW COST

★

ARMY E NAVY

PARISH PRESSED STEEL CO., Reading, Pa.

Subsidiary of SPICER MFG. CORP.

Western Representative F. Somers Peterson, 57 California St., San Francisco, Cal.

Assembly Line . . . STANLEY H. BRAMS

• Detroit tool shops again are filled, as aircraft companies order . . . Caution rules helicopter outlook . . . Industrial stylists show wares and indicate the trends ahead.

DETROIT—Tool shops here are undergoing another of their volatile swings. At the turn of the year they were edging toward the easiest level of operation since the war begin. Now they are suddenly loaded up with work again, and some few shops are booked to an extent that they are not taking any new business right now.

The reason is the release and near-release of several large aircraft tooling jobs. These involve both airframes and engines, and the tooling programs for them run high into the millions. There are four major jobs of this size on which capacity is being sought and filled in Detroit, and work on others is also being placed in lesser measure.

This presages new aircraft production programs late this year or perhaps early in 1945. There will be big cargo planes coming out of this tooling, new combat ships, and larger powerplants to go with them.

Trade gossip is that at least three motors have been developed which turn up far more horsepower than ever before put out of aircraft power packages. Tooling for such big motors and the big ships to go with them will take up any slack anticipated for the equipment shops for quite a little time to come.

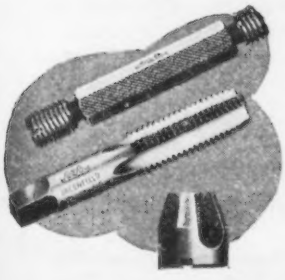
On the subject of aircraft, there are other well-based rumors percolating through Detroit these days. One concerns Chevrolet and Buick, whose overall commitments for Pratt & Whitney jobs were recently reduced. Since then Buick has taken on production of the cargo plane engines heretofore made exclusively in this area by its General Motors cousin. The expectation is that while Chevrolet cuts down Buick gradually will further increase this output until it is the sole automotive manufacturer of the type. To fill the gap caused by this transfer, Chevrolet will go into production on a somewhat more advanced version of the job which it is now producing. As a result, the layoffs in those two companies and the curtailed ordering from parts and materials suppliers will likely be of rather short duration.

WITH regard to another kind of aircraft development, confirmation was forthcoming this week of gossip that Warner Aircraft Co. has been tinkering with an engine planned for helicopter installation. The confirmation came in the form of an official slap on the wrist delivered by WPB which alleged that Warner, in delivering an apparently experimental helicopter engine on a top preference rating, had bypassed earlier orders carrying equally high priority. Warner was reported put on probation until April 26, 1944, along with several other Detroit firms found guilty of equally unintended WPB regulation violations. Warner's experimental work has roused hopes among its well-wishers that the concern may finally fall into some engine production of significance.

But helicopters, it might be stated, lack in informed quarters the enthusiasm manifested for them in the Sunday supplements. One expert said privately last week that in his opinion the helicopter, as it stands today, has not progressed beyond "an advanced state of pure research." This speaker is quite close to the entire helicopter scene. In equally informed other quarters there is general regret that recent publicizing of helicopter accomplishments has bedazzled the nation into expecting a vertical flight age the day the war ends. No such era is in prospect, the experts agree, for a number of years to come. Don't make reservations yet on those bus-helicopter lines scheduled for intrastate runs. The day is coming, quite likely—but not this week or next. Notwithstanding the down-to-earth helicopter limitations as they exist today, the wave of general interest in the device will undoubtedly continue, and postwar speculative enterprises may spring up as they once threatened to do on autogiros. Incidentally, basic

NAPIER SABRE ENGINE: *In late 1936 Napier Co. completed development of the twin crankshaft airplane engine and built a 2000 h.p. model. This engine, the Napier Sabre, was officially approved in 1940. Women workers here are inspecting many of the parts that go into this engine.*

THE WOUNDED PLANE THAT *Flies* AGAIN



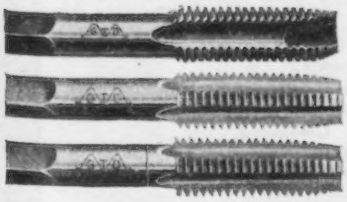
The Germans and the Japs do bring down some American planes — but they'd better be sure they fall in enemy territory. Otherwise, many of them have a way of coming up again, to do battle once more.

The damaged planes — called "hangar-queens" — are kept intact, till their undamaged parts are needed to repair another plane.

What makes possible this free interchange of parts is that miracle of modern manufacture which we're prone to take for granted — STANDARDIZATION.

The striking story of the hangar-queen, made possible by standardization, only highlights its benefits to the world in *time of peace.* For not until the use of interchangeable parts made mass production possible did all the people begin to share the comforts formerly available only to the few. *And the end is not yet.*

Standard Threads - SAVE TIME - SAVE MONEY!



GUN TAP
●
CUT THREAD TAP
●
GROUND THREAD TAP

Here are 3 different types of Tap, all of the same size. One of these will best suit your requirements. You'll save money on your work if you first determine which of these types you should use, and thereafter specify this type for that job. This is "Standardization" in practice.

GREENFIELD TAP AND DIE CORPORATION GREENFIELD, MASSACHUSETTS

helicopter patents stem from the Cierva rights, which are licensed to Pitcairn and embodied in that company's autogiro.

THERE are probably a dozen big league industrial designers in Detroit, and an additional score or so on the fringes of prominence. The dollar value of the products which they style is undoubtedly far above that of the more prominently publicized eastern designers, for they turn out the major share of the automotive and industrial developments of their geographical area. Last week the newly-organized Detroit Industrial Designers Association sought some public recognition for its members with a rather provocative display of models and sketches.

There was plenty of blue-sky dreaming in many of the exhibits—"air-brush engineering," as many hard-bitten technicians call it. There were aircrafts designed for appearance sake, but not for flying. Automobiles with transparent roofs, requiring occupants to bake to a well-seasoned brown under summer sun. More of the same.

But here and there were ideas which might click, and some which already have. Sketches of an integrated kitchen-and-bathroom unit attracted attention as a practical innovation. To be built as one piece and so installed, a wall was shown with kitchen sink and other accoutrements on its one side, and a bathroom lavatory, bowl and shower-and-tub on the other. The objective of such a combination is to reduce plumbing required for a home.

Also shown was a new idea in refrigerators, a low, wide, horizontal unit. Ice compartment, bottle storage and space for fast-frozen foods was provided on top, with lid opening. Underneath were sets of drawers for vegetables and miscellaneous storage, each opened by foot control bar at the base. One objective here was to reduce dissipation of refrigerated atmosphere by use of top lids and by comparatively small, individually-opened compartments. Another was to make possible varied temperatures.

Exhibited was a plywood chair by Ray Russell made by shaping one sheet of plywood to seat and back contour, then fastening it to a wooden base which sat on the floor.

Light metals and low pressure plastic molding were stressed in descriptions of the exhibits, and it is evident that recommendations for post-war product design will lean heavily in that direction.

Returning to automotive ideas, a number of interesting passenger car and bus designs were shown which represented logical advances on Packard Clipper, Lincoln-Zephyr and Lincoln Continental styling.

Tool and Die Group Plans Postwar Study

Washington

• • • **A program to prepare** the tool and die industry for orderly postwar conversion has been inaugurated by the National Tool & Die Manufacturers Association, according to M. W. Rowell, general manager. The program should be interesting to every industry in the country that is planning for postwar, Mr. Rowell pointed out, for even the large corporations with tool shops rely on the special tool and die industry for many tools, particularly those they are using for the first time.

As part of the program, a survey is being made of the tool and die industry's facilities and output in order to assist manufacturers in making an orderly transition to peacetime production. Reconversion to postwar production must take into consideration the special renegotiation problems of the industry, which consists of about 4000 small shops each employing from five to 60 men in normal times.

Usually, each shop is owned and managed by one or two people who, basically, are craftsmen risen through the ranks as tool and die makers. Unless they are permitted to emerge from the war with enough cash resources to operate over a period of comparative inactivity, bankruptcy and dislocation will result.

The program will also correlate new and revolutionary ideas developed in the past few years by tool and die plants working on war materials. There will also be an attempt through nine established "tool centers" to coordinate the work of the industry's local groups. These centers, already functioning, are located at Cleveland, Bridgeport, St. Louis, Rockford, New Britain, Buffalo, Minneapolis, Milwaukee and Chicago. Additional centers are being formed in other cities.

The Association was formed in September, 1943. Officers are: L. A. Sommer, Sommer & Adams Co., Cleveland, president; Richard F. Moore, Moore Special Tool Co., Inc., Bridgeport, first vice-president; Willis G. Ehrhardt, Ehrhardt Tool & Machine Co., St. Louis, second vice-president; Harry V. Anderson, Crescent Mfg. Co., secretary; and H. F. Jahn, B. Jahn Mfg. Co., New Britain, Conn., treasurer.

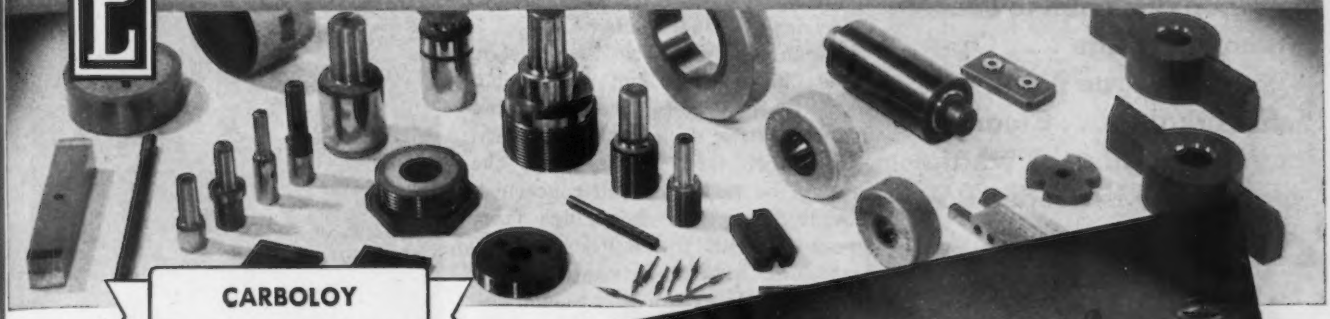
M. W. Rowell

COMING EVENTS

March 14, 15—National Association of Waste Materials, Inc., New York.
March 27, 28—American Society of Tool Engineers, Philadelphia.
March 30, 31—American Gas Association War Conference, Rochester, N. Y.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
May 25—American Iron and Steel Institute, New York.
Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.
Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.

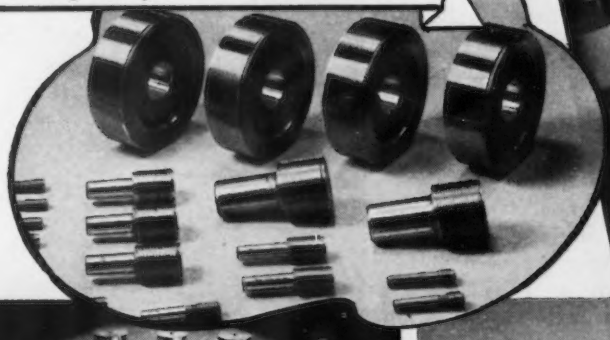
These Are Typical of

LINCOLN PARK GAGES AND NON-CUTTING PRECISION TOOLS

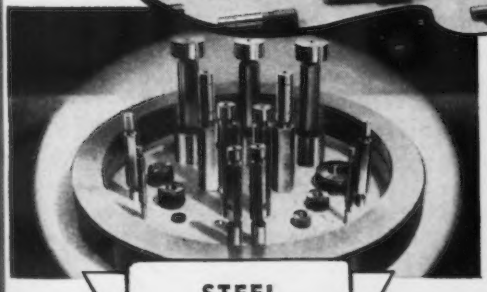


CARBOLOY

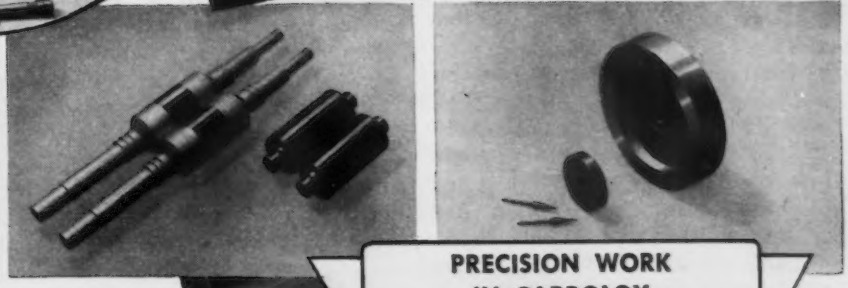
THREAD PLUG GAGES
Salvaged by Hard Chrome Plate



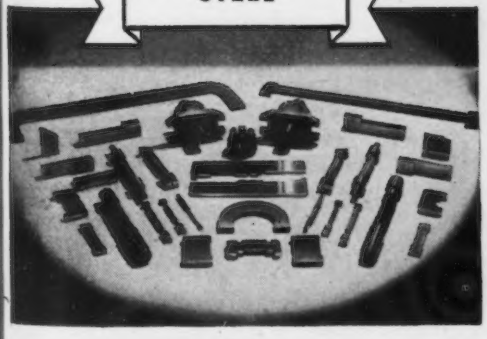
CHROME PLATE
NEW and SALVAGED



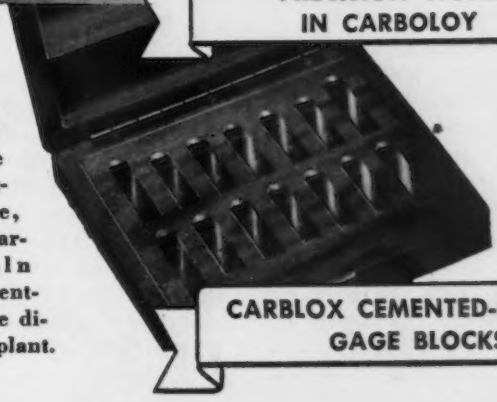
STEEL



PRECISION WORK
IN CARBOLOY



For full information on any of the products pictured here, see your nearest Lincoln Park representative or write directly to the plant.



CARBLOX CEMENTED-CARBIDE
GAGE BLOCKS

ARMY (E) NAVY

LINCOLN PARK INDUSTRIES, INC.

Successor to The Lincoln Park Tool and Gage Company and Carbur, Inc.

1729 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

Washington . . .

• Cartels hold Washington's attention . . . Proponents point to economic savings . . . Opponents argue it will be unworkable . . . Clearer understanding of what cartels are is needed

WASHINGTON—Is the United States moving into a long period of widespread cartelism? Many prominent business and government men think so.

One of the foremost business thinkers of the day, Eric Johnston, president of the U. S. Chamber of Commerce, told THE IRON AGE that he does not believe cartels can long be the answer to domestic economic problems because of the inevitable postwar dispersion of industries. Mr. Johnston pointed out that Russia plans to increase its steel capacity many fold and China, Brazil, and many of the British dominions expect to gain independence from foreign steel sources.

Mr. Johnston's view is that cartels before the war were possible in steel, chemicals, and illumination because many countries had little or no steelmaking facilities and because a lack of patents and technical skills kept many nations from competing in the chemical and lighting field. Competition caused by industrial dispersion will result in a check on the cartel movement, which depends largely for its success upon monopoly, is a summation of the Chamber of Commerce president's opinion.

On the other side of the question is Dr. Louis Domeratzky, chief, the European Unit, Division of Regional Economy, Bureau of Foreign and Domestic Commerce. Mr. Domeratzky, who for at least two decades has been conceded to be this government's leading authority on cartels and international economics, says that political cooperation between the United States and Great Britain should be paralleled by economic cooperation.

The current widespread interest in cartels in business and government can be traced first to the opportuning of Britons who declare that competition between former allies after the war will be ruinous to all concerned. Secondly, the interest springs from agreement with the British government and industrial viewpoint by comparable American groups and the fact that the Department of Agriculture has entered into international commodity agreements on agricultural products, which are in essence cartels.

MOREOVER, Justice's Anti-Trust Division has focussed public attention on the malpractices of cartels, while all over official Washington from the halls of Congress to the steps of the State Department an undercover dispute on the merits of cartelism is raging.

Not too much understanding of what cartels are is shared by all those engaged in argument. There is nothing inherently evil or sinful about cartels as Assistant Attorney General Wendell Berge has implied, nor is abuse of privileges any more confined to cartels than it is to corporations or partnerships.

Cartels are merely forms of business organization somewhat like trade associations which set prices, rates of production, and distribution in foreign and domestic markets, pursuant to inter-company agreements. However, the anti-trust laws forbid most of the activities of cartels in this country.

The question is: Should the United States make the activities of cartels legal and enact legislation to regulate them? Are international cartels necessary to protect domestic markets, find outlets for surplus materials and manufactures, and to maintain employment at high levels?

PERHAPS the most lucid criticism of cartels in recent literature is contained in an issue of *The Economist*, an English publication. *The Economist* stated that the doctrine appears to be growing up, almost unawares, that British industry cannot hope to compete on an open basis with other countries, cannot increase its volume of exports except through such mechanical devices as the cartel.

Said the English publication: "It is curious doctrine and is maintained with utmost inconsistency against both low-wage and high-wage countries. Where we are not undercut by the low wages of the Japanese, so runs the argument, we are undercut by the high productivity of the Americans. That is pure defeatism.

"It would be just as true to argue that, with good management, we can out-compete any country in the world, the low-wage countries by the skilled use of complex machinery, and the high-wage countries by the cheaper cost at which our policy of importing food and raw materials enables us to sustain a high standard of living. The real trouble is that too few British businessmen are trying to compete."

The publication points out that to say that a firm has so increased its efficiency that it can sell at low prices is not to give praise for initiative

HELP SMALL BUSINESS: *Jesse Jones, Secretary of Commerce, told the House Banking and Currency Committee that small business men and returning veterans, those who are bearing the brunt of the war effort, should have preferential treatment in the purchase of surplus government materials in the postwar period.*

TOOLS WORK TWO EXTRA SHIFTS PER WEEK

SUNOCO
EMULSIFYING CUTTING OIL

increases tool life 35% . . . improves finish . . . at war plant

Machine tool men looking for ways to effect tool economies will find this case history valuable. It's about a plant producing armament parts, and how they increased tool life the equivalent of two extra 8-hour shifts in every 48-hour week.

Production was slowed because of trouble on machines using a competitive soluble cutting oil. Tool casualties ran high, finish of parts was inferior, emulsions showed a tendency toward rancidity.

Trouble stopped when they changed to Sunoco Emulsifying Cutting Oil upon the advice of a Sun Oil Engineer. Tool life increased 35% . . . finish was noticeably finer . . . rancidity stopped. And in addition, cutting oil costs were cut.

Now parts are speeded from the machines of this plant . . . and from hundreds of other plants that have found Sunoco Emulsifying Cutting Oil a spur to machine tool output. Sunoco's exceptional heat-absorbing quality and stability make it the answer for all metal cutting operations where a soluble oil is used.

For advice on cutting oil problems, write

SUN OIL COMPANY · Philadelphia 3, Pa.
Sun Oil Company, Ltd., Toronto, Canada

SUNOCO

SUN INDUSTRIAL PRODUCTS *HELPING INDUSTRY HELP AMERICA*

and enterprise, but to criticise it for breaking the rules of "fair" trading and indulging in "the ultimate sin of cutthroat competition."

BRIEFLY, the chief arguments against international cartelism are that they lead to "high-profits and low turn-over," and would "stereotype the present pattern of trade for all time and prevent the buoyant development of new opportunities in which is the chief hope for rising world prosperity" through stifling competition.

Cartel or combine proponents assert that this form of business organization offers distinct advantages to industry, labor and stockholders.

They maintain that labor can benefit through the fact that diminished competition forces fewer industry units out of existence than open competition and thus workers jobs are made more secure. Increased efficiency, it is further argued, can make for higher wages in large units than in small ones and uniform wage contracts are a concomitant.

The international labor organization has given its approval to agriculture's venture into cartels, but USWA president Philip Murray recently told THE IRON AGE that he is against the cartel idea.

Additional arguments made by cartel proponents are: Combines are able to save money through diminishing the cost of selling. Distribution organizations and promotional departments are merged and decreased in personnel. The not-so-successful business methods of member companies are subjected to the searchlight of comparison with more successful ones and inefficient operations are improved.

EXPENSIVE cross hauling is prevented through distribution of orders to member concerns close to the consumer needing steel. A saving of expense and time is made through distributing orders according to the facilities of member concerns whereas a single company might have to alter setups to accommodate a particular order.

Proponents also say that with decreased competition, unwise credit extension is no temptation to a cartel and yet, with government backing, credit can be extended beyond the limits a private concern would be able to go. Although not so profitable as domestic sales, increased volume of foreign sales can keep production costs down.

Too Much, Too Late

"• • • It is already too late for anybody to hold any brief for the citizens in the higher-income brackets. They are doomed through the actions of a demagogic, socialistic, soak-the-rich policy of this spendthrift administration. The welfare of the people in the low-income brackets is what gives me grave concern, because they are being slowly led to slaughter by the same rope that was used to lead the people in the higher-income brackets, and they are certain to suffer the same fate."—Senator O'Daniel, Democrat of Texas.

o o o

Army Leaves Price Role for OPA

Washington

• • • **The War Department** is not contemplating use of its repricing power contained in the new tax bill on an industry basis, and will leave the job of the fixing of flat prices to OPA, Brig. Gen. Albert J. Browning said on Feb. 16.

Gen. Browning, director of the purchases division, told a press conference that no contractor who is fairly pricing his products need fear the pricing title of the tax bill, a power which the Secretary of War has had since the enactment of the Second War Powers Act in 1942.

Lieut. Gen. Brehon Somervell, who heads Army Service Forces, has issued a directive requiring all repeat and continuation orders to be placed at prices which can be exempted from renegotiation by June 1, pending discontinuance of the Renegotiation Act by the end of 1944.

As provided by the new tax bill, orders which are so "close priced" between now and June 1 can be exemption from renegotiation. The close pricing is to be complete by June 1, but contracts in force on that date not drawn under the new program will be subject to renegotiation.

Glen A. Lloyd, assistant director of Army Purchases Division, said the end of renegotiation will present some new aspects of the War Department pricing problem.

"We will have to effect a greater control of prices paid to subcontractors under prime contracts," he commented.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

How can machine tools avenge this

Dunkerque in Arkansas?

This is no enemy propaganda. No "usually well-informed sources" or Berlin broadcasts tell this tale. This is real . . . this is here . . . and this is defeat.

Our own private *peacetime* Dunkerque — in Arkansas, in New York, in West Virginia or California — in countless American "homes" where millions of people are ill-housed, ill-clothed, and bodily and mentally ill-fed.

What part will machine tools play in turning this kind of defeat into victory? The *whole* part, if the men of industry have the vision and the freedom to plan ahead, and to carry out what they plan.

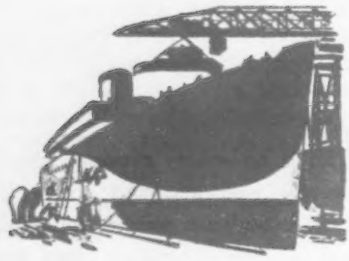
If you are a manufacturer, there is one thing you can do at once: Have your production men and planners consult now with the engineers of the leading basic machine tool producers. They can help you in planning today your part in the peace that must be won after the war is won.

One of these is a Bryant man. . . . We invite you to send for him.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.

WEST COAST . . . OSGOOD MURDOCK

• Unusual owner-lessee relationship develops over Eagle Mountains ore deposit, most desirable for Fontana . . . Important Portland plant will not be rebuilt after fire.



LOS ANGELES—Following newspaper reports from Riverside headed "Kaiser Buys Solid Mountain of Iron Ore", when County Recorder Jack A. Ross filed a deed with $1100 revenue stamps on it, indicating a purchase price of approximately one million dollars for the Iron Chief Mine in the Eagle Mountains, the conflicting interests of the Southern Pacific Railway, the Riverside Iron & Steel Corp., Harlan H. Bradt and the Kaiser Co. Inc. have come to the front of the stage after long years in the wings and behind the backdrop.

War Minerals Report 97 of the Bureau of Mines dated February, 1943, describes in detail the 70,000,000 tons of potential ore reserves in this belt of metamorphic sedimentary rocks ¼ to 1¼ miles wide, extending over six miles across the northern part of the Eagle Mountains of northeastern Riverside County. The Iron Chief Mine is about 50 miles east of Indio on the line of the Los Angeles Metropolitan acqueduct and main power line from Boulder Dam and north of the Indio-Blythe highway. "It is one of the most important of the western iron ore regions and contains enough proved reserves to supply the iron and steel plants at Fontana for more than 20 years," declares the report. The magnetite-hematite ore averages a little over 50 per cent iron and 0.40 per cent sulphur.

After detailed exploration of the eastern part of the district, 1¼ out of 6½ miles of the range, the Bureau of Mines finds that "positive ore amounts to 21,629,000 tons averaging 51.2 per cent iron . . . probable ore in the same part of the district makes an additional 15,000,000 tons. From deposits explored, over $8,880,000 tons of ore averaging 53.9 iron and 0.11 per cent sulphur can be shipped directly to blast furnaces. Other ores can be beneficiated readily by either sintering or by gravity (sink-and-float) concentration, recovering 90 per cent of the iron in a product averaging 60 per cent iron and less than 0.20 per cent sulphur.

Harlan H. Bradt, president of the Riverside Iron & Steel Corp. who has been interested in this property for many years, his company holding a lease and purchase contract on it, declares that in addition to the 36,500,000 tons proven and probable in the eastern portion of the range, a sufficient additional amount of ore is geologically indicated in the 140 patented claims covering 2764 acres to bring the deposit well over 100,000,000 tons, over 80 per cent of the known ore in the southern California district.

To get the ore to Fontana it will be necessary to truck some 50 miles to the present railroad at Indio or to run a 50-mile spur from the S.P. main line at Mortmar near the Salton Sea.

The Riverside Iron & Steel Corp. entered into a lease and sale agreement April 24, 1940, which embodied an option period followed by a 10-year installment purchase agreement. This latter became effective Jan. 24, 1942, and specifies a final purchase price of $1,500,000 by the end of the ten years.

In its recent action, the Kaiser Co. has purchased for $1,000,000 from the Southern Pacific Land Co. its fee title to the ore subject to installment purchase contract with the Riverside Iron & Steel Corp. It is understood that the Kaiser Co. has borrowed additionally from RFC for the purchase.

Now that the lower grade and higher sulphur ore from its Vulcan mine is running low, the Fontana plant must soon have new ore. It is understood that sulphur in the present ore has run as high as 0.50.

It is further understood that Harlan Bradt offered to sell to the Kaiser interests rights to the Iron Chief ore at a low royalty in June, 1942, and later the Riverside Iron & Steel Corp. offered to deliver high grade beneficiated ore at a price acknowledged to be fair by representatives of RFC. The Riverside Iron & Steel Corp. is said to be backed financially by substantial interests in the mining and steel industry and in banking circles and expects to be able to carry its contract. Mr. Bradt proposes to erect a beneficiation plant at the mine to bring the ore up to 60 per cent bessemer grade with a guaranteed sulphur content below 0.20 or 0.10, whichever is demanded.

What kind of a deal will the Kaiser Co., as landlord, now make with the Riverside Iron & Steel Corp. its lessee?

IN spite of difficulties and handicaps with ore and coke and consequently pig-iron, the Kaiser-Fontana open hearths and rolling mill are reported to have performed remarkably. In January, 31,632 tons of plate were rolled and the high day was 1453 tons. For the first ten days in February the aggregate rolling was 11,283 tons. Furnace No. 1 produced a total of 10,917 tons of steel ingots in January and Furnace No. 5 10,913 tons. Until the structural mill is completed only four furnaces are now operated to supply the plate mill with ingots.

"What has happened to the Kaiser-Hughes flying boats" has frequently been asked of late and in answer Howard Hughes offers WPB a $500,000 guarantee that one of the giant plywood flying boats being hatched at Culver City will fly this year.

SEATTLE—For the fifth straight month Boeing has broken its production record, this time upping its production eight per cent over last month. This increase brings production up to over twice what it was just one year ago. In addition to the extensive in-plant feeding facilities being installed at the two Seattle plants, an expenditure of $2,500,000 has just been authorized for a new cafeteria building at the new Renton plant.

Washington state payrolls carried 886,850 workers at the start of this year compared with 607,672 just before Pearl Harbor. This shows an

Ex-Cell-O machine illustrated is an opposed Style 58 two-way machine arranged with six boring spindles at each end for finish boring, counterboring and facing the gear holes in an aluminum supercharger cover. All spindles operate simultaneously, finishing the holes within .0005" at a highly satisfactory production rate. The units have 20 inches of table travel and 15¾ inches between the ways. Each spindle is individually adjustable for quick setting. In this particular application all centers are set to a master gage, which, in effect, is a master for the part itself.

INCREASING PRODUCTION . . .

with new economy!

Ex-Cell-O Unit-type Precision Boring Machines Bring Added Practical Features

Ex-Cell-O has developed standard boring units, each a complete machine in itself, yet by means of heavy flanges and bolts these units can be bolted singly or in multiples to a stationary center section, resulting in a multiple precision boring machine. Note these advantages:

It is still a *precision* boring machine. Bores may be finished in tenths of thousands as before, yet units may be mounted in multiples and at angles, all operating simultaneously toward the center section.

Because all units may operate simultaneously, production is considerably increased on many parts.

The unit-type construction allows for salvage of all but the fixtures in case of part changes. It is possible and economical merely to remove and replace the entire center section. This means a flexible machine on which maximum production can be obtained while the machine is set up.

Each way or unit has two feeds and a dwell in forward and reverse direction, and each can be controlled individually or by a central control button in conjunction with all other units hooked into the electrical panel. It is completely automatic except for loading and unloading.

More than most semi-special machines, this Ex-Cell-O machine incorporates desirable features in flexibility and production, for war work today and peacetime products tomorrow.

EX-CELL-O CORPORATION • DETROIT 6, MICH

Ex-Cell-O has just printed a new folder on Unit-type and other Way Machines. A copy is yours for the asking. Send to Ex-Cell-O Corporation, Detroit 6, Michigan, and specify Bulletin 31631.

PRECISION THREAD GRINDING, BORING AND LAPPING MACHINES • SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES • SPECIAL MULTIPLE PRECISION DRILLING MACHINES BROACHES • GRINDING SPINDLES • HYDRAULIC POWER UNITS • DRILL JIG BUSHINGS TOOL GRINDERS • CONTINENTAL CUTTING TOOLS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

increase of 280,000 according to the report of A. F. Hardy, state manpower director. The ratio of women workers has increased from 21.3 per cent in the fall of 1940 to 35 per cent today. But railroads, trucking and communications employers have only 25 per cent more workers now than in 1940, threatening a crisis in communications if and when further demands occur.

A coastwide investigation of compliance with manpower regulations is in progress, successively in the Los Angeles, San Francisco and Seattle-Tacoma-Bremerton areas.

Strangely, in spite of USES and WMC pressure and pleas for more workers, claims for unemployment insurance are rising uncomfortably. In California there were 42,956 claims for benefits last September and 55,209 in December, an increase of 12,253.

A SERIOUS, sober setback to the industrial future of the Pacific Northwest occurred earlier in the month when the big Iron Fireman plant burned down mysteriously in Portland at night. This most costly fire in Portland's history destroyed 24 marine engines valued at nearly $100,000 each along with the foundry, forging, shop and assembly facilities which employed 1245 persons and during the war has been supplying propulsion machinery for Maritime ships.

Iron Fireman mechanical stokers were conceived and first developed at Portland, originally to use the sawdust so readily available from northwest lumber mills. As the company's market became nationwide, an eastern plant was established at Cleveland. The management now declares that the fire-destroyed Portland plant will not be rebuilt, since it is impossible to supply this national market from a Pacific Coast plant, and since in this case a second plant is not economically justified. Similar industrial experience moved Caterpillar and Le Tourneau from San Leandro and Stockton, California, to Peoria, Illinois, in the 20's.

Those fervid advocates of home industry and industrial destiny emanating from the Pacific Coast may well study carefully the factors and circumstances here involved.

o o o

Bearings Placed under Stricter WPB Controls

Washington

• • • **To further speed** the output of large size ball bearings, essential components for such war goods as heavy artillery and airport construction machinery, additional production controls have been announced by WPB. The new WPB order is expected to concentrate factory runs of large anti-friction bearings (ball bearings) and therefore make them available at a more rapid rate. Under the new WPB limitation order it is provided that:

1—Only manufacturers designated as "authorized producers" may make anti-friction bearings in specified large sizes.

2—A maker not designated as an "authorized producer" of bearing sizes listed in the order may refer potential customers for those sizes to an authorized producer or may accept the business and place the production contract with an authorized producer.

3—Any factory that might previously have made some bearings of the specified sizes but is not now designated as an authorized producer must keep its equipment for making such goods, and in such condition that it may be utilized within one month if so ordered by WPB.

Exceptions to the new anti-friction bearing order provide that:

1—Any orders placed before Feb. 19, 1943, may be completed even though the factory filling them is not listed as an "authorized producer."

2.—Producers whose monthly shipments of all anti-friction bearings did not exceed $60,000 in November, 1943, are not bound by the terms of the order.

Authorized producers for one or more of the specified bearing sizes are Marlin-Rockwell Corp., SKF Industries, Inc., Fafnir Bearing Co., and Torrington Co.

Steel Operations to Continue at Capacity

Washington

• • • **Steel Division Director** John T. Whiting said on Monday that the steel industry should operate close to capacity during the first half of the year, and that reports of an easier steel situation have created false impressions.

In a letter to all producers, Mr. Whiting said: "While it is true that cutbacks in programs have resulted in a slight reduction in the military requirements for steel, these have been offset by increases in the steel requirments for essential non-military needs. I refer particularly to the programs covering railroad equipment and track material, farm machinery, gas and oil facilities, food containers, etc.

"The net result has been an allotment of steel to the claimant agencies for the second quarter of 1944 approximately as great as that made for the first quarter."

Producers were urged to maintain maximum output and to observe all WPB orders and regulations.

Mining Equipment Reports

• • • **WPB announced** that mining equipment manufacturers need no longer file monthly reports on schedules for 40 items of equipment because production of these items is now meeting demand. This action was taken by amending Limitation order L-269. It provides, however, that manufacturers may be required to submit a report at any time, should such report be deemed necessary. In addition, the order provides that additional exemptions may be granted whenever it is justified by the supply-demand situation.

An amended list of all "mining equipment," giving CMP code numbers has been appended to the order, along with items for which no monthly reports are required.

. . . Cited for Awards . . .

• • • **The following companies** have won the Army-Navy E for excellence in war production:

Cincinnati Planer Co., Cincinnati (star).

Sylvania Electric Products, Inc., Williamsport Plant, Williamsport, Pa.

Wyandotte Plant, E. I. du Pont de Nemours & Co., Wyandotte, Mich.

Alloy Steel Products Co., Inc., Linden, N. J. (star).

Ilg Electric Ventilating Co., Chicago (star).

Martime M

J. A. Jones Construction Co., Inc., Wainwright Yard, Panama City, Fla.

Barrett & Hilp, Belair Yard, San Francisco.

Consolidated Steel Corp., Ltd., Los Angeles (Merit Eagle pennant).

St. John's River Shipbuilding Co., Jacksonville, Fla., and Brunswick, Ga. (star).

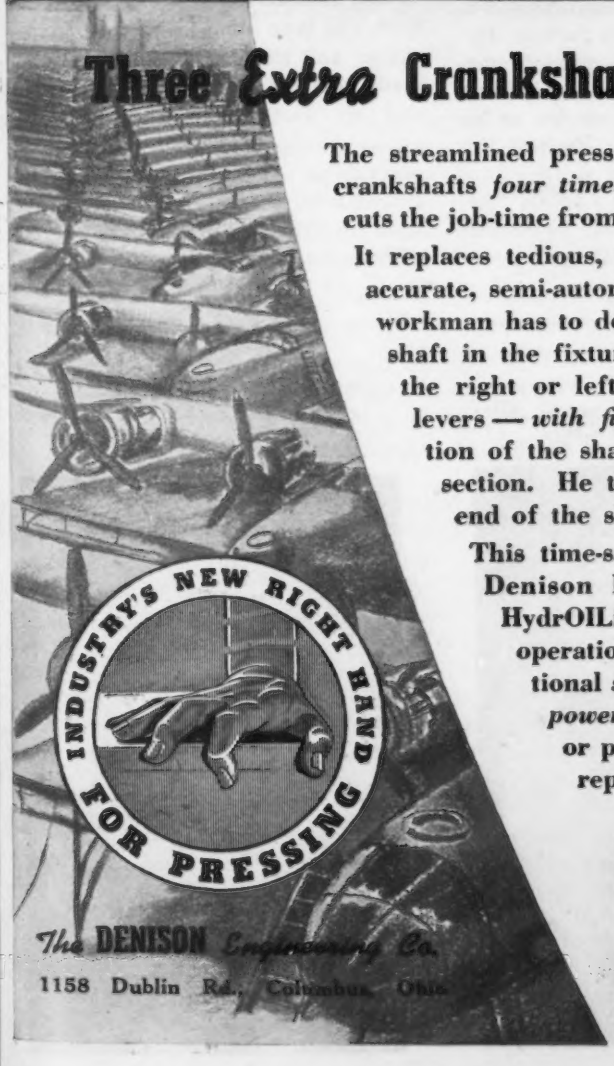
Southeastern Ship Building Corp., Savannah, Ga. (third star).

New England Shipbuilding Corp., South Portland, Me. (fourth and fifth stars).

Delta Ship Building Co., Inc., New Orleans (eighth star).

Houston Ship Building Corp., Houston, Tex. (ninth star).

PRESSING NEW METHODS INTO SERVICE WITH INDUSTRY'S NEW RIGHT HAND



Three *Extra* Crankshafts Every Ten Minutes

The streamlined press shown above assembles airplane crankshafts *four times faster* than previous methods — cuts the job-time from *10* to 2½ minutes!

It replaces tedious, painstaking hand labor with quick, accurate, semi-automatic *oil hydraulic* operation. All the workman has to do now is lock the three sections of the shaft in the fixture, and direct hydraulic fluid to either the right or left ram. Then by moving ram-operating levers — *with fingertip pressure control* — one end section of the shaft is assembled to the rigidly held center section. He then repeats the operation on the opposite end of the shaft.

This time-saving equipment is a good example of how Denison Engineers are tailoring the advantages of HydrOILics to a constantly expanding field of industrial operations. They will be glad to show you how the exceptional *smoothness, flexibility and accuracy* of oil hydraulic *power, speed, and control* can be applied to your products or production. Write or wire today, or call your Denison representative.

The DENISON Engineering Co.
1158 Dublin Rd., Columbus, Ohio

DENISON
EQUIPMENT *in* APPLIED
Hydr OIL ics
TRADE-MARK

PERSONALS

• **W. P. Hilliard** has been named manager of the radio division of Bendix Aviation Corp., Baltimore, Md., and Red Bank, N. J. Mr. Hilliard, director of sales and engineering of the radio division since its inception in 1936, succeeds **Hugh Benet** who will assume other special assignments.

• **William Miller,** formerly Detroit district sales manager, has been appointed assistant general manager of sales of Jones & Laughlin Steel Corp., Pittsburgh. He has been with J & L for 30 years, serving in various sales capacities. **Charles M. Merritt,** formerly assistant Detroit district sales manager, will succeed Mr. Miller.

• **D. Trotter Jones,** former adjutant of the Alabama department, American Legion, has been elected executive vice-president of the Associated Industries of Alabama, Birmingham.

• **Myron M. Eicher** has been appointed works manager of Jessop Steel Co., Washington, Pa. He succeeded **Harry Wilson, Jr.,** who was promoted to vice-president in charge of operations. Mr. Eicher joined Jessop in 1942 as head of the scheduling department. Prior to that time, he was chief clerk in the scheduling division of the Crucible Steel Co. plant at Midland, Pa.

• **P. E. Floyd,** formerly sales manager of the Chicago district of the Allegheny Ludlum Steel Corp., has been appointed assistant general manager of sales for the corporation. Mr. Floyd will have his headquarters at Brackenridge, Pa.

• **A. P. Hall** has been appointed assistant general manager of sales of American Chain & Cable Co., Inc., Bridgeport, Conn., and will assume his duties March 1, with headquarters in New York. Mr. Hall has been with Bethlehem Steel Co. since 1922.

• **C. D. Williams** has been appointed vice-president and general counsel in charge of the corporate and legal affairs of American Locomotive Co., New York, and **Carl A. Sundberg,** formerly assistant treasurer, has been appointed secretary.

• **Russell M. Allen,** formerly general manager of sales, was elected vice-president in charge of sales of Allegheny Ludlum Steel Corp., Brackenridge, Pa. Mr. Allen became associated with Allegheny Steel Co. in 1920 as production man in the mill. In 1922 he entered the sales department, and in 1923 was transferred to the sales organization in Detroit. Two years later he became district manager of the Chicago territory, and was later recalled to Brackenridge as assistant sales manager. He held this position through the merger and formation of Allegheny Ludlum Steel Corp. in 1938, and in 1940 he became general manager of sales.

• **C. E. Kraehn** has been appointed assistant to V. H. Peterson, who is in charge of all sales activities of the Baldwin Locomotive Works, Philadelphia. Mr. Kraehn has been with Baldwin since 1943. Previously, he was with General Electric Co. for 24 years.

• **G. Bronson Philhower** has recently been added to the staff of the New York office of Tube Turns, Inc., to represent the firm in the New York area and New England.

• **Boyd R. Hopkins,** of Pasadena, has recently joined the sales department of the Thermex division of the Girdler Corp. and will represent the firm on the West coast.

• **W. S. Long,** formerly operations manager of United States Rubber Co.'s Los Angeles plant, has been appointed Pacific Coast sales manager, mechanical goods. Mr. Long will continue in charge of war products activities on the Pacific Coast.

• **George W. Hinds,** purchasing agent of the Lamson & Sessions Co. since 1926, has been named director of purchases and **Frank DeCrane** has been made purchasing agent. Mr. Hinds and Mr. DeCrane have worked together in the Lamson organization's purchasing department for 18 years, Mr. Hinds starting as purchasing agent in 1916, and Mr. DeCrane as an office boy in 1920.

P. E. FLOYD, assistant general manager of sales for Allegheny Ludlum Steel Corp.

RUSSELL M. ALLEN, vice-president in charge of sales, Allegheny Ludlum Steel Corp.

GEORGE W. HINDS, director of purchases, Lamson & Sessions Co.

W. H. HOLCOMB and JAMES J. NELSON, left to right, have been appointed vice-president in charge of industrial relations and vice-president of the Cramp Brass & Iron Foundries division of Baldwin Locomotive Works.

• **W. H. Holcomb,** assistant to the president of Baldwin Locomotive Works, Philadelphia, has been appointed vice-president in charge of industrial relations, a newly created office. **James J. Nelson,** general manager of the Cramp Brass & Iron foundries division of the company, has been named vice-president of the division. Mr. Holcomb entered the employ of the company in 1919. Mr. Nelson joined the Cramp Brass & Iron Foundries Co. in 1932 as vice-president and sales manager.

• **N. A. Holmer** has been appointed director of sales and marketing of the Elastic Stop Nut Corp., of America, Newark, N. J. In this capacity he will have charge of all marketing developments and sales planning for the company's patented stop nuts. Mr. Holmer was formerly general sales manager for Mid-States Steel & Wire Co., Crawfordsville, Ind., and before that was general sales manager for the Unity Mills Distributing Co., Minneapolis.

• **J. Richard Adams,** works manager of the Crucible Steel Casting Co., Lansdowne, Pa., has been elected vice-president of the company, in charge of operations.

• **Dwight R. Means,** who has been associated with the Columbia Chemical division of the Pittsburgh Plate Glass Co. for 21 years, has been named assistant to the vice-president. Prior to his new appointment he was technical director and had previously served as research director and assistant superintendent.

OBITUARY...

• **Benjamin F. Affleck,** who rose from an obscure office position to president of the Universal Atlas Cement Co. from which he retired in 1936, died suddenly of a heart attack on Feb. 13, in Winnetka, Ill. He was 74 years old.

• **Melvin V. Pattison,** chairman of the board and former president of Industrial Brownhoist Co., Bay City, Mich., died Feb. 11 after a long illness.

• **Guy E. Swartz,** president of Swartz Tool Products Co., Detroit, which he established in 1918, died recently.

• **John A. Camm,** 64 years of age, president of the Camm Blades Machinery Co., Milwaukee, died at his home there Feb. 4 after a long illness. He was previously head of the Cleveland Milling Machinery Co. and past president of the Western Iron Stores.

• **Charles F. Niemann,** born Feb., 1869, died at his home in Pittsburgh, Feb. 4, 1944, after a brief illness. He was president and treasurer of the Parkersburg Iron & Steel Co. of Parkersburg, W. Va., since 1906, and lived in that city for a number of years.

• **Robert W. Roloff,** formerly manufacturing manager of the Sylvania Electric Products, Inc., died Feb. 8 in Missouri. He was 64 years old and retired in 1939.

• **Elmer H. Boyer,** a General Electric Co., Lynn, Mass., executive for more than 40 years died Feb. 9, at Fairfield, Conn. He was born in Sunbury, Pa., 83 years ago, and was graduated from Lehigh University.

• **Charles E. Hahn,** general manager of the Cincinnati Electrical Tool Co., died at his home in Cincinnati recently. Mr. Hahn was 53 years old at the time of his death. He had been general manager of the Tool Company for the past eight years.

• **George L. Dumbauld,** vice-president and treasurer of Blaw-Knox Co., Pittsburgh, died Feb. 3 at his home in Glenshaw, Pa. He was 61 years old. Mr. Dumbauld joined the Blaw-Knox Co. as comptroller in 1920. In August, 1936, he was elected vice-president and treasurer.

• **Herbert W. Hunt,** a salesman for Braman Dow Co., Boston, for some 25 years and later a manufacturer of brass and copper pipe, died in Reading, Mass., Feb. 11. He was born in Somerville, Mass., 68 years ago.

• **William H. Foster,** one of the founders of the Foster Machine Co., Elkhart, Ind., died on Feb. 8 at the age of 73. In 1902 he founded the Foster-Kimball Machine Co., which later became known as the Foster Machine Co. Mr. Foster remained president of his company until the controlling interest was sold to the International Machine Tool Corp. (now the International Detrola Corp.) in 1939, at which time he became chairman of the board of directors. He retired soon after owing to failing health, but was retained in an advisory capacity up to the time of his death.

• **George L. Sargent,** retired president of Sargent & Co., hardware manufacturers, died Feb. 5. He was 81 years old.

• **Gus Anderson,** superintendent of the Louis Marx Co. Inc. of Pa. die shop at Erie, Pa., for over 20 years, died Jan. 30. He was 70 years of age.

Fatigue Cracks . . . BY A. H. DIX

Visiting Royalty

• • • We recently warned you that an impostor who signs himself "B. E. Plummer" is traveling through the Southwest, soliciting payment for subscriptions for your favorite family journal, and offering false receipts bearing the name of "Consolidated Trade Journals," a fictitious organization.

"Plummer," the National Publishers Assn. informs us, is the favorite alias of the famous Ray Palmer, the greatest figure his profession has ever produced, and as outstanding in his line as Henie, Tilden, Sande, Einstein, and Hoppe are in theirs.

His is no faint heart, to be turned aside from his mission by a jail sentence. Like the Greek whose strength multiplied with every knockdown, Palmer uses his periodic rests behind bars to improve his technique. It is said that he could sell a subscription for the *Catholic News* to a hardshell Baptist.

If he calls on you, the chances are he will be using the alias "Plummer," if it doesn't happen to be the week for that name to go to the cleaners. But under any name he is sharp-featured, reddish blonde, big-nosed, and if he visits you will you wire us collect, "PALMER HERE," as he is over-working himself and needs another rest.

Wrong Rockaway

You said that Dewey Pott is Rockaway, N. J.'s chief of police. Wrong. Our chief is Alfred Rarick. Dewey Pott belongs to Rockaway Valley, N. J.

—Edward Ehlers, President, Rockaway Rolling Mill, Rockaway, N. J.

"I" for An "E"

I am intrigued by the word "omniligent" used by you recently. It is new to me. I fail to find it in the unabridged. Apparently it is also new to Webster.

—Edward C. Worden, II, E. I. du Pont de Nemours & Co., Wilmington, Del.

"Omniligent" is an accidental and unhappy invention of ours, caused by our failure to copy "omnilegent" (meaning "reading everything") correctly from our drugstore dictionary. We had left our glasses in our other suit.

Miss—Or Hit!

• • • But the brains department is either blessed with two pairs of glasses or has only one suit, as this reveals:

Your Feb. 3 editorial ends "It will have been, as the saying goes, 'spurlos versank.'" Did your "Dutchman" join the army? It should be *versenkt*.

—I. Maddaus

All that is left us of a year's losing battle with the master race's tongue is "Ich weiss nicht was soll es bedeuten." *But our money is on versank.* This is hardly more than a hunch, reinforced by the fact that page 67 of the "German Grammar for Chemists and Other Science Students" reads, "To form the past indicative tense, endings are added to the past stem of the strong (irregular) verb, except in the first and third persons singular."

True Story

• • • Our Philadelphia G-2 reports that an old gentleman walked down the long steps of the Union League Club, stopped in front of a high-priced haberdasher's on Walnut St., stared at a $100 hand-painted necktie in the window, and muttered "Damn Roosevelt."

Boil It Down

I have been making inquiries about reading habits, and am not sure that the desire for brief copy will depart after the war.

So writes one of the brains department's outposts. One of the few things we are sure of is that love for brevity will not be a victim of peace. It did not come with the war and will not leave with the war. It predated the chisel and stone tablet age, and there is no evidence that fondness for the-whole-story-in-a-sentence is greater in these days than in Shakespeare's.

But the journalist who assumes that his customers want everything in tabloid form will soon have no customers. The customer is content with a news pill where the development is of little interest to him. But if it is something of vital concern to him he wants a report in extenso.

The *New York Times*, which tells all, is not only the country's most influential newspaper, but a top money-maker as well. You can feed a man a well-balanced diet of concentrates. In theory he is well-nourished, but the trouble is that before long he gets too weak to walk.

Pale Gray Matter

• • • People who try to live entirely on tabloids get pernicious mental anemia. They get to know next to nothing about everything and come to a sorrowful end. To protect you from this fate, your favorite family journal gives you a balanced diet of tabloids and roast beef. For the former, see Newsfront (page 47), This Industrial Week (page 98), and Briefly Told (page 108).

See elsewhere in the issue for reports long enough to cover the subject. If two paragraphs will do it, two paragraphs you get. If it is an epocha! development, like continuous casting (page 48), requiring twenty pages, twenty pages you get.

Aptronym

The pastor of a Beverly Hills church is the Rev. Thomas Bellringer.

—E. J. Ehret, Farval Corp.

Happy Marriage

• • • Army Ordnance did a neat bit of word-telescoping in entitling a recent booklet "Metalurgency."

Emily Post's Office Guide

• • • Tom Campbell, your Pittsburgh leg man, was shown a list of typical questions asked the librarian of a large firm in Tom's parish. One was, "What is the correct procedure in introducing a vice-president and a typist?"

Considering the relative supply of each, we think the first thing for the introducer to do is to set the vice-president at ease. We suggest, "Miss Hockenlooper, allow me to present our Mr. Drane. We hope you find him satisfactory. If not, don't hesitate to report him to the personnel director." At this point the vice-president steps forward, curtseys, and says, "Just call me Joe."

Stopper

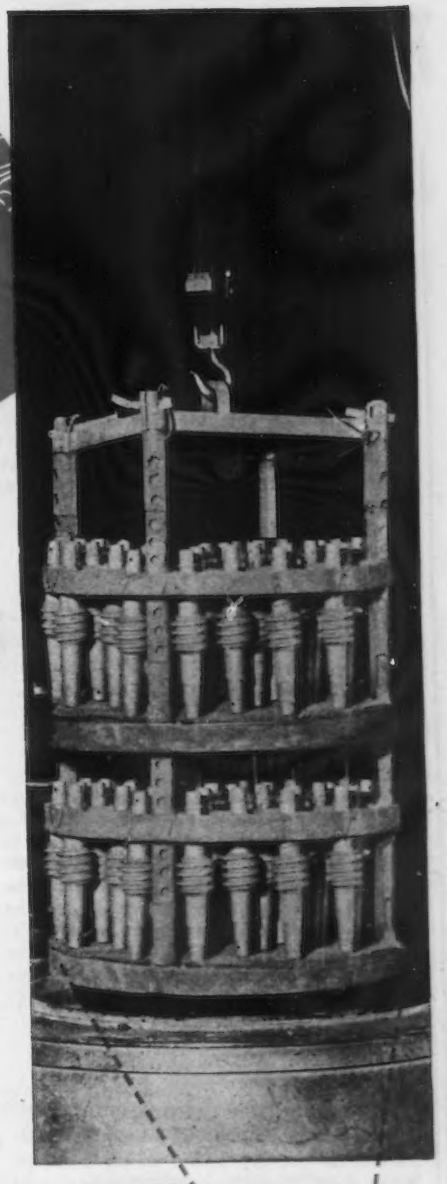
• • • The "Pincer Movement" with the Mother's Touch *—American Engineering Co.*

Puzzles

Last week's metallurgist was able to identify nine cubes, not counting a cube with no side ground. There were: 1 with 1 side ground, 2 with 2 sides ground, 2 with 3; and 1 with 1 side not ground, 2 with 2 not ground, and 1 with all sides ground.

Stan ("Assembly Line," see page 80) Brams sends this in:

This arrangement of 3 nines equals 11: $\frac{99}{9}$. *Rearrange them with simple mathematical signs to make them equal 80.*



Saves this labor and space and TRIPLES production

Lindberg Super Cyclone Furnace

ONE TYPICAL user by handling 100 worm gears per load, *increased production 3 times.*

This great improvement is possible because the work is confined in a small area and the heat is driven through the load at high velocity. Then the entire load is quenched at once, without piece-by-piece handling.

These are advantages of the principle of heating solely with fan-driven hot air which, in the Super-Cyclone, builds up temperature with rapid uniformity to as much as 1750°F. *throughout the charge.* Other advantages include keeping work straighter because there is no one-sided heat to cause distortion. Each piece and the complete mass of each piece is heated at the same rate.

And the versatile Super-Cyclone can be used for normalizing, hardening and tempering, with a temperature range from 300° to 1750°F. Lindberg furnaces can save for you too . . . write us now for complete information. Lindberg Engineering Company, 2452 W. Hubbard St., Chicago 12.

LINDBERG FURNACES

ARMY NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

Dear Editor:

SCRAP TO JAPAN

Sir:

How much scrap iron was exported to Japan for the ten year period prior to Pearl Harbor, and what are the closest estimates of Japan's scrap inventory?

FULTON OURSLER
WOR,
New York

● An estimated 11,600,000 tons of scrap was exported from U. S. to Japan in the eleven years from Jan. 1, 1931, to Dec. 31, 1941. On Jan. 1, 1942, Japan had stocks estimated at 10,000,000 to 12,000,000 tons.—Ed.

BRAZED CAST IRON

Sir:

What are the anticipated strengths per lineal inch of brazed joint and the cross-sectional strength per square inch of cast iron brazed to steel?

OLIVER H. WATSON
Harold Van Doren & Associates,
1217 Madison Ave.,
Toledo

● Eutectic Welding Alloys Co., 40 Worth St., New York, makes a ferrous alloy (No. 14) that develops tensile strengths up to 48,000 lb. per sq. in. It is applied at 940 to 1400 deg. F., which is much below the melting point of cast iron or steel. The joint is color matching and machinable. Other copper-base alloys, which can be used in brazing cast iron and steel, give even higher strengths.—Ed.

JAP MAP

Sir:

We would like permission to reproduce the map of Japan's war plants in the April 30, 1942, issue of IRON AGE, for the use of army and navy officers attending our Civil Affairs Training School on the Far East. This school is an army military government school.

FRED EGGAN,
Director
University of Chicago

● Granted.—Ed.

NEW ALLOY STEEL

Sir:

One of my associates heard Mr. Joslin, of du Pont's, made a fine talk in which he pointed out that aluminum and magnesium play such a large part in the post-war metals field. He cited a new alloy steel with 19,000 lb. tensile strength which would weigh comparatively the same as aluminum for equal strength.

Can you give me the names of any of the steel companies we might write to for technicals on these steels?

H. A. BEHRENDT,
Secretary
Basic Advertising Organization
475 Fifth Ave.,
New York

● A cipher is missing. A tensile strength of 190,000 lb. per sq. in. is obviously meant, as this is about the upper limit for high tensile steels. One of the best discussions on possibilities of low allow high tensile steel is the article, "Is Steel a Laggard?" by Frederick D. Foote, in THE IRON AGE issue of Mar. 4, 1943.—Ed.

ETHYLCELLULOSE PLASTIC

Sir:

In a recent *News Front* you refer to ethylcellulose plastic. Where can we get this?

J. L. MAYER
Trimount Instrument Co.,
37 West Van Buren St.,
Chicago 5

● From the Japan Co., 5103 Lakeside, Cleveland. For more information on this material see the article in our Feb. 3 issue, beginning on page 54.—Ed.

GRIND ANGLES

Sir:

Where can we obtain a tabulation of the recommended grind angles for all types of cutting tools? We are especially interested in how the angles should be adapted to the composition and hardness of the material to be cut, the cutting conditions, the finish desired, and the tool size.

R. K. WARREN,
Metallurgist
Crucible Steel Co. of America,
Sanderson Bros. Wks.,
Syracuse, N. Y.

● Most handbooks show tool shapes worked out by Taylor and presented by him before the ASME in 1906. Some sketchy data on tool shapes are in "Manual on Cutting of Metals" published by the ASME in 1939. The manual is now being revised and the new edition will contain much more specific information on recommended angles.

The best work has been done by manufacturers of non-ferrous metals. American Brass Co., Waterbury, Conn., last year produced an excellent manual on machining copper and copper-base alloys which recommends tool angles for all classes of cutting tools. The Aluminum Co. of America, Pittsburgh, Pa., revises from year to year its booklet on machining of aluminum, and The Dow Chemical Co., Midland, Mich., has produced similar data on the machining of magnesium.

The cemented carbide manufacturers and the makers of Stellite have issued much literature on recommended tool angles.—Ed.

IRON MINE DIRECTORY

Sir:

We have in years past depended considerably on the Lake Superior Iron Ore book published in Cleveland as a directory of the northern iron mines, but the last issue was 1938 and, of course, numerous changes have been made during the interim.

At the moment we do not seem to be aware of a good compendium of the northern iron mines, and wonder if you could assist us.

A. B. MOSELEY,
Asst. Sales Mgr.
MacWhyte Co.,
Kenosha, Wis.

● The Mines Register, published by Atlas Publishing Co., 133 W. 21st St., New York City, 742-pages, price $15, covers all metal mines. The last edition is dated 1942. Minnesota Mines Experimental Station, University of Minnesota, Minn., publishes a mining directory of Minnesota.—Ed.

AVERAGE EARNINGS

Sir:

We are interested in obtaining information which will enable us to establish a base year in an appeal for relief on Federal Excess profits tax rates.

Our business is that of metal working, which includes machining and forging of machine parts. Can you advise us where we may obtain information on the earnings for this particular field of business for the past ten or twelve years?

H. W. UMBERGER,
Treasurer
The Brenner Engineering Co., Inc.,
Myerstown, Pa.

● Try the Machinery and Allied Products Institute, 221 N. LaSalle St., Chicago.—Ed.

REX CORE BINDER

Sir:

In a recent issue you referred to Rex core binder. Who makes it?

F. X. KINDBERG
Letz Mfg. Co.,
Crown Point, Ind.

● Rex core binder is distributed through F. B. Stevens Co., Inc., 500 3rd Street, Detroit.—Ed.

GAS CLEANING

Sir:

Can you let us have any information with regard to the question of cleaning blast furnace gases?

J. H. STOREY,
Managing Director
Darwen & Mostyn Iron Co., Ltd.,
Mostyn, Flintshire,
England

● We recommend the recent paper on the use of super-imposed precipitators in the cleaning of blast furnace gases, which was presented by B. B. Frost before the Association of Iron and Steel Engineers, 1010 Empire Bldg., Pittsburgh, Pa. We are asking the Association to send you a copy.—Ed.

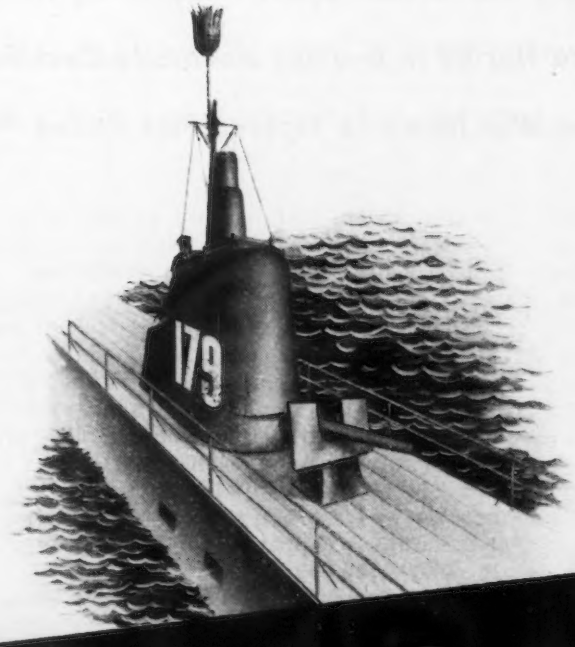
CENTRIFUGAL CASTINGS

Sir:

Thank you for the mention of our company on your "Dear Editor" page of Jan. 27. You intimated that we produce centrifugal castings. We do not operate a foundry of any type and are engaged solely in the manufacture of centrifugal casting machines.

However, the writer does do some actual centrifugal casting work, inasmuch as he is Consulting Engineer on centrifugal casting to the American Brake Shoe Co., and to the American Steel Foundries. He also does consulting work for other concerns on occasion.

NATHAN JANCO
Centrifugal Casting Machine Co.,
P. O. Box 947,
Tulsa, Okla.



Clean Sweep

When a Navy submarine comes into the home port with an old broom tied to the conning tower that is the sign of a "clean sweep." To a Navy man this means that every torpedo fired registered a hit. In metal cleaning, Wheelabrator makes a "clean sweep" in more than 2,000 plants on practically every conceivable cleaning application.

The Wheelabrator method of airless abrasive blasting registers a hit with every efficient business man as it knocks his cleaning problems into bits. Wheelabrating gives you these advantages: High-speed cleaning . . . Low-cost cleaning . . . Reduces horsepower . . . Conserves space . . . Reduces breakage . . . Speeds up machining and grinding . . . Lengthens tool life . . . Simplifies inspection . . . Improves appearance . . . Provides perfect bond for final finishing.

Check the list at the right and see how the Wheelabrator makes a "clean sweep" with cleaning problems for a variety of products.

Whatever your problems are, bring them to us. Our engineering staff has a wealth of sound experience that is ready to serve you.

- Cylinder blocks
- Tank turrets
- Armorplate
- Springs (all types)
- Gears, pinions, splines
- Boiler flues
- Sanitary ware
- Railroad car wheels
- Hardware
- Tools
- Bayonets
- Turbine parts
- Steel drums
- Torpedos
- Bombs
- Shells
- Cast pipe
- Compressors
- Brake drums
- Pumps
- Machine tools
- Stoves and furnaces
- Pistons
- Textile machinery
- Tractor parts
- Propellers
- Screw machine products
- Stampings
- Billets, sheet, strip, plate, rods, tubes, etc.
- Gun barrels
- Supercharger parts
- Bearing races
- Piston rings
- Tank treads
- Tank pins
- Tank links
- Landing struts
- Zinc die castings
- Shovels, hoes, rakes
- Gun mounts
- Anchor chain
- Lock washers
- Truck wheels
- Cartridge belt links
- Crankshafts
- Camshafts
- Connecting rods
- Axles
- Oil well castings
- Agricultural machinery
- Railroad specialties
- Oil burner parts
- Steam shovel parts
- Airplane parts
- Plumbing supplies
- Carburetor parts
- Typewriter parts
- Gun sight pieces
- Printing roller cores
- Sprockets
- Crankcases
- Diesel engine parts
- Pipe fittings
- Pumps (all types)
- Motors and generators

WHEELABRATOR
Airless Abrasive
Blast Cleaning

American
FOUNDRY EQUIPMENT CO.
510 SOUTH BYRKIT STREET MISHAWAKA, INDIANA

This Industrial Week . . .

- ***Many Phases of Baruch's Masterful Report Favored by Industrialists***
- ***Nation's Railroads Face Hurdle in Getting Necessity Certificates***
- ***Use of Steel for Packing War Items to Tighten Flat Rolled Picture***

MOBILIZATION for war gave the United States some valuable but hard earned instruction emphasizing the need for speediness, coordination and practicality. Can these lessons be applied in the difficult demobilization era ahead? The Baruch Report, issued Feb. 18, puts the spotlight on this broad question, points out that a businesslike job is entirely feasible, and delineates a program of great scope proposing specific steps on the many key problems, including those of manpower, surplus materials and plants, contract termination, and reconversion. Moreover, reformation of certain governmental conditions and methods is advocated.

Industrialists concur heartily in such Baruch recommendations as those governing the expediting of tooling, avoidance of unneeded military surpluses, reduction of debt, gradual elimination of strictly wartime agencies, the encouragement of private enterprise, and the blasting of red tape.

The report, which is said to have the imprint of Presidential approval and to reflect some of the War Department's thinking tempered by Mr. Baruch's own ideas, has aroused a question in Congress as to protection of Congress' powers. Congress particularly seems to want to direct the reestablishment of veterans and demobilized civilians. From the viewpoint of the public the main thing desired is adequate insurance now against chaotic conditions in the event of sudden cessation of the war.

While insisting that the needs of war are paramount at this juncture, the report nevertheless reminds the War Department that the demands of a healthy economy cannot be retarded during war. This is a subject that has been debated hotly at intervals in Washington for many months.

CURRENTLY, the nation's railroads are facing a hurdle of getting certificates of necessity for the 1944 equipment program scheduled by ODT, because opposition has arisen in certain Washington quarters to amortizing all-steel freight cars under the five-year Treasury plan.

While WPB would like to see the production of nearly 19,000 freight cars in the third and fourth quarters, and has made material available to keep all capacity filled, railroad executives say they do not think more than 50,000 cars and 1000 locomotives will be made this year due to lack of manpower in shops. Only 9000 cars are scheduled now for production in third quarter, but orders for 13,000 additional have been placed, pending the decision on amortization. Orders for about 11,000 cars have been placed for first and second quarters.

The total metal allocation to ODT for second quarter was: Carbon steel, 1,490,000 tons; alloy steel, 105,900 tons; copper and copper products, 24,510,000 lb., and 5,756,000 lb. of aluminum.

Approximately 370,000 tons of steel were allocated in the second quarter for freight cars, 37,500 tons for locomotives, 550,000 tons for rails, 291,000 tons for track accessories, and about 80,000 tons for frogs and switches.

Recognizing the increasingly critical situation in automotive replacement parts, the WPB granted the entire ODT request of 137,000 tons of carbon steel for this purpose, a 47 per cent increase over the 93,000 tons granted for the first quarter. The military spare parts program, too, is larger this year, and constitutes a sizable share of all combat vehicle production today.

TWO widely heralded civilian goods ventures, the providing of more household irons and the experimental production of diversified goods by small plants in three areas, are lagging. Difficulty in proving non-interference with war work and difficulty in holding down to 1942 ceiling price levels are said to be a drag on the civilian iron project.

Steel production this week is still strong, the national ingot rate remaining at 96.5 per cent. In some quarters of the industry it is expected that the absolute necessity for making furnace repairs may be a slight drag on operations during the next few months. Labor for tearing down and rebuilding open hearths is scarce.

The tight situation in flat rolled steel appears likely to become even more hectic since a new Ordnance Department packaging program requiring large quantities of 12 to 14 gage sheet is imminent. Third quarter tin mill production is expected to exceed 800,000 tons, compared with an approach to 800,000 tons for the second quarter and slightly more than 600,000 tons in first quarter. Tubular goods mills are working at top speed against huge backlogs of orders.

AMONG current problems in the steel industry is the situation whereby to an increasing extent, molybdenum, nickel, and other alloys have been creeping into carbon steel heats where they are not

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Steel Market Briefs

• GENERAL—Order volume will be high until outcome of European invasion becomes definitely known. Ingot stocking has diminished or disappeared. Repairs on furnaces may cause a two or three-point decline in the near future.

• FLAT ROLLED STEEL—Still tough. Plate directives heavy. No signs of let-up for some months. Carryovers at some plants are huge. Deep cutbacks have been made on barrel program, but still probability of later reinstatement of considerable tonnage. Sheet inquiries heavy. Deliveries are more extended. Change in the course of the war in Europe would drastically alter this picture.

• BARS—Backlogs on larger sizes heavier. Schedules well filled at some plants for first three months. Into August for some. Small sizes easier. Ammunition demands will support large bars for few months at least.

• TIN PLATE—Substantial tonnages of beer cans for export to be made in second quarter. Even more in third quarter. Third quarter tin mill production expected to exceed 800,000 tons, compared with an approach to 800,000 tons for the second quarter and slightly more than 600,000 tons to be produced this quarter.

• RAILS—Close to 2,200,000 tons expected to be produced this year. Second quarter stepped up from 515,000 to 550,000 tons. Return to mill on rail price portends upward adjustment by OPA.

• CANCELLATIONS—Increasing as a result of cutbacks, but continuing to be offset by heavy volume of new orders. Many cancellations turn into new orders at a later date, but trend is upward.

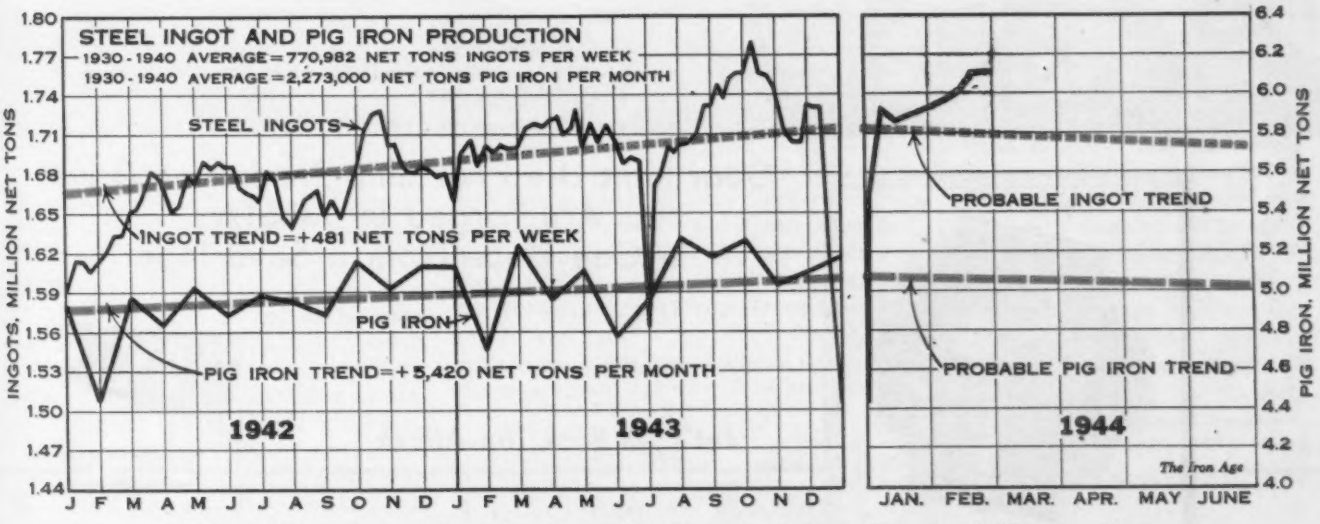
desired. Poor segregation of scrap and poorly meshed government orders are at the root of the troublesome problem, which is bothering certain mills more than others. Where possible, the heats with high residuals now are being diverted to such products as tie plates, spikes, fence and reinforcing bars, instead of going into vital uses where dies might be harmed and other damage caused. Steel producers have been urging customers to make wider use of triple alloy steels, but a $6 price differential is a barrier to wider acceptance of certain of these grades. Some customers recently have been pressing WPB to ease restrictions on SAE 2320, 3140 and 4140 steel.

So serious is the mixed carbon steel scrap problem that one steel company is sending a letter with every scrap order, specifying that carbon grades which contain in excess of 0.30 per cent nickel and 0.06 per cent moly will be rejected.

GETTING ready for hearings on the demand of the CIO-USWA for a 17c. per hour increase in wages, the War Labor Board has announced a panel of six which will consider the case. Meanwhile, WLB called a hearing for Wednesday of the present week on the question of extending contracts between USWA and 74 steel companies. They were cited to show cause why an interim order should not be issued extending contracts as requested by the union.

A further angle to the labor picture is a report that steel fabricators and miscellaneous manufacturers of steel products may be pressing to have their own WLB panel hearing, instead of being included with the companies actually producing iron and steel. Different competitive conditions would justify a separate hearing, it is held by the fabricators. The union naturally would oppose the move.

OPA'S study of carbon steel prices is proceeding as expected and it is now reported that findings will be released in two or three weeks, followed several weeks later by recommendations covering alloy steel. Meanwhile, the study into merchant iron ore prices which has been under way for a month is expected to result in a meeting of interested parties next Monday.

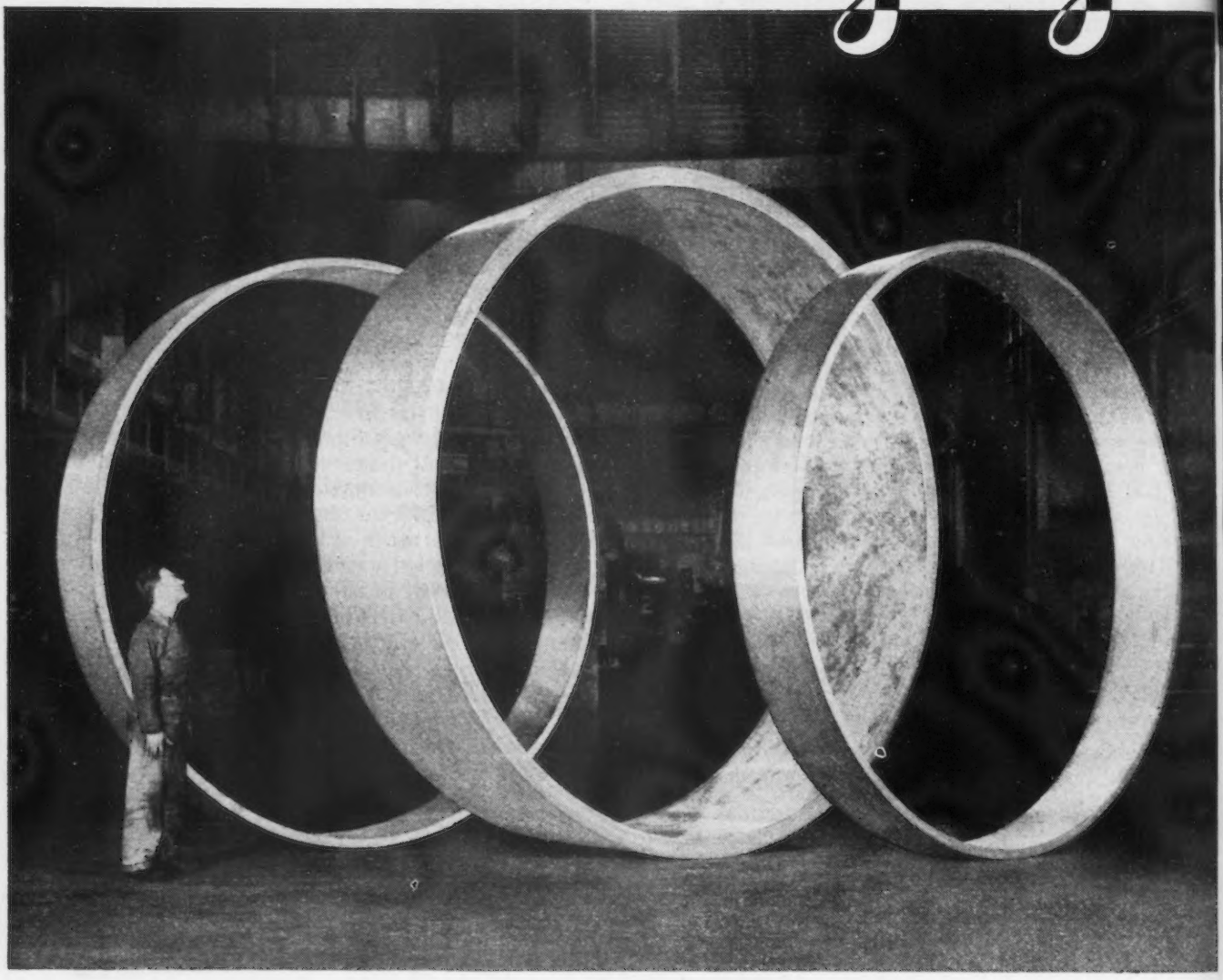


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 17	95.0†	102.0	95.5†	91.0	96.5	102.5†	95.0	99.0	96.5	95.0	94.0	101.5	90.0	96.5†
February 24	94.0†	102.0	97.0	91.0	93.0	104.5	96.5	99.0	98.5	95.0	94.0	101.5	80.0	96.5†

* Revised
† Based on revised capacity

MESTA Forgings



Gear Rims Used For Ship Propulsion Drives
Are Forged By MESTA
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Send for your copy of this
64 page booklet containing
valuable engineering data.
Address your requests to Dept. A-2.

Let's All Back The Attack

The Army-Navy "E" Flag with four stars, flies over the Mesta Plant.

MESTA MACHINE COMPANY
PITTSBURGH, PA.

Congress Questions Broad Principle Involved in Baruch Report

By DONALD BROWNE
Washington Staff

o o o

• • • **Clearly bearing** the imprint of Presidential approval, Bernard M. Baruch issued a demobilization report last Friday which reminded the War Department that the demands of a healthy economy must not be retarded during the war, and warned WPB and industry and labor in general that the needs of war come before plans for reconversion, but that those plans must be formulated immediately.

Senator George, Democrat of Georgia, chairman of the Senate Postwar Committee, said that while most of the differences between the Baruch report and the report of his committee could be easily ironed out, the two reports are irreconcilable on the point of whether postwar economics should be governed by directive order or by general policies laid down by "the representatives of the people," meaning Congress. From Senator Murray, Democrat of Montana, chairman of Montana, came the comment that the Baruch report was "admirable" but that he was not prepared to endorse all of its principles. The Montana Senator added that the report "properly emphasizes" the need for broad legislative action by Congress.

One of the chief differences between the Baruch report and the recent George report is that the former opposes the creation of an Office of Demobilization which would have supreme authority over reconversion subject only to the direction by War Mobilizer Byrnes. The Senate committee would deprive the War Department of any authority over reconversion. The Baruch report would make the War Department an equal authority over reconversion with WPB.

The Baruch report which is strongly dominated by War Department thinking tempered by Mr. Baruch's own ideas holds out benefits to all classes of people.

Veterans and demobilized civilians are assured of a re-establishment of private enterprise, jobs through economic resurgence caused by a civilian goods boom and a government plan for distribution of war surpluses and peace production surpluses to foreign countries needing reconstruction.

To the civilian population is offered immediate introduction into retail channels of war surpluses which are needed by domestic economy. The general surplus plan is conditioned upon a three-fold method of disposition.

The plan is:

1—Sell during the war to state, local and foreign governments such goods which are perishable in nature or tend to early obsolescence; 2—ration over a period of time those goods of standard quality which are relatively durable; 3—scrap all war goods obsolescent in nature, or likely to remain unsold after strategic requirements are met.

Personal subsidies of credit during the adjustment period will be granted by the government to "those requiring it" and particularly for smaller business groups and returning service men.

Industry is told that it can resume peace production plans under an "X" day reconversion plan to be formulated now and put into effect as soon as the war in Europe ends. The War Department has geared its supply program to this hypothetical "X" day.

Speedy reconversion financing through government assistance and private guaranteed loans, and a termination plan which with minor exceptions agree with the bill introduced recently by Senators Murray and George are inducements to industry and labor.

In the same category is a suggested tax law to be enacted now and put "on-the-shelf" to reduce taxes from war to peace levels, "thereby providing necessary incentive for initiative and enterprise and stimulating employment.

Attached to all of the demobilization programs affecting labor, industry and returning servicemen are strings whereby controls can be maintained by War Mobilizer James F. Byrnes.

WPB is given many reconversion duties under the report. However, most of its authority is shared with the War Department, particularly in "X" day reconversion matters. Nothing is said about how soon limited civilian production can start above present levels.

Some of WPB's duties are:

Setting up policies for order of termination; determining the priority of civilian manufacture; allocating materials to war as well as reconverting industries; assisting in mak-

DETROIT DREAMS: *Industrial designers in the auto city are really letting their dreams take form. The gadget in the lower left is a lawnmower, but you will still have to walk in order to direct it. Too bad it wasn't equipped with the chair shown in the center picture.*

ing policy on termination and surpluses through membership in two new interdepartmental bodies which are to govern these activities; and making plans for general reconversion through industry advisory committees.

The usual administration slap at pressure groups is contained in the report which also recommends that wartime industrial controls be relaxed in an orderly fashion and as quickly as feasible. The report does not say, however, when this period of relaxation should end and government controls dropped.

The War Department is gently chided although praised for its "fine advance planning which is under way and civilian agencies are told to "organize themselves to use the information effectively." The chiding has to do with War Department policy on making known its shifts in production programs public.

"To assure that cancellations will be planned in advance as far as is practicable and to remedy the inadequacies we found, we are recommending this tightening up of the cancellation procedure:

"1. The procurement agencies, in acting on the decision of the Chiefs of Staff, to inform the WPB of possible cancellations a soon as they begin to think of them, this should be done so WPB and other civilian agencies can become properly attuned for swift action when decisions are made.

"**We recommend** that the OWI, WPB and the procurement agencies work out the necessary machinery for informing the public fully and frankly as to the problem involved and the actions taken."

In calling for "speediest resumption of civilian production" to control the inflationary gap and make for a smooth transition to peace through enabling government and industry to plan for "X" day, Mr. Baruch dealt with great sagacity with the War Department fears of "complacency" if civilian plans are made, or put into effect.

He said: "With the hardest and bloodiest fighting ahead, some will object to such planning, in the fear that talk of resuming civilian production will divert people from the war; and perhaps, even precipitate a scramble by some to get back into peacetime production. We have weighed this view most carefully. It is an argument not without basis. But we conclude that the American people will face the facts courageously if the Government deals frankly with them.

"An early or sudden collapse of the Nazis in Europe, finding us unprepared for handling the transition problem could result in such chaos and confusion as to seriously obstruct the most effective prosecution of the war against Japan, and the last few weeks have given every American a special reason for not wanting to lose a minute in getting on with that job.

"Plan for peace? Yes. Let up on war? No."

TERMINATIONS — Termination features of the plan include: To assure quick cash pending settlement, immediate payment in full for completed and uncompleted contracts to prime and sub-contractors; payment of interest in termination claims; loans by local banks to war contractors to assure against delays in claim validating; direct government loans if banks aren't able to handle loans in 30 days; quick, fair, and final settlement through negotiation by contractors and procurement agencies.

Review powers of Controller General limited to fraud; settlements made by team of negotiators; teams filing reports and keeping records; contractors to keep records for three years; additions of Controller General and Attorney General to Joint Contract Termination Board.

Establishment of Joint Contract Termination Board within OWM to unify procedures and policies of all agencies. Chairman of this board to report to Congress, maintain surveys of V, VT, and T loans; recommend changes in contract settlement.

Spread acceptance by war contractors of uniform termination article for fixed price contracts.

Speedy handling of subcontractor claims. Prompt clearance of government property from private plants.

SURPLUS PROPERTY — Surplus property features of the plan include:

(CONTINUED ON PAGE 104)

WLB Steel Wage Panel

• • • The War Labor Board announced the names of the members who will form the panel to take evidence in the wage dispute between the USWA-CIO and the steel industry. Hearings will begin soon on procedure, which will be reported to the WLB before the panel takes evidence on the merits of the case. The panel members are:

Public—David L. Cole, chairman, public member of the Second Regional-WLB in New York and chairman of the New Jersey State Board of Mediation, and N. P. Feinsinger, vice chairman, director of the WLB disputes division and until recently chairman of the WLB trucking commission.

Industry — Hugh Morrow, president of the Sloss-Sheffield Steel and Iron Co., Birmingham, Ala., and Edwin D. Bransome, president of the Vanadium Corp. of America.

Labor—John Despol of San Francisco, international representative of the USWA on the Pacific Coast, and Stephen Levitzky of Pittsburgh, a charter member and international representative of the USWA.

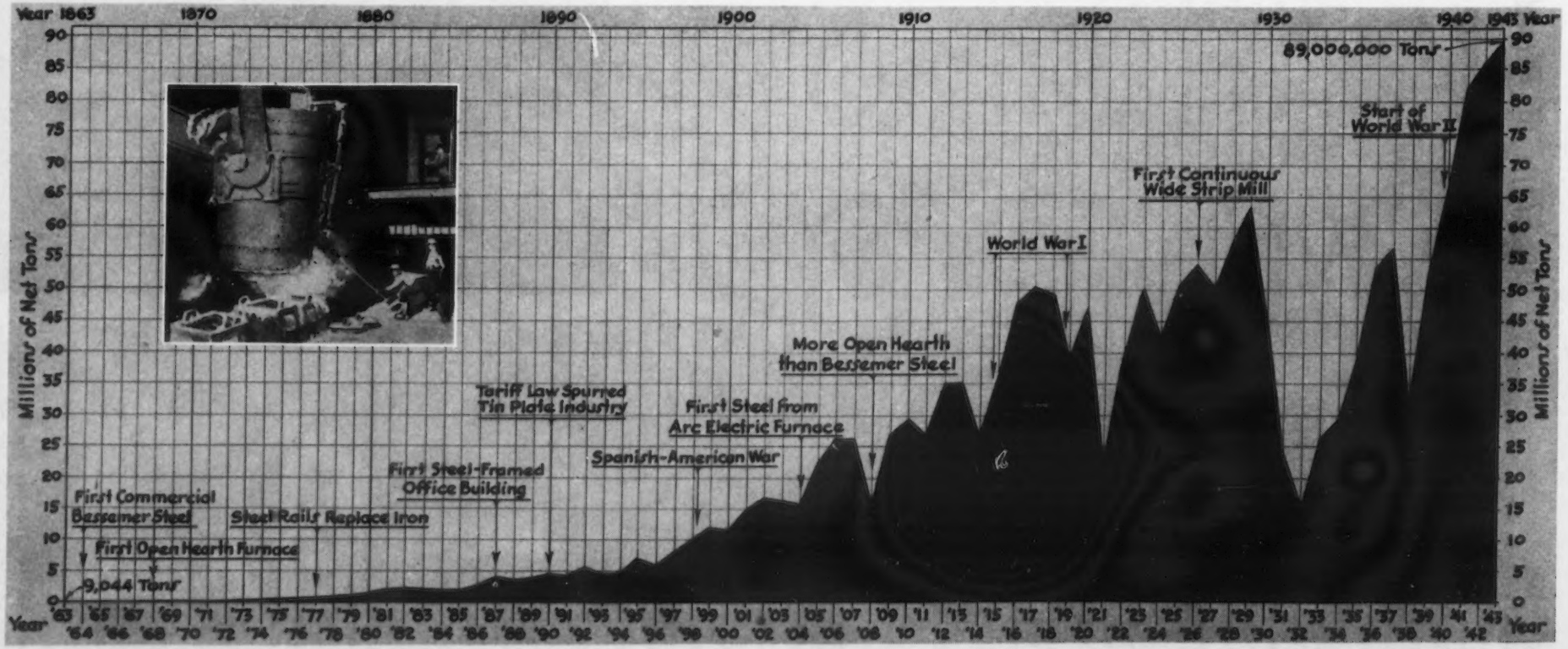
SUPREME COMMAND: ***Meeting in London on Feb. 1, to plan second front operations were: (seated, left to right) Air Chief Marshal Sir Arthur Tedder, Deputy Supreme Commander; Gen. Dwight D. Eisenhower, Supreme Commander; Gen. Sir Bernard L. Montgomery, Commander British Land Armies. Standing (left to right) Lt. Gen. Omar N. Bradley, Commander American Ground Forces; Admiral Sir Bertram Ramsey, Naval Commander in Chief; Air Chief Marshal Trafford L. Leigh-Mallory, Air Commander in Chief; and Lt. Gen. Walter B. Smith, Chief of Staff.***

Eighty-One Years of Steel Production in the United States

• The following tabulation is the production of steel ingots and castings compiled by the American Iron and Steel Institute. After 1933 the figures include only steel castings produced by companies making steel ingots. The chart is appearing in "Steel Facts," published by the Institute.

Years	Net Tons
1863	9,044
1864	10,369
1865	15,262
1866	18,973
1867	22,000
1868	30,000
1869	35,000
1870	77,000
1871	82,000
1872	160,108
1873	222,652
1874	241,614
1875	436,575
1876	597,174
1877	637,972
1878	819,814
1879	1,047,506
1880	1,397,015
1881	1,778,912
1882	1,945,095
1883	1,874,359
1884	1,726,685
1885	1,917,350
1886	2,870,003
1887	3,739,760
1888	3,247,373
1889	3,792,020
1890	4,760,319
1891	4,372,748
1892	5,518,891
1893	4,502,395
1894	4,941,476
1895	6,848,614
1896	5,915,492
1897	8,015,792
1898	10,004,800
1899	11,916,840
1900	11,410,928
1901	15,080,426
1902	16,740,920
1903	16,279,175
1904	15,623,074
1905	22,426,821
1906	26,205,913
1907	26,166,105
1908	15,706,037
1909	26,829,624
1910	29,226,309
1911	26,517,238
1912	35,001,459
1913	35,056,979
1914	26,334,594
1915	36,009,161
1916	47,906,522
1917	50,467,880
1918	49,797,923
1919	38,831,779
1920	47,188,886
1921	22,157,853
1922	39,875,277
1923	50,336,940
1924	42,483,772
1925	50,840,747
1926	54,089,014
1927	50,327,407
1928	57,729,481
1929	63,205,490
1930	45,583,421
1931	29,058,961
1932	15,322,901
1933	26,020,229
1934	29,181,924
1935	38,183,705
1936	53,499,999
1937	56,636,945
1938	31,751,990
1939	52,798,714
1940	66,982,686
1941	82,839,259
1942	86,031,931
1943	88,872,598*

* Preliminary.



The OWM director shall name a Surplus Property Administrator with full authority to handle all surplus disposal. A Surplus Property Policy Board shall be created with various government agencies represented.

Four major outlets are planned to handle actual disposal, each in a clearly defined field, with no overlapping: Consumer goods to the Treasury Procurement Division. Capital and producer goods, to a single corporation within RFC, consolidating present RFC subsidiaries. Ships and maritime property to the Maritime Commission.

The Surplus Administrator to report to Congress on legislation needed, basing recommendations on actual experience with the problem.

Suggestions by Baruch as to the broad policies that the Surplus Administrator may wish to follow are summed up in 10 basic principles.

All disposal agencies are to make effective use of Industry Advisory Committees. The Army and Navy are to examine inventories of critical civilian items to see what can be released during the war for the civilian economy.

RECONVERSION — Reconversion features of the plan include: Armed Services and WPB to work out an "X" Day reconversion plan based on the assumed defeat of Germany on a hypothetical "X" Day. Contract cancellation shall be integrated with procurement and expansion of civilian production so facilities and manpower are shifted to new war work. A full frank information policy shall be established on all cutbacks and cancellations.

The WPB shall work out in advance policies on which producers should be canceled and which left in production. The choices are to be made after consultation with WMC and other interested agencies.

Protection of small business in the resumption of civilian production as far as practicable without interfering with the war is urged.

Advance listing of the priorities are to be given different civilian needs in any opening up of civilian supply. The highest priority to go to those things which contribute directly or indirectly to improved military efficiency such as vital repairs, transportation.

As far as possible, all competitors to be treated alike in the resumption of civilian production.

Problem of Residuals in Carbon Steel Forces Producers to Take Definite Steps

By D. C. MacDONALD
Cleveland Regional Editor

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• • • **The trend away** from the production of pure analysis carbon steel has been growing during the past few months as a by-product of poor scrap segregation. The impetus placed behind the government alloy scrap segregation order has apparently produced some results in that direction. But with little or no incentive to accurately segregate plain carbon grades, very little scrap moving to the mills today can be trusted as being uncontaminated by one or more alloys, several steel producers report.

Orders for plain carbon steel in one principle area for instance are reported being accepted on the basis that residual nickel will not exceed 0.20 per cent and moly not over 0.08 per cent. A cross check of recent heats from several melters here shows open hearth plain carbon melts running from 0.06 to 0.10 per cent nickel, 0.07 to 0.10 per cent copper, 0.08 to 0.10 per cent molybdenum and in some cases up to 0.10 per cent tin. One exceptionally bad heat reported ran 0.37 per cent nickel and another 0.26 per cent nickel.

Moly is considered to be the most troublesome residual especially when deep drawing qualities are required. Nickel has been proving exceptionally troublesome in free-cutting steels. Chromium, which oxidizes off in the open hearth, has caused no trouble but its waste in this manner is being pointed out.

Just what amount of alloy is going into the making of carbon steel is impossible to estimate. Every car of presumably plain carbon scrap going into the yards of most consumers today is now being analyzed and the mean analysis of the alloy content used as a guide in charging. Melters report that practically every carload has some contamination and a spot check of mean anlysis reports showed nickel running as high as 0.45 to 0.62 per cent in a number of instances indicating that the car probably had nickel scrap running as high as 1.25 or 1.50 per cent mixed in with plain carbon.

Since the analysis limits of plain carbon steel have in reality nearly taken on a new set of tolerances, melters are working with the contaminated scrap to produce "mild alloys" within a given tolerance to be marketed as plain carbon grades. No premiums or discounts enter into the sale and in all cases the steel goes into normal plain carbon uses. However, wherever possible it is diverted to such products as tie plates, spikes, fence, barbed wire, nails and reinforcing bars. The waste of vital alloys in this way is beginning to catch the attention of both industry and the government.

Some dilution of high alloy content scrap is also being achieved by melting turnings in the blast furnace and charging the open hearths with pig containing somewhat less alloy than the original scrap and then further diluting with pure carbon scrap.

The effects of the various residuals are being offset by balancing the analysis through adjusting the carbon and manganese contents. However, troubles with the steels are being reported and one producer has had to cease making certain grades in some furnaces due to the nature of his local scrap supply.

D-E BEARING: *This Destroyer-Escort engine gets a "bearing job" at the York Corp. plant, York, Pa. This 1500 lb. cast iron tool marks areas on the bearings that must be ground.*

Industry Gives Returning Veterans A Helping Hand in Rehabilitation

Boston

• • • **Progress** is being made by Massachusetts industry in rehabilitation of veterans, especially by large concerns such as the Westinghouse Electric & Mfg. Co., and the General Electric Co. There has not been a single instance where a veteran returning to civilian life and applying for re-employment at the plant he left to enter the armed services has been turned down.

There have been cases, however, where a veteran is incapacitated for his original job, but in such instances he is put to work at some other task. Statistics regarding rehabilitation are not always available because the number of returning veterans is, in the case of some plants, not significant enough to be impressive. However, a very good idea of the progress of rehabilitation is had through the United States Employment Service in Boston. Some 800 war veterans are placed in civilian jobs each month by that organization.

The service reports that a very large majority of veterans want jobs in non-war plants, evidently figuring that postwar security is relatively more essential than high war job pay now. A great many veterans require a month or longer to get their civilian bearings and are strangely lacking in direction and purpose. The greatest handicap to rehabilitation is the many cases of psychoneurosis, the shock of rigorous basic army training making the veteran chronically morose.

Management knows that discontent and self-pity quickly rob producers of their efficiency, therefore it is important not to allow the handicapped man to grow to feel, because of his disability, that he is an object of charity, according to Robert M. Gaylord, president of the National Association of Manufacturers.

He believes that while a veteran is being trained to become self-sustaining it should be done in such a manner that his individuality develops, his earning power increases and his own dignity grows because of the work he is doing. He must realize that he will not be discriminated against because of his disabilities, but at the same time he must be able to produce effectively in competition with other men to keep a job at going rates.

Industry's responsibility for rehabilitation of all veterans who want to work and are able to receive training is vitally important and it is necessary that management take a personal interest in it before it becomes routine, according to Mr. Gaylord.

The average Massachusetts industry keeps in mind that to re-employ men now when plants are running full is one thing, and keeping them on the payroll is another. Manufacturers are therefore keeping before the public the kind of goods they make, and by so doing are laying the foundation for postwar business.

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Steel Research Committee Will Develop Wage Fight Data

Pittsburgh

• • • **Steel companies and** the United Steel Workers of America are making initial preparations for what is believed will be a long, drawn-out, War Labor Board hearing on the CIO's request for a 17c. an hr. raise, shift differentials, guaranteed annual wage, sick leave, etc.

A Steel Case Research Committee, to work with individual iron and steel companies in their forthcoming hearings before the WLB, has been established, according to John A. Stevens, vice-president, industrial relations, U. S. Steel Corp. of Delaware, who is chairman of this committee. Other members are: J. C. Argetsinger, vice-president and general counsel, Youngstown Sheet & Tube Co.; R. Conrad Cooper, assistant vice-president, Wheeling Steel Corp., J. M. Larkin, vice-president, Bethlehem Steel Corp., and, Lauson Stone, president, Follansbee Steel Corp.

The committee will produce data and conduct research on steel industry facts and figures pertinent to the steel case.

The Steel Case Research Committee has retained M. K. Mellott and Co., Pittsburgh, as public relations counsel. Temporary offices of the committee are with the Mellott firm.

The United Steel Workers of America are now preparing their data for the hearing, and, it is believed, much of its argument for higher pay will be built around the cost of living study recently made public by the two labor members of the President's Cost of Living Survey Committee.

Speculative opinion on how much the steel union will obtain in the way of a wage increase, regardless of the method used to produce such an increase, ranges from seven to 10c. an hr.

WLB Holds Hearing

• • • The National War Labor Board scheduled a public hearing, Feb. 23, in the Department of Labor Building, Washington, on the question of extending the contracts between USWA-CIO, and 74 steel companies.

The union has moved to terminate its contracts with these companies in order to negotiate for wage increases and petitioned the Board to extend the contracts as the Board did in the case of 500 steel companies covered by a similar petition Dec. 27, 1943.

Secondary Warehouses Want Zone Price System

• • • **Warehouses are closely** watching the results of the study of steel production costs undertaken by the OPA in an effort to determine the need for ceiling price adjustments since any price adjustments on the mill level obviously will be reflected directly in warehouse costs.

However, as pointed out by the Steel Products Warehouse Association, Inc., Cleveland, an association covering the bulk of the secondary and resale warehouses, such cost adjustments will be automatically translated into adjustment in resale prices on prime materials only. On rejects and seconds, however, resale prices are fixed and will not move in relation to changes on the mill level.

Thus, if mill ceilings increase, the price paid by secondary and reject warehouses will go up but the selling price will remain fixed. To overcome this discrepancy, the association plans to recommend to OPA a zone price structure for secondary products, which would tie resale prices to mill prices. Specific proposals prepared by the Association are being submitted to OPA to provide a basis for the adoption of the prime price structure.

Plates About Half of Flat Rolled Output

Pittsburgh

• • • **Slightly more than** 48 per cent of the total flat rolled steel products produced for sale in 1943 consisted of plates. This compares with 17.3 per cent participation for plates in 1939. The trend, so far this year, is probably close to 50 per cent of flat rolled production, going into various types of plates, due to the continuation of the unprecedented shipbuilding program.

The phenomenal increase in plate production during 1942 and 1943, which materialized, for the most part, through the conversion of wide strip mills, was also supported by unprecedented production records on regular plate units. This gigantic output was necessarily at the expense of sheet and tin mill production.

The tables accompanying this story disclose the various trends in various flat rolled steel production. It is expected that the trend in plate production has reached its zenith, and will, by mid-year, start a slow downward trend, both in participation and in actual production. Likewise, the trend in sheet production, which has been downward because of plate requirements, will probably, in the third quarter of this year, make a slow start toward regaining its pre-war position. These opinions, however, are predicated entirely upon Allied successes in Europe by August of this year—successes which will show, beyond any reasonable doubt, that the defeat of Germany is practically an established fact. Unlooked for military reverses, in the European phase of the war, would, in all probability, hold down not only sheet and tin mill production, but would also keep plate output around present levels.

The loosening up, by the WPB, on tin mill restrictions, means, no doubt, that production of these items in 1944 will be somewhat ahead of 1943, when tin mill output constituted about 9 per cent of total flat rolled steel production, as contrasted with 17.4 per cent in 1939.

In comparing the position of total flat rolled steel output with respect to total finished steel produced for sale, it has maintained its relative importance fairly well since 1939. In that year, total flat rolled production was 46.5 per cent of total finished steel produced, as contrasted with 43 per cent in 1943. The decline in the participation of sheets, tin plate and strip, was almost entirely offset by the substantial increase in plate output.

As a pure guess, it seems possible that the position of flat rolled production and its various components, after the end of the European phase of the war, will probably take a pattern somewhat along the line shown in the statistics below for 1941. At the close of all military hostilities, it seems reasonable to believe that the 1939 pattern will predominate.

Trends in Flat Rolled Steel Produced For Sale

1939-1943 000 Omitted

(Source American Iron & Steel Institute Rept. No. 10. Net Figures Used. Adjusted for Shipments Within the Industry.)

	NET TONS							
				Tin Mill Product				
Year	Plates	Skelp	Sheets	Black P.	Tin Plate	Strip	Total Flat Rolled	All Steel Products
1939	2794	227	8505	269	2561	1837	16193	34955
1940	4171	527	10186	273	2690	2140	19987	45966
1941	5987	449	12654	474	3566	3090	26220	60943
1942	11437	368	8504	419	2659	2234	25621	60591
1943	12918	298	8529	355	2105	2516	26721	62210

Flat Rolled Steel Products in Per Cent of Total Finished Steel Produced For Sale

Source Material: American Iron & Steel Inst. Compilation—The Iron Age. 1939-1943

	PER CENT OF TOTAL FINISHED STEEL					
Year	Plates	Skelp	Sheets	Tin Mill	Strip	TOTAL Flat-Rolled
1939	8.0	0.7	24.4	8.1	5.3	46.5
1940	9.1	1.1	22.2	6.4	4.7	43.5
1941	9.8	0.7	20.7	6.7	5.1	43.0
1942	18.9	0.6	14.0	5.1	3.7	42.3
1943	20.7	0.5	13.7	4.0	4.1	43.0

Flat Rolled Steel Products in Per Cent of Total Flat Rolled Produced For Sale

Source Material: American Iron & Steel Inst. Compilation—The Iron Age. 1939-1943

	PER CENT OF TOTAL FLAT ROLLED				
Year	Plates	Skelp	Sheets	Tin Mill	Strip
1939	17.3	1.4	52.5	17.4	11.4
1940	20.8	2.6	51.0	14.9	10.7
1941	22.9	1.7	48.2	15.4	11.8
1942	44.6	1.4	33.3	12.0	8.7
1943	48.4	1.1	32.0	9.1	9.4

Lukens Earns $1,317,280

Coatesville, Pa.

• • • **After all charges** including $4,320,000, for Federal and state taxes on income and a postwar reserve of $733,000, for the 1943 fiscal year which ended Oct. 9, Lukens Steel Co. reported a net income of $1,317,280. This compares with $1,172,522 earned in the 1942 fiscal period after provisions of $3,900,000 for taxes, $330,000 for postwar reserves, and $2,500,000 for renegotiation of contracts.

Manufacturing costs of products sold during the year were 19.5 per cent higher than in 1942, while sales were 13 per cent higher than during 1942. The company purchased $634,000 of its 4.75 per cent sinking fund debentures during the year, of which $298,000 were retired through the operation of the sinking fund and $336,000 are held in the treasury. On Oct. 9, 1943, $1,556,000 of the debentures were outstanding in the hands of the public, which compares with $2,200,000 on Oct. 10, 1942.

Engine Cylinder Life Extended By New Chromium Plating Process

New York

• • • **Postwar motor car,** airplane, marine, and industrial engine cylinders may be expected to run from 4 to 20 times longer than thought possible before Pearl Harbor. Under military restrictions, the existence of a development that prolongs engine life to such an extent has remained practically unknown to the public. It has been used in the Navy's submarines since the beginning of the war, giving undersea craft longer striking ranges.

Of late, it has been adapted to reconditioning cylinders of planes. Tests show that the worn cylinder barrels can be renewed by this process and made capable of six times their original life. It is also being used to reclaim tank engines.

This development was brought to America by a Hollander, Hendrik Van der Horst. It involves coating cylinder walls with a thick layer of hard chromium applied by a special process that leaves the plated surface porous. The plating has high resistance both to wear and the corrosive acids that accumulate in engine combustion chambers.

The chromium is applied to cylinders in such a manner that the surfaces are made porous, like a sponge, to retain an even distribution of oil. Van der Horst, in interesting the Navy in the development, was given the salvaged engines of the ill-fated submarine squalus on which to apply what was aptly termed Porus-Krome. The success of that effort quickly led to further use of the process by the Navy before war broke out.

Recognizing acceptance of the process led to formation of the Van der Horst Corp. of America, which now operates plants in Olean, N. Y. and Cleveland. Under license from this concern, the process is applied to piston rings manufactured by American Hammered Piston Ring division of the Koppers Co., Baltimore; the Wilkening Piston Ring Co., Philadelphia, and the Kohler Co., Kohler, Wis.

In addition to being used in many of the combat vehicle engines, compressors and stationary diesels used by many plants engaged in the war effort are so equipped, and a number of tests and experimental installations are on record.

New York Omnibus Corp. reported that a group of its bus engines proved to have five times longer cylinder life as a result of using Porus-Krome. A tank truck and trailer of the fleet operated by the Willett Co., Chicago, has hauled 110,000 miles and shows only 0.002 in. of wear in its chromium processed cylinders.

These instances, and others now coming to attention in various industries, give promise of "more miles per dollar" from postwar use of this process.

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Large Projects May Aid Bar Sellers

Pittsburgh

• • • **Although** the concrete bar industry is still being pushed around, tonnage-wise (its order volume being only about a third of normal practice) there seems to be some glimmer of hope on the horizon when postwar construction, or even pre-postwar building, finally is permitted.

At a recent meeting, covering construction subjects, some members of Congress hazarded guesses that close to $3,000,000,000 of Federal funds, probably will go for road building after the war. These Congressional sources, however, suggested that State and County personnel do not wait until the war is over to make their plans.

Another angle, which has entered into the discussion of preparing for postwar or pre-postwar construction, is the need for supplying jobs to men who are constantly being released from military service. A rough estimate, given recently, indicated that about 100,000 men a month were being released from the armed forces.

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ARMY LANDING: *After an unopposed landing on the beach at Saidor, New Guinea, and the subsequent capture of the Jap airfield there, these American soldiers unloaded a cub plane for artillery observation.*

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Briefly Told—

Reserves and Renegotiation
Alabama Detinning Plant
Mystic Banks Furnace

• Representing the six Government renegotiating agencies the Joint Price Adjustment Board held that reserves for war contract renegotiation funds which may be set aside are "not to be considered directly or indirectly" in connection with determinations of price adjustment refunds to the Government. Chairman Joseph M. Dodge said that the "increasing practice of providing such reserves is to be encouraged as a matter of sound accounting."

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• *Affecting 25,000 workers, a liberalized vacation plan for hourly rated employees, allowing a week's vacation with pay for those with one year's service, has been approved by the War Labor Board for the Aluminum Co. of America. The previous vacation system allowed vacation pay only for those with at least two years of service. Employees with five years of service will get two weeks' vacation with pay as heretofore. If time off cannot be taken, the employee will be given vacation pay in lieu of time off.*

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• The new detinning plant at Birmingham, Ala., financed by the Defense Plant Corp., went into operation Feb. 15. The plant is being supplied with salvaged tin cans from Alabama, Georgia, Florida, Mississippi, and other states with easy rail connections. This was the only complete DPC-built detinning plant project that was finished. Some 25 or 26 other such projects were cancelled before completion. The Birmingham plant was built by H. K. Ferguson Co., Cleveland.

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• *The Mystic Iron Works has decided to temporarily bank its furnace Feb. 20. In making this announcement it was stated the action was taken to relieve the coke situation, both foundry and domestic, which is decidedly light. The furnace has a sufficient stock of foundry and malleable iron on hand to supply demands as foreseen now, and is in a favorable position to resume operations promptly when it becomes necessary.*

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• Normal attendance was reported during the day shift at the Bethlehem Steel Co. Hoboken Shipyard Feb. 18, following a strike of approximately 1400 workers on the night shift on Feb. 17. George Brown, manager, said the strike delayed work on Navy vessels and cargo ships. The night shift struck over the disciplining of a shop steward who assaulted his supervisor.

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• Effective at once, establishment of a new basing point for sales of primary lead was announced by OPA on Feb. 22. The new basing point is Bayfield, Wis., and the maximum price for lead, delivered at Bayfield in carload lots, is established at 6.50 per lb. Bayfield was established as an additional basing point because that city has become a lead consuming center, OPA said. The ceiling price is fixed at .10c. higher than ceilings at other basing points cities in Wisconsin to reflect higher freight costs.

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• WPB announced simplification of allocation procedures for slab zinc. The action, however, in no way relaxes restrictions on its use. Under amended order M-11, remelt zinc is removed from allocation and scrap zinc deliveries are no longer controlled. Another change is that in procedure for applying for and receiving authorizations to accept delivery of slab zinc. The order no longer requires dealers to obtain a preference rating off of AA-5 or better before making shipment. The changes in reference to remelt zinc and scrap zinc become effective immediately, whereas the new allocation procedure becomes effective April 1, following filing of new applications on March 12.

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• *Reference in L-65 to WPB application forms, used by manufacturers in requesting permission to ship resistance wire and commercial cooking appliances, have been brought up to date through minor revision of that order, WPB announced. At the same time, the form numbers for appeals and reports under the order were brought up to date. The application forms required under the revised order are WPB form 1319 (instead of PD-556), the report form, WPB-1600 (formerly PD-655), and the appeals form, WPB-1477 (formerly PD-500).*

• Donald M. Nelson said reecntly that WPB is examining with leaders of various consumer goods industries the problems that will arise when the time comes for transition back to peace-time production. These discussions are being held with the members of a number of WPB industry advisory committees, and will be supplemented by meetings with labor groups.

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• B-24 bombers that once cost $238,000 recently were ordered (4500 of them) for $137,000 apiece; a .50-cal. machine gun formerly priced at $510 is now being bought for $210; light tanks which used to cost $45,000 each have fallen in price to $22,564; Garand rifles are available at $42 vs. $116 previously; a 105-mm. shell is priced at $3.75 vs. $5.97 formerly. These were examples cited by Brig. Gen. A. J. Browning last week in stating that the Army is paying 20 per cent less for equipment than two years ago. More than $9 billion has been saved as a result of these reductions.

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• Charles R. Hook asserted recently that industry faced possible "economic starvation" unless the government assumed a "more reasonable" attitude toward corporate taxation in the postwar period. The Armco head was speaking before the San Francisco Chamber of Commerce.

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• *H. E. Hall, president of the Metals Disintegrating Co., Inc., Elizabeth, N. J., has been elected president of the Metal Powder Association, a new group of commercial producers of all types of metal powders. Headquarters of the association will be at 60 East 42 Street, New York.*

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• Industry faces continued severe cuts in war orders in the next few months with complete or partial cancellation of a large number of contracts, according to Brig. Gen. Albert J. Browning, director of purchases of the War Department, who has just been made chairman of the WPB procurement policy board. Aircraft deliveries, however, will make up for a large part of the reduction in deliveries of other goods to the Army, the general said.

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• With the lower Great Lakes free of ice there is feverish activity preparing the 25 ships wintered at Milwaukee. While shipmasters have not received definite instructions, it is expected navigation will open much earlier than the traditional April 15, according to Harry C. Brockel, Milwaukee port director. Milwaukee has car ferry service across Lake Michigan all winter and there have been several tankers out of Chicago running this winter.

Metal Allotments Made to ODT

• • • **Continuation of** the upward trend in allotment of controlled materials for domestic transportation was reflected today in ODT's announcement of the WPB's allotment for the second quarter of 1944. ODT officials said that for the second quarter of 1944 domestic transportation will receive a total of 1,812,000 tons of carbon steel, or 94.5 per cent of the 1,917,325 tons requested. This allotment constitutes the largest amount made available since the ODT became the claimant agency for domestic transportation under the CMP early in 1943. For the first quarter of this year, the allotment was 1,538,645 tons.

In addition to the carbon steel, ODT was also authorized proportionate amounts of alloy steel, copper, and aluminum. Railroads will be allotted, during the second quarter, the full quantity of new rail which the ODT requested, amounting to 550,000 short tons. Track accessories totaling 291,500 tons were also authorized, plus a further allowance for frogs, switches and other "B" products for track work.

The ODT requested materials to build 25,000 new freight cars and was granted materials for 18,500, which, according to the WPB, is the maximum capacity available for car building for domestic transportation during the third quarter. Third-quarter capacity must be taken into account in setting the second-quarter allotments owing to the lead time required for production.

ODT officials said that orders placed to date by the railroads for new freight cars fall far short of potential production during the third quarter. They emphasized that unless the carriers expedite additional orders, the materials and plant capacity available for that quarter will not be fully utilized. The same considerations apply to subsequent quarters, they added.

Recognizing the increasingly critical situation in automotive replacement parts, the WPB granted the entire ODT request of 137,000 tons of carbon steel for this purpose, a 47 per cent increase over the 93,000 tons granted for the first quarter. While this increased allotment is expected to contribute to improving the general parts situation in the next few months, production difficulties on critical engine, transmission and axle parts are still being encountered. Material requirements for local transport, motor transport and waterways were met practically in their entirety, the ODT said.

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Tool Bits Classed as B Product Under CMP by WPB

Washington

• • • **Tool bits, beginning** in April, will be classified under CMP as a B product. Thus, when tool steel is cut to length and heat treated it will no longer be classified as a controlled material.

In a letter to producers of tool steel from J. T. Whiting, director of the WPB Steel Division, it was pointed out that in Schedule I of CMP Regulation 1, amended Feb. 2, 1944, CMP code numbers 2001, 2005, 2501, and 2505 covering carbon and alloy steel bars will not include, after March 31, 1944, "tool steel, irrespective of grinding, when cut to length and heat treated for use as tool bits." In other words, cutting to length and heat treating tool steel for use as tool bits will mark the change of tool steel from a controlled material to "tool bits; metalworking," a class B product, code 362 under the jurisdiction of the WPB Tools Division.

Manufacturers of tool bits will apply for an allotment of controlled material by filing form CMP-4B with the Tools Division, or, if so notified, with the WPB Field Office. Sales will be made to fill rated orders subject to provisions of WPB orders and regulations governing distribution of class B products.

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Replacement Method Issued For Damaged or Lost Material

Washington

• • • **WPB announced** rules governing replacement of defective material or material which has been lost, stolen, destroyed or damaged in transit when rated orders were placed for it. A supplier must schedule replacement delivery of material on the basis of the original date of the order as follows:

1—If, in the case of defective or damaged material, he is notified within 15 days after the material was delivered by the person who placed the rated order.

2—If, in the case of material lost, stolen, or destroyed in transit, he is notified by the person who placed the rated order within 45 days of the date the material was shipped.

If the notice is received after the 15 or 45 day period, the supplier must schedule the replacement delivery as if he received a separate order on the date the notice is received.

If the purchaser wishes, he may place an order for material that is defective, damaged, destroyed, lost or stolen, with another supplier than the one from whom it was originally ordered, using the same rating as first used. However, the new supplier must treat the order as new order.

Price Briefs

• Amdt. 92 to RSR 14 applies a new pricing system to used and reconditioned valves.

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• Amdt. 14 to RPS 4 establishes specific dollars-and-cents differentials on railroad steel scrap generated by railroads, car manufacturing companies, and switching companies to determine their ceilings for 35 listed grades of railroad steel scrap. (Release No. OPA-T-1733)

Priority Changes

L-1-j—Amended order eliminates reference to information supplied when filing WPB Form 1319 to sell, transfer or convert fluid-food trucks, trailers, or tank tractors. (2-16-44)

L-53-b—Amended order waives minimum requirement certificate for certain purchases of construction machinery parts. (2-16-44)

L-112—Amended order eliminates reference to information supplied when filing WPB Form 1319 to sell, transfer or convert industrial power trucks. (2-16-44)

L-161—Amended order prohibits use after April 1 of vulcanized fiber tubing in the manufacture of non-renewable electric fuses except under specified conditions. (2-16-44)

L-298—Amended order requires filing WPB-1319 as the authorized form for the delivery of resistance welding equipment. Formerly Form 2752 had to be filed. (2-16-44)

L-332—Order restricts after March 1 all deliveries of new and used container machinery, including that used for packaging and labeling, can closing, can making, glass jar and bottle making and cleaning or reconditioning. (2-16-44)

P-142—Amended order authorizes operators of transportation systems to schedule a majority of materials for the final three quarters of 1944 without the necessity of seeking each quarter's authorization on WPB Form 2585. (2-15-44)

CMP Developments

• Operating Instruction No. 23, Supp. 3, repair shops are not to apply for controlled materials on Form WPB-2613. This form is intended for use in making application for production materials.

•

• Dir. 16 to Reg. 5, permits steel wire used in making brooms to be ordered under procedures applicable to MRO supplies. (Release No. WPB-4997)

Industry Given Credit by Hoover of FBI for Low Rate of

By EUGENE J. HARDY
Washington Staff

o o o

• • • **Hitler's and Tojo's** hopes of disrupting American war production have been blitzed. The vigilance of the Federal Bureau of Investigation and the cooperation of American industry have held industrial sabotage to a minimum. Of 13,672 cases of sabotage reported to the FBI as of Jan. 1, not one was found to be enemy-inspired. In comparison to the enemy-caused destructive explosions and fires of World War I, acts of this sort have been non-existent during this war.

The files of the FBI show 1404 cases of sabotage in some form uncovered in the investigation of the total cases reported. The Department of Justice has obtained convictions of 508 persons in these cases, resulting in 1341 years of sentences, one life imprisonment and six executions up to Jan. 1. The executions accounted for six of the eight Nazi saboteurs who were apprehended by the FBI before they had an opportunity to do their dirty work.

Sabotage has been uncovered in steel mills, aircraft factories, food processing plants, shipyards, railroads and many other American industries. Motivation behind these acts can be classified under five general headings: Carelessness, spite, horseplay, revenge and the desire to become a hero. Faulty machinery and inadequate plant protection are also contributing factors. The FBI archives hold case histories encompassing all of these.

The saboteur acts in many ways to impede production and the industrialist has to maintain a watchful eye if his plant is to be free from destructive acts. Broadly, the types of sabotage may be broken down into three general categories: Arson, explosion and mechanical. Sabotage which has been uncovered and may possibly occur includes many and varied acts. Following are some of the forms of sabotage which may come up at any time during the course of the war:

(1) Damage to machines and equipment by breakage, abrasives and chemicals; (2) destruction of buildings and machinery by use of explosives and time bombs; (3) attempted damage to key points such as power plants and switchboards; (4) injury to raw materials; (5) creation of fire hazards; (6) bacterial hazards, water and food; (7) theft or damage to blueprints or models; (8) damage or destruction to main transportation routes; (9) injury to precision tools.

With the outbreak of war in Europe on September, 1939, the FBI commenced surveys of all the major industrial plants engaged in war production or designated by the War and Navy Departments as vital. Over 2400 plants were inspected. The surveys showed many cases where carelessness and lack of knowledge of plant protection may have resulted in immeasurable damage had they not been corrected. The FBI found industry extremely cooperative and in all cases speedily remedied conditions discovered by special agents.

In one plant agents discovered that the average age of guards was above 64 years, with some individuals over 80. On a military reservation children living there were given a master key which opened the gates, as a shortcut to school. These children were relied upon to lock the gates after them. In a case of another sort irreplaceable plans and working models of successful experimental government machinery were kept in a flimsy building, protected by two carbon tetrachloride fire extinguishers, which are valueless against wood fires and other combustibles of that type. A great number of plants had fire extinguishers which hadn't been recharged in years, as well as rotten fire hose.

Many plants were found to have inadeqate employee identification systems. Too great reliance was placed on time clocks, but it was quickly pointed out that anyone can punch a time clock, resulting in the adoption of photographic badges as a means of identification in a great number of cases.

A hobo was discovered on a government proving ground. On questioning it was learned that he had been living there for three days without having been challenged. FBI officials emphasize the necessity of maintaining proper systems of employee identification, as one of the major points in protection against sabotage.

In quite another type of case in which the employee was at fault the FBI learned that several barrels of tools, valued at several thousand dollars had been recovered from employees who were taking them from the plant. This happened when a local news photographer asked permission to have the gates closed to enable him to get good picture of crowds leaving the plant. The word soon spread through the plant that the gates were closed so that employees could be searched before leaving the plant and pockets were soon emptied. As trivial as this incident may seem the loss of equipment might become serious if carried on indefinitely.

Other dangers discovered in the FBI survey include fire hazards where spontaneous combustion could have been the igniting agent and cases where vaults constructed to house blueprints and models had wooden floors, and glass windows facing the street, despite the elaborate steel doors and combination locks.

FBI Director J. Edgar Hoover told THE IRON AGE that "the low rate of sabotage has been due in a large measure to the fact that industry has taken due precautions to guard against it."

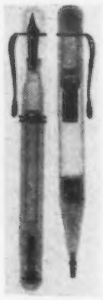
Another step taken by the FBI to protect American industry from the dangers of sabotage and provide security at home was taken immediately after the Japanese sneak attack with the inception of the alien enemy program by residential directive. Within 24 hr. after Pearl Harbor over 1400 alien enemies of the most dangerous type for many months known to the FBI were taken into custody. Up to Jan. 7, 1944, the FBI with the cooperation of local law enforcement officers, had taken 15,103 alien enemies into custody. These included 5335 Japanese, 6191 Germans, 3553 Italians and 24 Bulgarians, Rumanians and Hungarians. Of these 5176 have been interned, 4820 paroled, 2908 released without further hearing and the remainder released after hearing.

Large quantities of dangerous material have been confiscated from the

(CONTINUED ON PAGE 112)

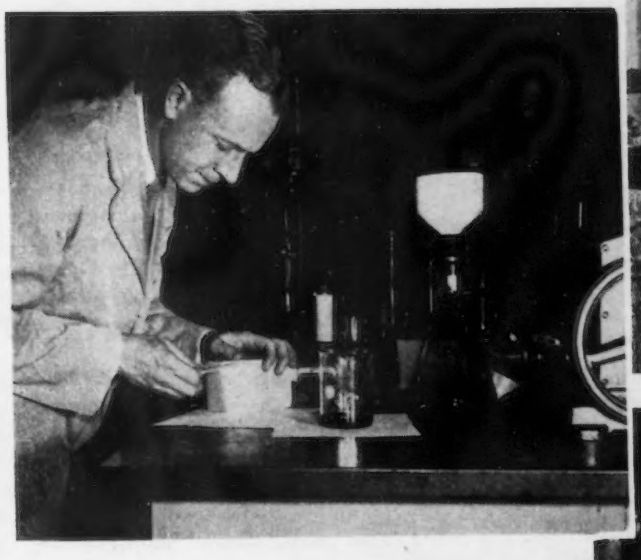
Industrial Sabotage During This War

Much Malicious Work Uncovered in Mills and Factories, but No Cases Inspired by Enemy; Carelessness, Spite, Horse-play, Revenge Among the Many Motives



• Part of Nazi saboteurs' equipment—incendiary pen and pencil set, shown by means of X-ray photo. At right, group of German saboteurs who were executed or imprisoned.

F.B.I. Chief J. Edgar Hoover



• Because of the acts of two small boys, more than $1,000,000 worth of patterns burned in the plant shown in ruins af extreme right. The boys went into the plant carrying a pot containing burning paper and wood, then fled when they saw a "ghost."

Below, at right, equipment of Nazi saboteurs is shown. This box contained ten blocks of TNT and four bombs resembling coal.

Above, FBI scientist is examining TNT blocks brought by German saboteurs.

IF YOUR PLANT is one of the ever-growing number that is extending the useful life of tools, dies, gauges and other production machine parts by hard chrome plating, you will find that the FIRST important STEP in getting successful results is THOROUGH DEGREASING. Surfaces must be CHEMICALLY CLEAN . . . insoluble smut, grease, shop dirt, oil and other accumulations completely removed to assure durable, uniform finishes.

No wonder, then, that many plants, to put this essential cleaning work on a trouble-free, low-cost basis, are using

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Applied either by still tank cleaning, anodic degreasing or cathodic cleaning methods, these effective, fast-working materials have effective wetting-out, emulsifying and penetrating properties that SPEEDILY, COMPLETELY remove ALL accumulations. As a result, surfaces are left in the chemically clean, smut-free condition required for the proper adhesion and uniformity of the subsequent chromium plate.

Successful, time-saving, economical Oakite acid-detergent techniques also are available for thoroughly yet safely stripping old chromium plate, wherever necessary, prior to replating.

WRITE FOR *FREE* DETAILS *TODAY!*

Your nearby Oakite Technical Service Representative will be glad to place at your disposal his specialized knowledge and experience on this or any other degreasing and cleaning job you want performed faster, easier or at low cost! Write today . . . no obligation whatever, of course.

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Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE MATERIALS METHODS SERVICE — FOR VICTORY BUY WAR — **CLEANING** FOR EVERY CLEANING REQUIREMENT

(CONTINUED FROM PAGE 110)

homes of these aliens, including 4626 firearms, 306,247 rounds of ammunition, 2300 sticks of dynamite, 2800 dynamite caps and several thousand radio sets and cameras.

Actual cases of sabotage discovered by the FBI show a wide variety of motives and methods, In March, 1943, Eduardo Gonzales, a 19-year-old employee of the Warman Steel Casting Co., Los Angeles, struck an electric furnace with a sledge hammer until the inside brick lining collapsed. On being called into the case FBI officials found that other employees had seen Gonzales committing the damage in question. He threatened to kill anyone who told of seeing him smash the furnace, but five signed statements were obtained. After the lining collapsed the furnace had to be shut off to prevent its destruction.

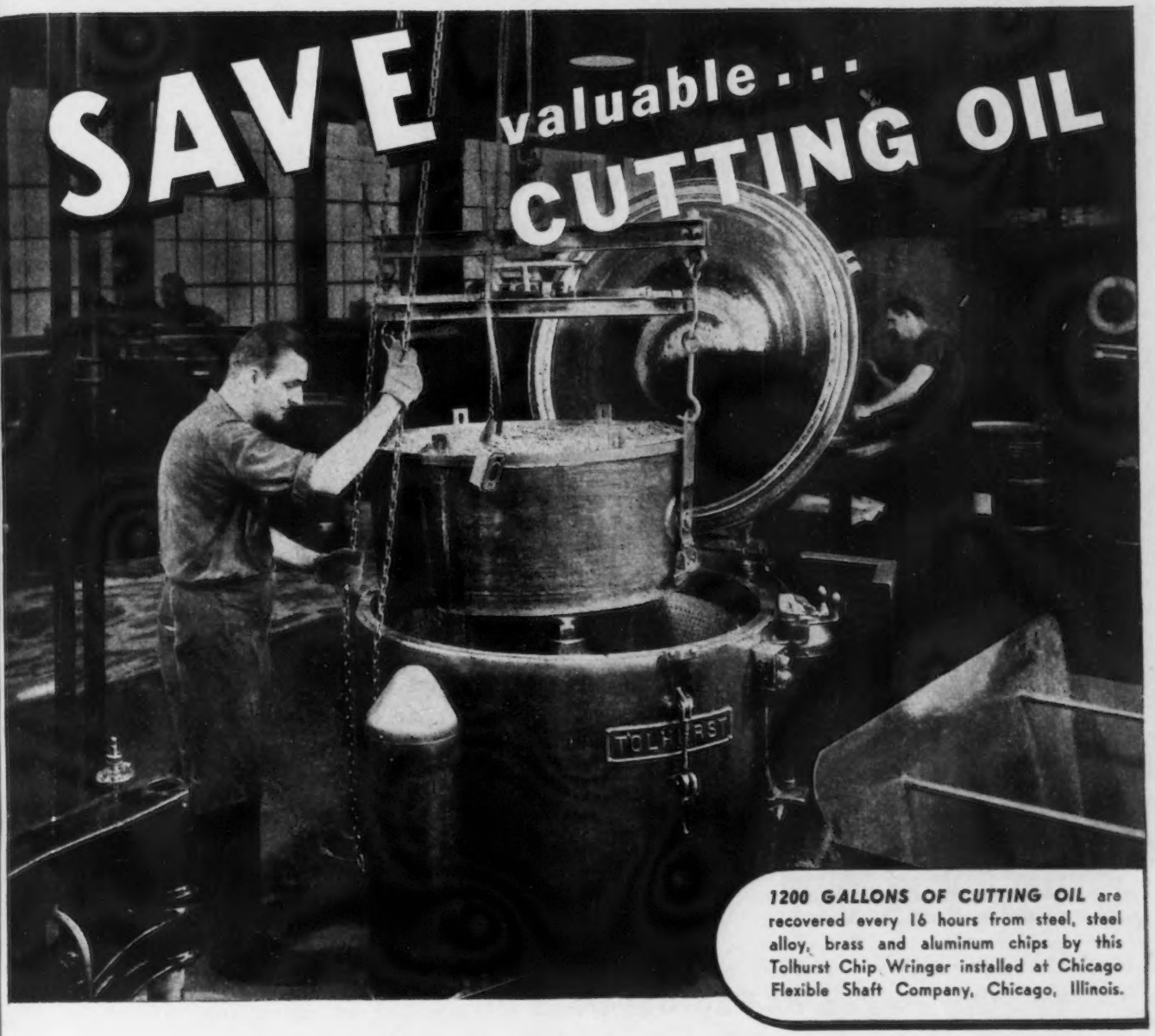
When confronted with this evidence Gonzales admitted the act and gave as his reason his desire to leave the plant early to keep a date with a girl. Gonzales was employed as a melter at the plant and when the furnace was shut down he went home.

He was connected with the "Zoot Suit Gangs" and had a criminal record. He entered a plea of guilty, was given a two-year suspended sentence and placed on probation for five years.

In a case involving spite as the motive, a young 32-year-old carpenter at the Glenn L. Martin Co. plant, Baltimore, was convicted and placed on probation for one-and-a-half years on condition that he make monetary restitution for damage done to an airplane engine shipping case and self-sealing airplane tank. Investigation revealed that he was notoriously headstrong and spiteful among his fellow-workers.

He readily admitted his acts and explained the damage to the shipping case as resentment against a supervisor who ordered him to move the case several times. The only explanation unearthed for damage to the tank, which happened on the same day, was that he was on a rampage.

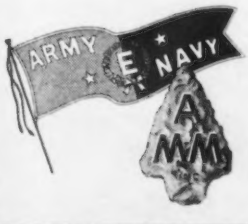
FBI files also hold the case of a young man employed by the Crown Cork & Seal Co., Baltimore, who plugged fire extinguishers and cut fire hose to create a sabotage scare, which he would discover and emerge a hero. On one occasion he claimed a hose had been plugged before he looked into it and after several slips of this sort he was confronted with the evidence. After pleading not guilty, he was convicted and sentenced to serve



1200 GALLONS OF CUTTING OIL are recovered every 16 hours from steel, steel alloy, brass and aluminum chips by this Tolhurst Chip Wringer installed at Chicago Flexible Shaft Company, Chicago, Illinois.

TOLHURST CHIP WRINGERS recover up to 98.6% of valuable cutting oil from metal chips, through the application of *centrifugal force only*. The routine is very simple and unskilled help can efficiently operate Tolhurst Chip Wringers.

REDUCE TOOL WEAR A plentiful daily supply of fresh, reclaimed oil encourages a more conscientious use of cutting oil. Tool room records show reductions in tool wear run as much as 50% after installing Tolhurst equipment. Frequent collection and processing of chips result in cleaner floors and reduce the hazard of fire. Investigate Tolhurst Chip Wringers for conserving cutting oil — reducing tool wear. Details gladly sent upon request.



TOLHURST CHIP WRINGERS

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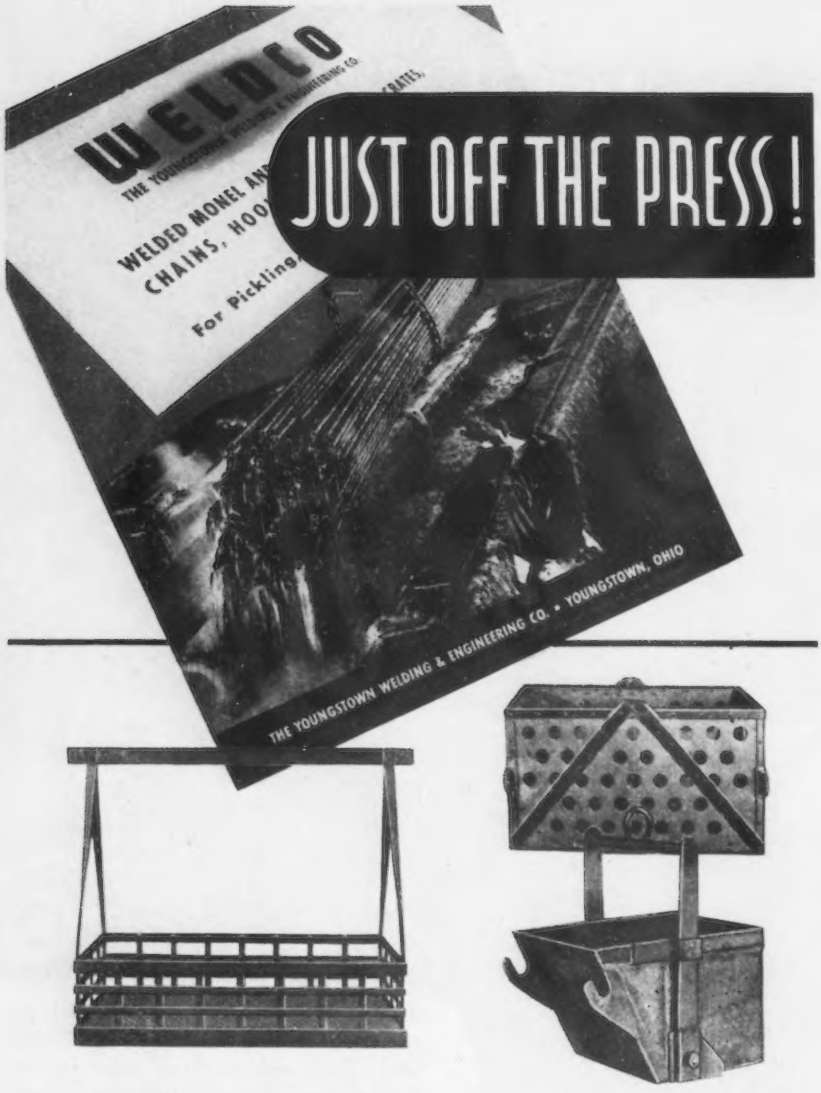

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You will find 33 clear-cut illustrations and specifications on the many different types of welded products made by The Youngstown Welding & Engineering Company. We hand-tailor all sizes and kinds of pickling and heat treating equipment, also welded tubing and fittings, for the Metals, Process, and Allied Industries. Our organization specializes in the fabrication of Monel, Inconel, and alloy.

If you use or intend to use pickling or heat treating baskets, crates, chains, hooks or accessories, this folder will pay you dividends. It will furnish you fresh production and profit information.

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THE YOUNGSTOWN WELDING & ENGINEERING CO.

3712 Oakwood Ave. Youngstown, Ohio

15 months. He also had a prior criminal record.

A series of fires committed against the Southern Pacific Railroad were discovered to have been the work of a man who had a desire for revenge against the United States and all humanity. Vincent Palokis was born in Latvia and came to this country in 1908 or 1909. He worked on occasions as a farm laborer but spent most of his life as a hobo and never thought enough of the United States to become a citizen. He was a member of the I.W.W. and has served a jail sentence.

After being taken into custody he boasted to special agents that he did not recognize the American flag and claimed that he would rather be imprisoned or shot than to serve in the United States Army. He also predicted that the United States would be overthrown by force and violence in 1945.

For destroying property of the Southern Pacific Railroad consisting of four bridges, two railroad section houses, three refrigerator cars and two unimportant houses, valued at thousands of dollars, he was sentenced to 15 years in prison after a trial by jury.

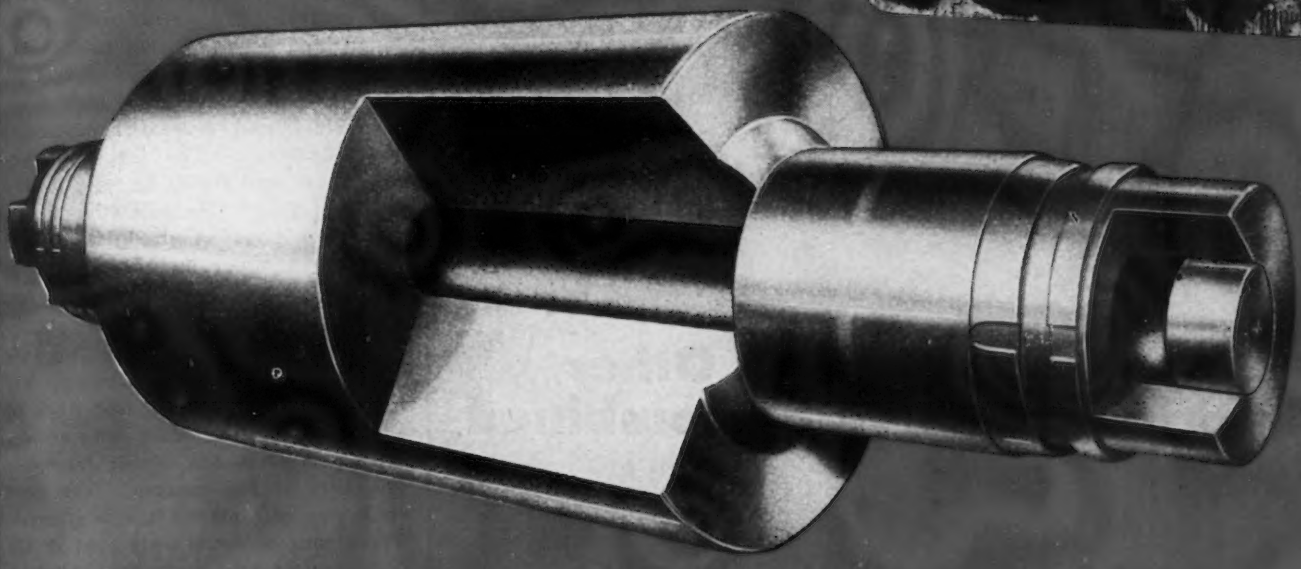
The FBI was called in when glass particles were mysteriously appearing in the hydraulic landing gear systems of Army pursuit planes. After intensive investigation for sabotage special agents discovered the glass was coming from a faulty hydraulic testing device.

Last fall a shipyard laborer was arrested at Orange, Tex., for placing launching wax in locks on seven tool chests and three nipples on storage tanks. The tanks and chests were on a destroyer escort under construction at the plant. Had this ship gone to sea without this being discovered damage might have been extensive. The laborer claimed he did it as a prank and did not intend to harm the United States or his employer.

"To get in some overtime work," an electrician in a West Virginia aircraft factory struck a lead-covered cable with a pair of side cutters, damaging it. The laborer confessed his guilt to FBI agents and said he was intoxicated when the damage was inflicted.

At Waltham, Mass., pieces of wire found in the gears of three important machines provided a sabotage mystery. Investigation by the FBI revealed that employees of that department were in the habit of throwing

OHIO ROLLS—"BEARS FOR PUNISHMENT"



HOLL-O-CAST STEEL ROLLS

have more strength and hardness

because they're heat treated

inside and out

These Rolls are cast with a hole through the center. Rolls cast in this manner have four big advantages:

1. Reduction of ingotism.
2. Positive elimination of internal hot rupture.
3. Stronger resistance to fatigue in the necks.
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The balanced alloy steel in Ohio HOLL-O-CAST Steel Rolls is selected for strength—and much greater strength is attainable through this special heat treatment than by analysis alone.

SELECT FROM ANY OF THESE 9 TYPES OF OHIO STEEL AND IRON ROLLS:

Carbon Steel Rolls
Ohioloy Rolls
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HOLL-O-CAST Rolls
Chilled Iron Rolls
Denso Iron Rolls
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THE OHIO STEEL FOUNDRY COMPANY
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ENGINEERS • FOUNDERS • MACHINISTS

OHIO ROLLS

FREE ENTERPRISE IS THE ONLY WAY TO CONSTANTLY HIGHER AMERICAN LIVING STANDARDS

Are Used Than All Other Chlorinated Solvents Combined

Perm-A-Clor, the most highly stabilized degreasing solvent, outperforms all others under adverse conditions of light, heat, moisture and combinations of different metals. It is more stable in all stages—as a liquid, vapor and condensate.

Triad cleans just as efficiently as Perm-A-Clor. It, however, is stabilized for less rigorous conditions.

When used in your degreasing equipment, you can readily see why these Detrex solvents are America's first choice by a wide margin, just as in Peace Time.

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such metal objects at each other an the wire obviously fell into the ma chines in the course of such horsepla Machines were out of production whi repairs were made.

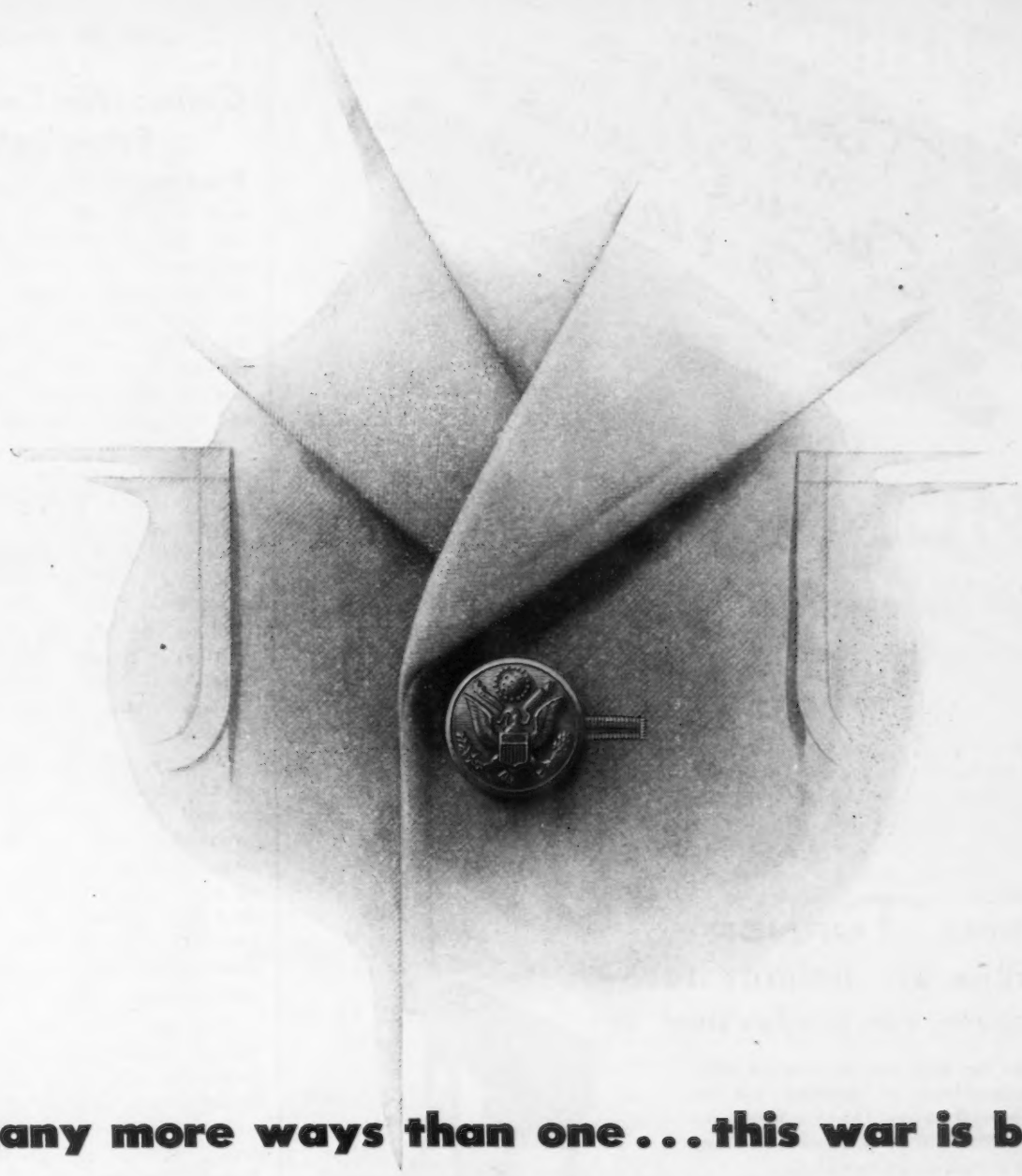
Several cases of suspected sabotag were reported at an Illinois factor It developed that an inspector of ai bombs had twice changed all electri cal controls, had turned off an ai valve, and several times had turne off the water valves of electrical ar welders. As a result, 1000 man hour were lost and several bomb case were damaged. The inspector wa questioned and stated he "did it in spirit of fun!" He pointed out tha the other boys at the plant woul hide his hammer and he wanted t get even. His horseplay cost hi his job.

The production of soup for th Army at a company in Chicago wa held up for a period of one week b 16-year-old Victor Mule, who stole vital part from one of the machine and held it for ransom. The par could not be replaced in this country Three ransom notes were sent to th president of the company. After week had elapsed Mule returned th part, because he had become fright ened when the FBI took over th case. He said he took the part be cause he disliked the president of th company and after having obtained it he decided to demand some money for its return.

Cases of sabotage, intentional and mere horseplay, in the FBI files would fill many pages, but American indus try is well aware of what its problem is, having experienced sabotage or horseplay, which has held up produc tion in almost every type of plant.

"Despite the fact that the peak of war production is in sight, no foreign-directed sabotage has been discovered and the home front is outwardly quiet, industry should not relax any work done along lines of plant protection," said Mr. Hoover. "There is no reason to believe there will be no sabotage, for with the Axis losing on all fronts they will no doubt resort to some drastic last-ditch action, which very likely might be a blow against the production front."

Since the Army has withdrawn all of its guards from plants throughout the country with the exception of those manufacturing secret and critical war materials, Mr. Hoover's admonition should take on a new meaning. Approximately 14,000 soldiers have been relieved of guard duty in various ordnance plants.



In many more ways than one . . . this war is being

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Today the entire energies and resources of this organization are bent to one end: To make every inch of Bristol Brass sheet, rod and wire so thoroughly fit . . . both physically and dimensionally . . . that there will be not one moment of production delay in the plants that make Bristol Brass into munitions and materiel . . . nor any shade of doubt as to its *sure-fire* dependability, when lives depend upon it in action. Yes, Bristol Brass is helping speed *the* day!

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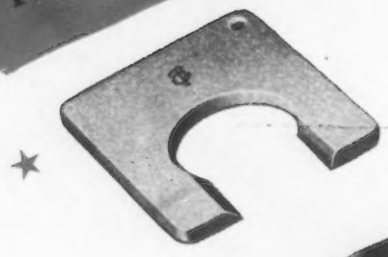
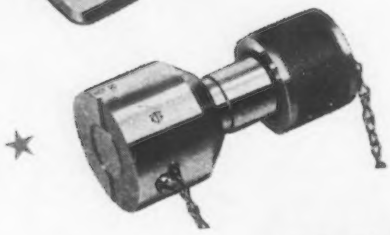
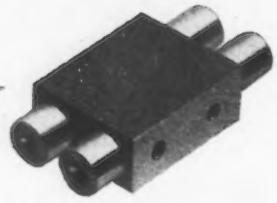
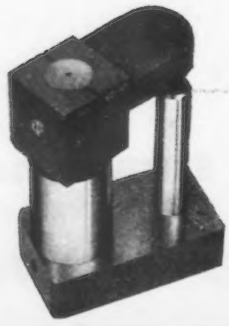






These TURNER gauges are helping to increase war production

Perhaps we can help you on some of your inspection problems by assisting you in designing special gauges. Quotations will be gladly submitted if accompanied by blue prints and complete specifications.



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TURNER
PLAST-O-LOCK GAUGE

Here's a plastic collet type gauge by Turner that is saving manufacturers money on their checking operations. Let us give you all the facts about this exclusive Turner idea in plug gauges. Write us today for descriptive literature.

Civilian Steel Cut Below Stated Need

Washington

• • • **Although cut slightly** mo than 7 per cent below their reques civilian allotments for carbon ste for the second quarter were increas by 55,000 tons over the first quarte The second quarter allotments grant the Office of Civilian Requiremen are 210,000 tons compared with 15 000 tons allotted for the first quarte

The second quarter allotments controlled materials, announced chairman J. A. Krug of the WPB R quirements Committee, represented scaling down of approximately 1,000 000 tons of stated carbon steel re quirements for the 14 military an civilian agencies. He stated that th military claimants, Army, Navy an Maritime Commission, received slight ly less than their stated require ments.

While pointing out that the suppl of and demand for basic metals ar virtually in balance for all essenti production programs, Mr. Krug em phasized that the increased allotmen of steel for civilian use does not re flect any change in WPB's policy fo restricting the production of civilia goods to the basic essentials, pendin clarification of military trends.

The increased allocation for th second quarter, Mr. Krug said, wil go for the production of those civilia items already authorized by the boar as essential to workers on the hom front. It was not disclosed in Mr Krug's statement but this civilia production will take a new turn i that the Victory specifications fo plumbing and heating products wil be dropped and the output of standard items will be resumed. The other civilian items already approved fo production include such lines as elec tric irons, electric ranges, flashlight cases and pots and pans.

National Steel Earnings Total $11,698,361

• • • **National Steel Corp.** reported preliminary net earnings for the year 1943, after all charges including a re serve of $750,000 for contingencies, of $11,698,361.70. This compares with earnings for the preceding year of $11,929,867.43. Net earnings for the fourth quarter of 1943 were $3,279,- 885.17, compared with earnings in the fourth quarter of 1942 of $3,664,701.32, equal to $1.66 per share.

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POWDER METALLURGY Inc. has become a subsidiary of GENERAL BRONZE CORPORATION and is now operating with new and enlarged facilities under the name of POWDER METALLURGY CORPORATION.

Save TIME AND MONEY

IN THE QUANTITY PRODUCTION OF SMALL METAL PARTS

WITH POMET

Under the stress of war-time demands, this plant has sped the development of powder metallurgy from the pioneer phases of a new process to practical production routines. Today Pomet parts are saving time, material and labor for many manufacturers who wish to combine high standards with quantity production. A wide variety of complicated parts can be produced quickly and economically using brass, bronze, aluminum, ferrous alloys and other metals, combinations of metals or metals combined with non-metallic powders.

POMET *also gives you these "PLUS" qualities:*

- **CLOSE TOLERANCES WITHOUT MACHINING** In many cases, finished pieces can be held to tolerances of plus or minus .001" or even closer, with all or most of the need for expensive machining eliminated.
- **DENSITY** Small parts which approach high technical density can be made. Complex Pomet parts often satisfactorily replace machine parts which were made by conventional methods.
- **CONTROLLED POROSITY** Pomet parts can be made with intentional porosity for special applications or porosity can be reduced to 5%.
- **WEAR RESISTANCE** Pomet parts can be made to resist strains and stresses such as tension, compression, shearing and abrasion and, in many cases, they out-perform the more expensive parts they replace.
- **DUCTILITY OR HARDNESS** When high ductility is a necessary characteristic, it can be incorporated in Pomet parts. Hardness is also a property that Pomet parts can give you when it is required.
- **COMBINED MATERIALS** Special combinations of metals, where two or more qualities are desired, can be satisfactorily accomplished in Pomet parts. Metals and non-metals can also be combined for the production of cutting and abrasive units.

New and greatly expanded facilities now assure even faster production. Technical excellence is being maintained and constantly improved. In quantities of 20,000 and over Pomet parts are particularly interesting to manufacturers who have to keep cost in line with rigid specifications. We will be pleased to quote on blueprints and specifications, and are in a position to give you exceptional service. We shall also be glad to send interesting and informative literature on request.

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Their strength and ability to take it begins in the Open Hearth that produces high quality steel for the world's finest war planes. Andrews is proud to be one of the steel manufacturers whose product meets the exacting requirements of aircraft producers. Aircraft alloy and carbon steel sheets are made in a wide range of sizes and thicknesses to meet specifications AN-QQ-S-685 (X-4130). AN-QQ-S-686 (X-4135). AN-QQ-S-756 (X-4340). AN-S-11 (SAE 1020-1025). AN-S-12 (NE-8630). AN-S-22 (NE-8635). Information on request.

THE NEWPORT ROLLING MILL CO.
NEWPORT KENTUCKY
DIVISION OF THE ANDREWS STEEL CO.

The Andrews Steel Company produces a limited range of aircraft quality alloy plates

New WPB Form 1319 Will Replace 20 Separate Forms

Washington

• • • To save paperwork and time in handling applications for authorization to purchase or deliver equipment, the new WPB Form 1319 will supplant the old variations of Form 1319 as well as many others, and will cover the entire field with the exception of those coming under the head of the old PD-1a and PD-3a, which are applications for certain preference ratings.

The new form, covering four pages, will have the same places of filing, same number of copies, and same methods of processing as the present forms. The net result is that only one instruction book and one form will control such applications. Copies of the instruction book will be included in "Products and Priorities" monthly publication of the board designed to keep executives and manufacturers informed on current orders and forms.

Inland Will Restore Old Greenwood Furnace

Chicago

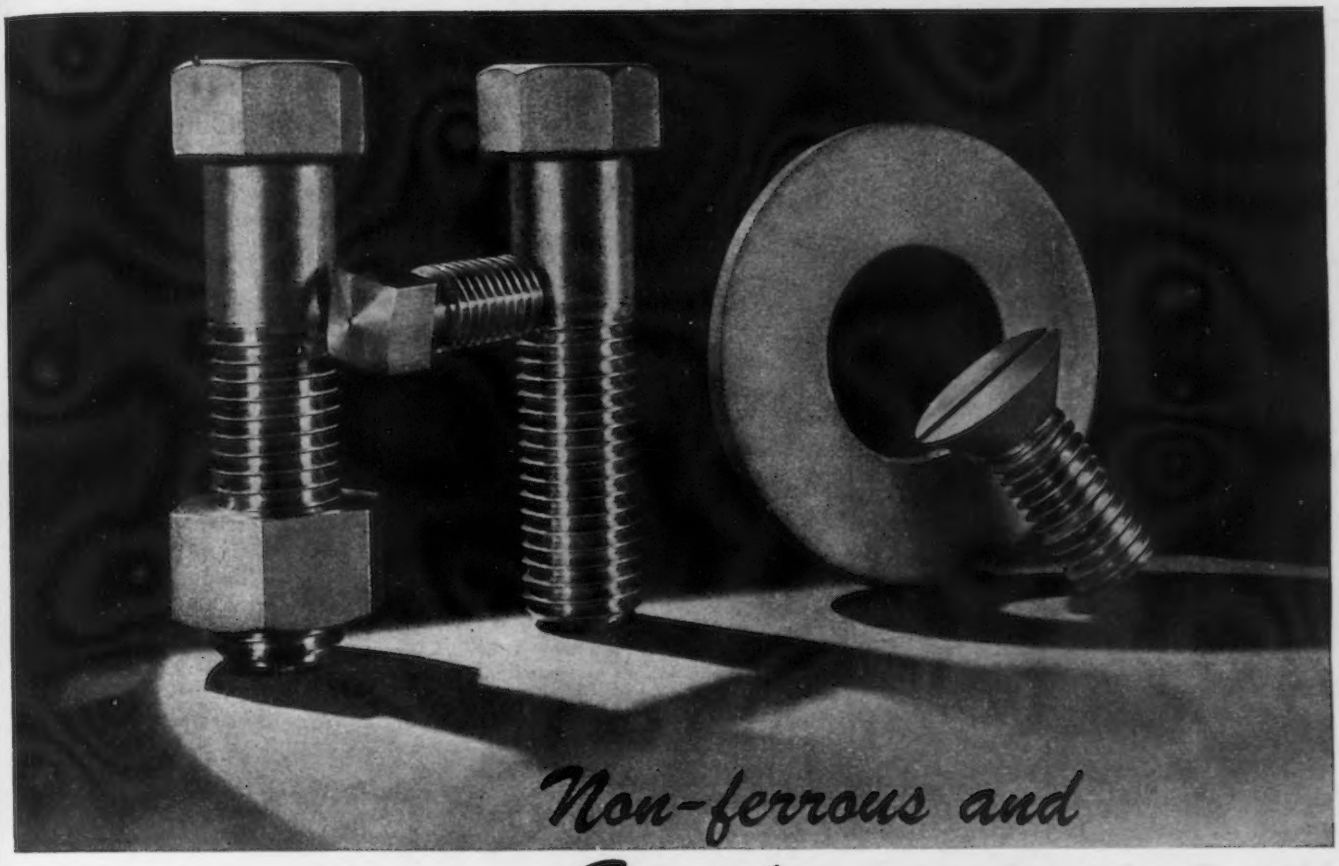
• • • The Inland Steel Co. has announced the purchase of the old Greenwood Furnace west of Ishpeming, Mich., built during the last year of the Civil War for the production of charcoal iron. It now stands as an isolated relic in the woods not far from Inland's Greenwood Mine. The company plans to restore this furnace as nearly as possible to its former state and believes this can be done without using critical manpower or material.

Buyers Trim Inventories of Iron

Buffalo

• • • A Buffalo iron maker running malleable and foundry grades (Tonawanda Iron Works) reports a tendency on the part of buyers to reduce inventories and become more particular about shipping dates and analyses. Also noticeable with the lifting of allocations is a disinclination by the foundry trade to over-order.

While this iron maker reports business on about the same basis as before allocations were halted, he has increased his inventory by 2000 tons since Dec. 1. He now has about 7500 tons in reserve, divided into some 20 to 25 different grades, which he regards as just enough for "elbow room," something he has not had for many months.



Stainless FASTENING

Headquarters

HEADQUARTERS is "a chief place of business." So . . . . . when you need non-ferrous and stainless fastenings, come to Harpers . . . the organization which specializes on the manufacture of bolts, nuts, screws, washers, rivets and specials made of Brass, Bronze, Copper, Everdur, Monel and Stainless . . . an organization not concerned with common steel fastenings.

To serve fastening users, Harper stocks over 4280 different items . . . employs a large staff of engineers and field service men . . . and offers a vast fund of practical non-ferrous and stainless fastening "Know how." Sample this "Know how" by writing (on your letterhead) for a 4-color, 84 page catalog.

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BRONZE

COPPER

EVERDUR

MONEL

STAINLESS

THE H. M. HARPER COMPANY, 2607 Fletcher St., Chicago 18, Illinois

BRANCH OFFICES: New York City • Philadelphia • Los Angeles • Milwaukee • Cincinnati • Houston

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HARPER

EVERLASTING FASTENINGS

HERE'S HOW YOU CAN "Get in the Scrap!"

This A-F Pan-Type Overlapping Beaded Apron Conveyor takes the scrap (via slides) directly from the stamping presses and conveys it out through the wall to a long reversing conveyor of similar construction, which, in turn, conveys the scrap to cars at one end—or to an inclined apron conveyor discharging into trucks at the other end of the line.

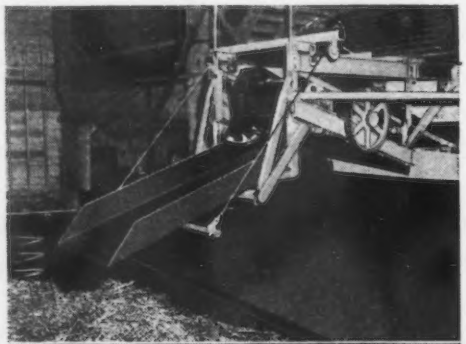
★ ★ ★ ★ ★ ★ ★

Alvey-Ferguson Scrap Salvaging Conveyors Help You to More Efficient Scrap Conversion

YOU KNOW that scrap reserves are declining—and at an alarming rate. Scrap that is needed for vital war products. You've been asked by Uncle Sam to back up the Nation's Scrap Conservation Campaign. But How?

Here's the first really practical, efficient and economical method—the use of an A-F *Scientifically-Planned* Scrap Salvaging System especially adapted for *your* plant!

This photograph shows how the scrap is discharged directly into the cars for immediate shipment to scrap salvaging plants. No trucks are used. No manpower is wasted.



The bottom photograph shows how the A-F Portable Conveyor units carry the scrap discharged from the main conveyor directly to a trailer truck for movement to a steel mill. After one trailer truck has been loaded, scrap can be dumped into either of two other lined-up empty trucks.

Whatever your scrap salvaging, material handling, and metal products cleaning and finishing problems—write us today.

THE ALVEY-FERGUSON CO.
709 Disney St. Cincinnati 9, Ohio
Affiliated Corporation
THE ALVEY-FERGUSON CO. of CALIF.
Post Office Box 396—Vernon Branch
Los Angeles, California

CONVEYING EQUIPMENT
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

Nelson Explains How Farm Supply Output Is Aided

Washington

• • • **Recognizing the importance** of the farmer in the country's war production programs, and the necessity of maintaining an adequate flow of machinery and equipment to farmers, WPB Chairman Donald M. Nelson in a memorandum to his executive staff, dated Feb. 7, outlined the steps being taken by WPB to aid the manufacture and distribution of farm supplies. The wording of the memorandum indicates that it takes the form of a directive, springing from PD-19 and M-330 establishing a basic policy for the manufacture and distribution of farm supplies.

Mehl to Lecture at Brazilian University

• • • **Dr. Robert F. Mehl,** professor and head of the Department of Metallurgical Engineering and director of the Metals Research Laboratory of the Carnegie Institute of Technology, Pittsburgh, has left this country to deliver the second of a series of lectures on metallurgy at the Escola Politecnica of the University of Sao Paulo, Brazil, in a new lectureship on this subject established last summer.

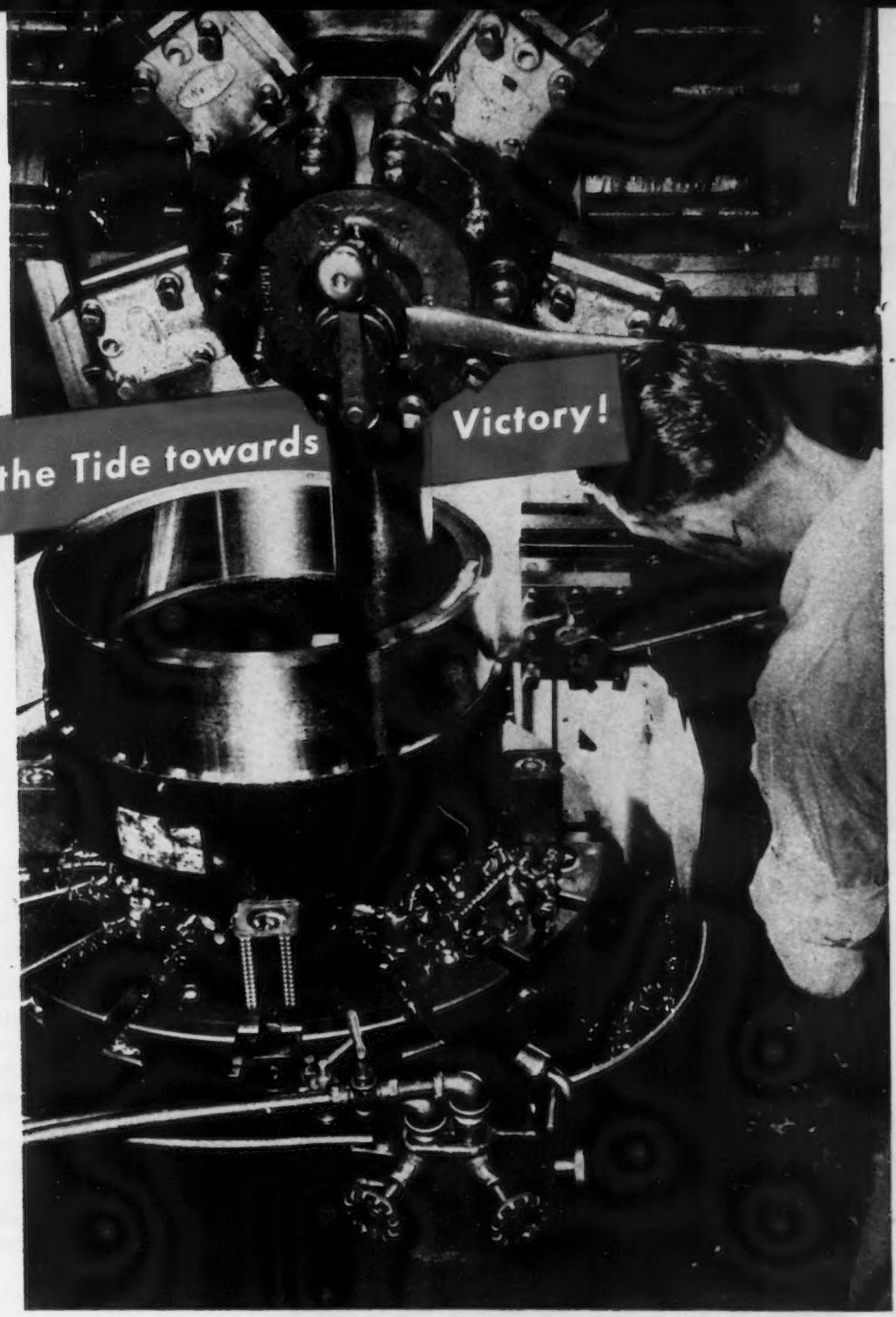
Tungsten-Molybdenum Alloy Distribution System Altered

Washington

• • • **Producers of tungsten,** molybdenum and their alloys are being given an opportunity to schedule that production better through an amendment order M-369, which covers the terms under which these are distributed, WPB reported. The amendment permits each person seeking to acquire such products to make written application to WPB not later than the "first day of the second month preceding the month in which such delivery is desired."

GE Research Director Receives Faraday Medal

• • • **Dr. Irving Langmuir,** associate director of the General Electric Research Laboratory, was awarded the Faraday Medal of the Institution of Electrical Engineers, London, according to a radiogram he has received from Stanley Angwin, president of the Institution. Plans for its actual presentation will be made later.



Big jobs on big, high powered and fast machines—jobs held to extremely fine limits of accuracy. That's the formula which spells success to the Marine Construction program. One of these big jobs is illustrated above . . . turning and boring a part for a Marine Turbine . . . the censored production data would shock the enemy . . . the accuracy, typical of all work on Bullards, is easily held to very close limits. For obviously the machine is the famous Bullard Vertical Turret Lathe, with rapid power traverse for the swiveling turret head. Two heads cutting simultaneously with independent feeds shorten cutting time. Indexing of one head while the other continues its operation cuts lost time between cuts. Consult with Bullard engineers for aid in TURNING the tide towards Victory!

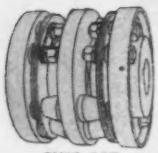
TURRET LA

BULLARD ★★ VERTICAL

★

THE BULLARD COMPANY
BRIDGEPORT 2, CONN.

THOMAS
Flexible COUPLINGS
FOR any SPEED OR SERVICE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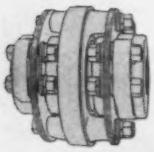
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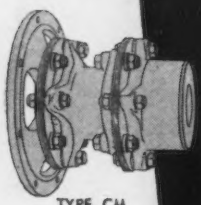
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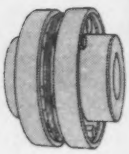
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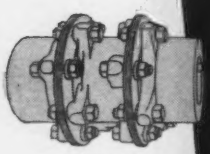
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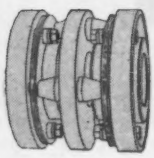
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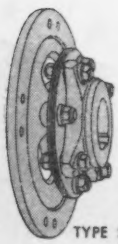
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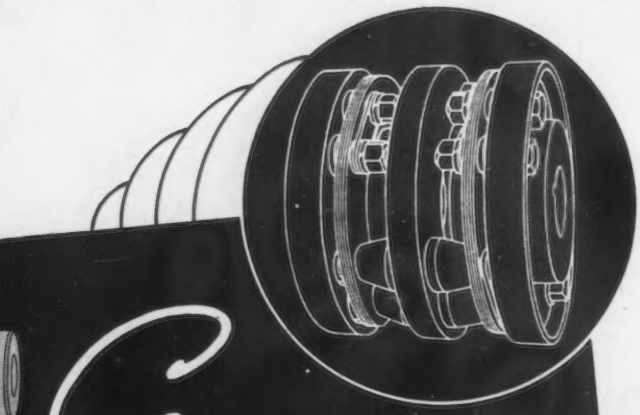


Eliminate

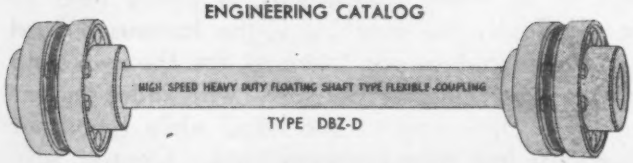
BACKLASH, FRICTION, WEAR AND CROSS-PULL

.....the 4 destructive evils found in all other types and makes of couplings.

NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT

These are the five essential features of Thomas Flexible Couplings that insure a permanent care-free installation.

WRITE FOR COMPLETE ENGINEERING CATALOG



TYPE DBZ-D

THE THOMAS PRINCIPLE ELIMINATES CHAINS, SPUR GEARS and other VIBRATING MAKESHIFTS

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Procedure Simplified for Class B Product Manufacturers

Washington

• • • **The WPB Controlled** Materials Division on Feb. 11, announced a simplified procedure under which manufacturers of one product, part of the output of which are Class B products and the rest of which are unclassified products, may file a single Controlled Materials Plan-4B application to cover the entire production of the item. Allotments of controlled materials for the manufacture of Class B products are obtained from WPB Industry divisions. Unclassified products are those that do not contain controlled materials forms or shapes of copper, aluminum or steel.

If the manufacturer elects to file the single CMP-4B application for his entire production, he must explain in a letter accompanying it that the products covered include both Class B and unclassified products.

No Ease Sighted for Enamel or Galvanized Ware

Washington

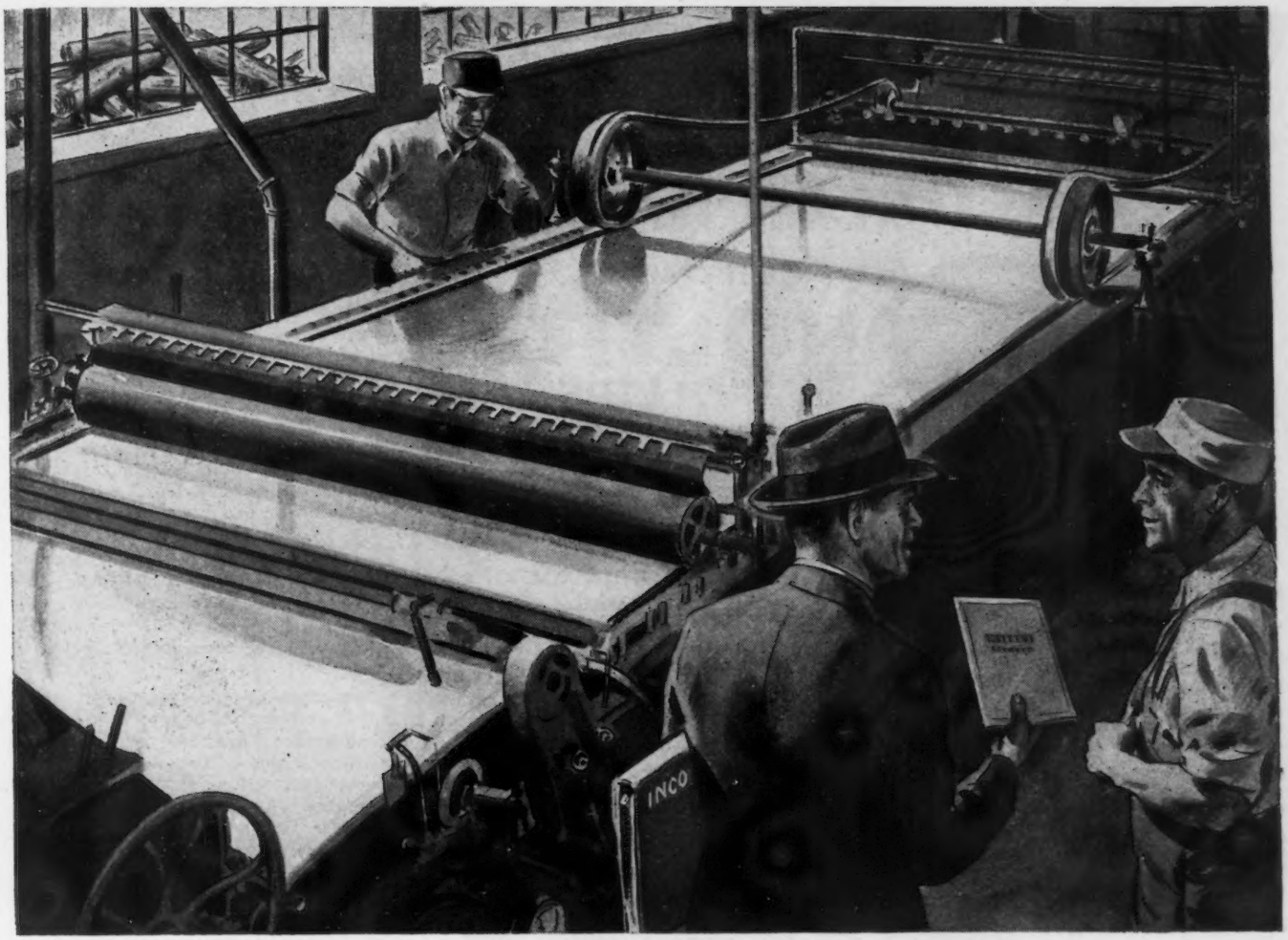
• • • **The WPB Galvanized** Ware Manufacturers Industry Advisory Committee has been told that while galvanized ware requirements for the second quarter of this year are being given serious consideration by WPB, no large-scale relaxation of the controls over production of civilian goods in general can be considered until the outcome of impending military operations is known.

A major factor in connection with galvanized ware production is the short supply of galvanized sheets. A large part of the sheet rolling capacity is needed for the fabrication of steel plates for ships, tanks, landing barges, and other war goods. Consequently, facilities for rolling galvanized sheets are and will continue to be extremely limited.

Adams Directs Consumer Goods

Washington

• • • **The appointment of** Stanley Adams as director of the Consumers Durable Goods division of WPB was announced. Mr. Adams has been connected with WPB and its predecessor agency, OPM, since May 19, 1941.



NICKEL AIDS THE PAPER AND PULP INDUSTRY

to KEEP 'EM PRODUCING!

"Paper is one of the sinews of war" . . .

A basic tool of communication . . . strategic substitute for metal in many products.

Made, for example, into new export containers that protect their contents against water, vapor, and grease, it's a vital factor in the Battle of Supply.

So the need is tremendous . . .

And the industry's vast output is possible largely because paper-making is almost entirely a machine process.

Plant engineers agree that when you depend so much on machinery, you'd better have machines that are dependable.

That is why . . . thanks to those engineers and the machine designers . . . equipment in paper and pulp mills includes large amounts of Nickel alloyed materials.

Metals so fortified help a lot to keep machines producing, because Nickel imparts toughness . . . strength . . . corrosion resistance.

Thus, when properly used in critical parts, "a little Nickel goes a long way" toward increasing dependability.

From grinder cylinders to dryer rolls, from digesters and save-all pans to Fourdrinier rails and beams, Nickel alloyed parts stand up better to abrasion, wear, and corrosive chemicals.

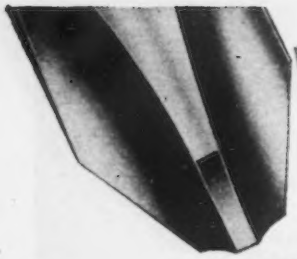
We have long enjoyed the privilege of cooperating with technical men interested in the selection, fabrication, and heat treatment of metals . . . not only in the paper industry but in many others. Whatever *your* industry may be . . . if you'd like to have such assistance . . . counsel and printed data are available on request.

New Catalog Index

New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

★ *Nickel* ★

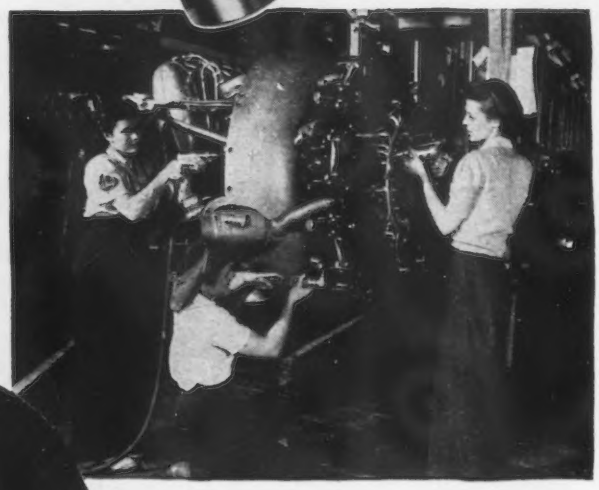
THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*



WOMEN WORKERS AND ALL GREEN HANDS can drive HOLTITE —PHILLIPS— SCREWS and BOLTS

with speed, safety and efficiency! Basic training time for inexperienced workers is cut to a minimum and production increased without hazards of injuries, spoiled work or burred heads.

The illustration below shows a specific instance of the proficiency in power driving that can be attained by women workers. At the Consolidated Vultee Aircraft Corporation in some departments power tools replace hand-driven screw drivers and wrenches commonly used when men were employed. This production - boosting operation has been made possible by the adoption of recessed head screws. By this modern fastening practice, experienced workers can cut fastening time up to 50% and more.



When Speed Nuts are used with HOLTITE Sheet Metal Screws in place of machine screws, another saving in production time is effected, as the small tapered point permits a quicker start when nuts are run on. The smooth threads with faster lead reduce turning time and provide a tighter lock to defy vibration.

HOLTITE "Thread-Forming" Sheet Metal Screws eliminate tapping operations by cutting their own threads in the material as they are driven in. For all metal-to-metal fastenings, specify HOLTITE Type "A," "Z" or "C" sheet metal screws.

CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.

BUY MORE WAR BONDS

News in Brief

• Pratt & Letchworth Co., Inc., Buffalo, is making railroad castings on a subcontract for use on Russian locomotives and freight cars. The plant is diverting facilities to production of more railroad equipment, its peacetime specialty, as war orders near completion. The foundry recently installed a 1000-kv X-ray unit.

•

• Maday Body Works, Buffalo, completed government orders for converting small trucks into larger Army units and will revert back to its peacetime field of repairing and rebuilding bodies of motor-transport equipment. Employment will be cut slightly.

•

• Producing chains for all battlefronts, Columbus McKinnon Chain Corp. of Tonawanda, N. Y., reports enough back orders to keep its plants operating at capacity for the remainder of 1944.

•

• General Drop Forge division of Brown Lipe Gear Co., Buffalo, reports production has increased about 500 per cent in the past three years. General Drop Forge was bought by Brown Lipe in 1941 and more than $2,000,000 has been spent on expansion. Output of forgings for landing craft engines is being increased but more than half the plant's production continues to go to the aircraft industry.

•

• The Industrial Marketers of New Jersey are holding a Fact Forum for the Future on March 21, at the Essex House, Newark, N. J. It will highlight the facts about applications of light metals, plastics, electronics, synthetic rubbers, and light airplanes after the war. A speaker from a leading company in each field will present concrete evidence of what can be expected from these products.

•

• Completion of a Navy contract for 40 LST's ten days ahead of schedule was announced by U. S. Steel's American Bridge Co. The record was achieved by Bridge Co.

•

• The Steel Co. of Canada, Ltd., established a new high record for the production of steel ingots in 1943. Notwithstanding increased steel production, sales in value declined approximately one per cent in comparison with the previous year, due largely to variations in the demands for the wide range of products manufactured and changes in control method which affected, from time to time, the production of different lines. Contraction of production of less essential products, followed later by partial relaxation of controls, did not tend to lessen existing difficulties. The current rate of basic steel production continues slightly under full capacity, and is supported partially by orders originating from mutual aid shipments. The trend of costs continues upwards, being influenced latterly by increases in coal mining wages.

•

• The formation of the National Society of Plastic Tooling by representatives of five ma-

POWER TO LIFT A TANK in the palm of your hand!

★ It weighs less than 4 pounds. It's so compact you can hold it in the palm of your hand. But it delivers enough pressurized power to lift a General Sherman tank. That's the amazing, new PESCO Pressure-Loaded Hydraulic Pump!

Never, until PESCO engineered it for modern aviation, was there so small a pump of equal displacement capable of delivering 3000 p.s.i. Radical improvements in design plus precision manufacture of the highest order are the ingredients.

Through PESCO design, entirely new opportunities are opened up for the more practical and efficient use of hydraulics in your product or plant. And that goes for controlled liquid flow as well as pressurized power. For PESCO's advanced design and performance extends through a complete line of hydraulic, pneumatic, vacuum and fuel pumps and pumping systems. Practically without exception, the precision equipment PESCO makes has been engineered to specifications of performance never dreamed of before modern aviation.

We would welcome the opportunity to tell you of our facilities to engineer PESCO equipment to meet your own specific problem. PESCO Engineering Service is available to you. Just write.

SEND FOR THIS BOOK "Pressurized Power and Controlled Flow by PESCO". This book pictorially tells the story of PESCO equipment, manufacturing facilities and engineering service. A copy will be mailed promptly upon request.

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Division Borg-Warner

In Precision Hydraulics, Fuel Pumps, Air Pumps, Related Accessories . . .
PERFORMANCE POINTS TO Pesco FIRST

DESIGNED to deliver the GOODS

Photo — Courtesy Consolidated Vultee Aircraft Company

STANDARD CONVEYOR COMPANY is able, through long experience, to specify and build for a diversity of handling needs . . .

A procession of products, of the widest imaginable variety, is pouring off assembly lines today — on time, or ahead of schedule — because Standard Conveyors are helping to channel the flow of production. Whether the rate of manufacture is several hundreds a minute or one an hour, Standard builds the right type of conveying equipment to meet the situation.

The range and versatility of Standard Conveyor equipment is the result of nearly 40 years of close contact with inside-the-plant transportation — in plants large and small, making products as widely diverse as steel or cosmetics. The benefit of this experience is available to you, without obligation.

The counsel of Standard Conveyor engineers is valuable in deciding on the right kind of conveying equipment to "deliver the goods" faster—at lower cost — now or for postwar production. *Write for comprehensive reference book — "Conveyors by Standard"—Catalog No. 1A-2.*

STANDARD CONVEYOR COMPANY
GENERAL OFFICES: NO. ST. PAUL, MINN.

Sales and Service in Principal Cities

ENGINEERED FOR FASTER PRODUCTION

jor Eastern aircraft firms has been announced at New York. Delmar Anderson, superintendent of production planning and tool design for the Buffalo plants of Curtiss-Wright Corp., was elected president. Thomas A. Herbert of Consolidated-Vultee is vice-president, Harry W. Tomkins of the Buffalo plants of Curtiss-Wright is secretary, and Charles H. Miller of Bell Aircraft is treasurer.

•

• The Society of Automotive Engineers has organized an Air Transport Engineering Activity Committee to facilitate cooperative solution of engineering problems arising in air line operations. William Littlewood, engineering vice-president of American Airlines, Inc., Jackson Heights, L. I., is chairman.

•

• While Canadian farm machinery production this year is still governed by manufacturing restrictions, certain types of equipment are being speeded up on the assembly line and will be in good supply by the spring and be available for seasonal requirements. Total equipment supplies for 1944 will be 80 per cent of the 1940 figure, with repair parts totalling 156 per cent of that year's tonnage. There is no lack of factory capacity, but there are lacks of materials and manpower. Because of military requirements, we will still face restriction problems in motors, ball-bearings, and malleable castings. Canada imports 70,000 tons of farm equipment from the United States this year and that 50,000 tons of this will be tractors.

•

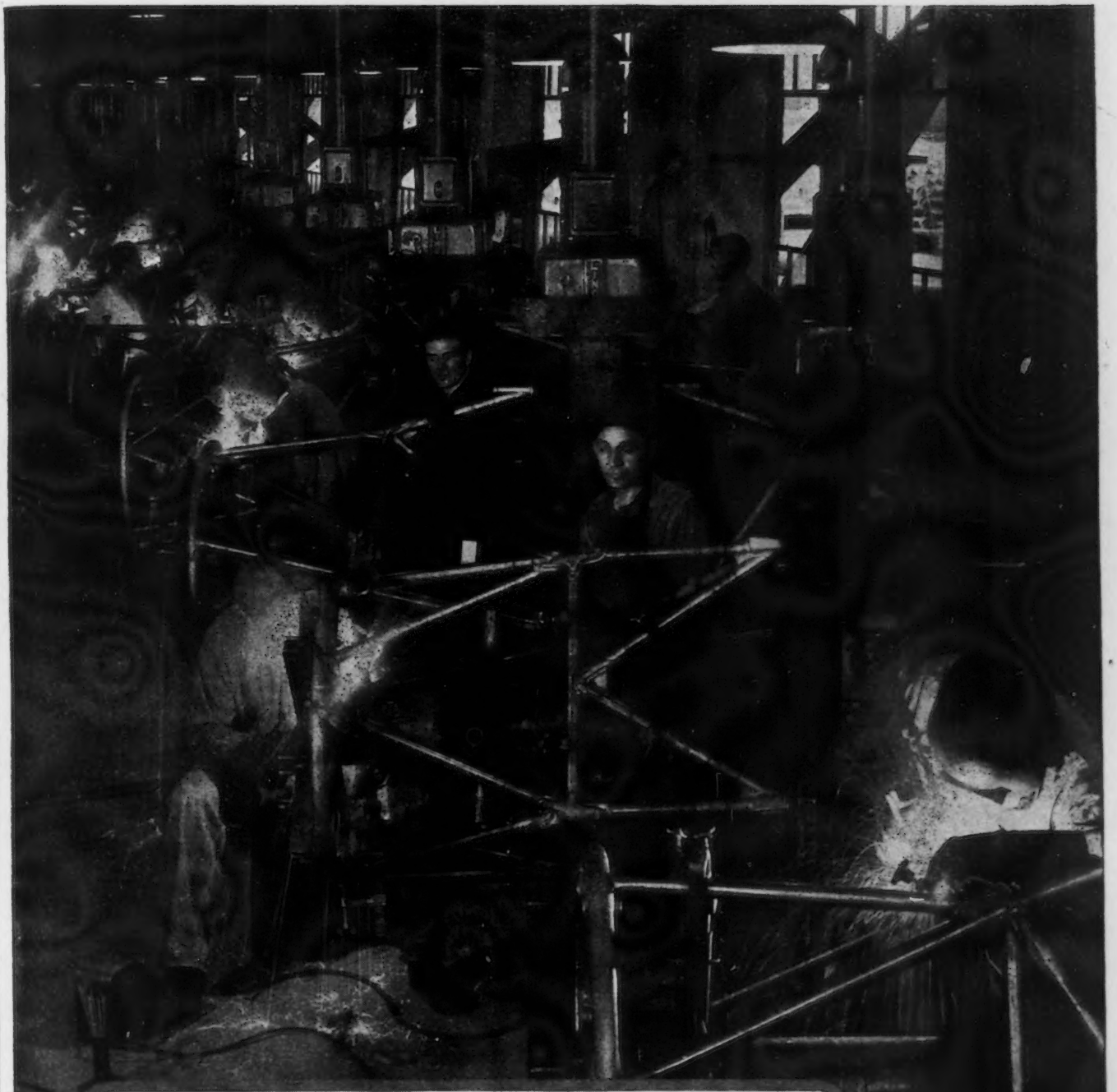
• U. S. Rubber Co. announced the development of multipore, a filter material containing as many as 6400 perforations to the square inch, which is now being used by chemical plants, food factories, medical manufacturers, coal and iron mines, steel mills, liquor distillers, and many other types of industry. These filter screens are made of either hard or soft rubber, and may be compounded to resist abrasion, high temperatures, alkaline and acid solutions, as well as certain oils and greases.

•

• Five members of the machinery fraternity in the Cincinnati area were honored by the Ordnance Department of the U. S. Army recently, for outstanding service in the production of machine tools during the critical period of the machine tool shortage. W. W. Radcliffe, president of the E. A. Kinsey Co., and E. C. Elstad, president of the Seifreat-Elstad Machinery Co., were given citations. Letters of commendation were given to J. F. Jewett, J. C. Mullen, and Arthur C. Pletz. The awards were given to these men by Col. J. C. Schoublin, chief, Cincinnati Ordnance District, at a special ceremony Jan. 31, in recognition of the work done by these men, who are members of the Cincinnati Ordnance District Machine Tool Panel.

•

• Trico Products, Inc., at Buffalo, has applied for permission to convert automatic screw machines used in making 20-mm. projectiles to the production of other munitions. Production of all 20-mm. ammunition has been discontinued at Trico, according to Col. Frank J. Atwood, chief of the Rochester Ordnance District.



MASS-PRODUCTION WELDING

● Time-saving, money-saving mass-production methods are employed throughout our manufacture of welded steel tube, tubular parts and assemblies for the transportation industry. Notable are *double* fixtures for the final welding of bomber motor mounts. Your jobs benefit by these advanced methods.

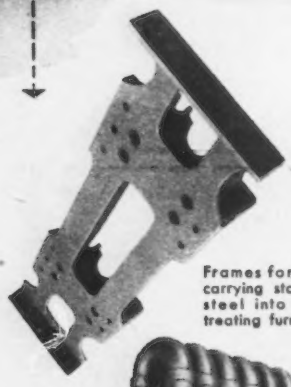
AMERICAN METAL PRODUCTS COMPANY

5959 LINSDALE AVENUE, DETROIT 4, MICHIGAN

Use MICHIANA "Longer-Heat-Hours" ALLOYS

● For war and post-war production, the longer heat-hour performance of MICHIANA Alloy Pots, Boxes, Muffles, Retorts, Grids, Chains and other Furnace Parts,—means fewer delays, lower costs, and more uniform output.

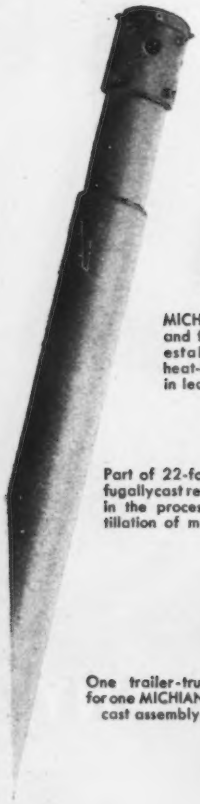
At MICHIANA, alloy steel metallurgists and specialized alloy casting foundrymen have multiplied their experience many times in meeting the greater and new needs of essential war industries. MICHIANA is still better able to serve you . . . for your routine requirements—or for new or unusual developments. You can rely on our suggestions and recommendations. MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.



Frames for cars carrying stainless steel into heat treating furnaces.

Centrifugally cast tubes and statically cast return bends used to form a 7-foot high pressure-tight chamber. Installed in light-metal industry.

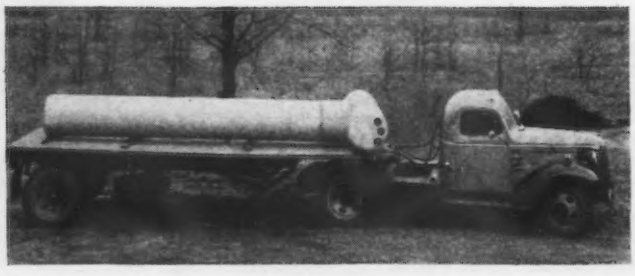
MICHIANA Trays and fixtures have established long heat-hour records in leading plants.



Part of 22-foot centrifugallycast retorts used in the process of distillation of magnesium.

MICHIANA pots and boxes are standard in many heat-treating departments.

MICHIANA
Heat-Resistant and
Corrosion-Resistant
ALLOY CASTINGS



One trailer-truck for one MICHIANA cast assembly.

Among the Week's Trade Notes

Nash Motors Division of Nash-Kelvinator Corp. has purchased a tract of land in Walworth County, Wis., for a postwar automobile proving ground.

●

Western Electric Co., Inc., has leased Area 2 of the Eau Claire Ordnance Plant at Eau Claire, Wis., formerly engaged in arms production. The move was made to take care of expanding production of the company.

●

Lincoln Park Tool and Gage Co. has changed its name to Lincoln Park Industries, Inc. The management, personnel and policies of the company remain unchanged. At the same time the merger of Carbur, Inc., with Lincoln Park was announced.

●

Steel Ingot Production, Inc., New York, has announced the appointment of A. B. Agnew, 4 Smithfield Street, Pittsburgh 22, as sales agent for its "SP" Ingot Mold Insulation.

●

Pennsylvania Salt Mfg. Co. has moved its New York office to 40 West 40th Street.

●

Wyman-Gordon Co., Worcester, Mass., has just installed a new 120-ton anvil base for a 20,000-lb. hammer. The base is 8 ft. high, 10 ft. long and 6 ft. wide, and will be used as a spare. The company is making aircraft crank cases and crank shafts.

●

Heald Machine Co., Worcester, has given Worcester Polytechnic Institute $25,000 to establish a James Nichols Heald research fund, honoring the company's founder, a Tech graduate in 1884.

●

Casco Shipbuilding Co., Freeport, Me., has been liquidated.

●

King Tap & Tool Co., Inc., 84 Chestnut St., North Attleboro, Mass., is being liquidated. All machine tools offered for sale were purchased new in 1941-1942-1943.

●

Joseph T. Ryerson & Son, Inc., has purchased Bethlehem Steel Co.'s Pittsburgh steel warehouse plant, located in Carnegie, Pa. Ryerson has also opened a sales office in the Grant Building, 330 Grant Street, Pittsburgh 19.

●

Rice Lake Engineering Works, Inc., has been organized at Rice Lake, Wis., to conduct a general machine shop business by William A. Cameron, Marie Alnes and Marion McCuskey.

●

Wesley Heat Treating Co., Manitowoc, Wis., has doubled its capital stock to $100,000 and will move its general office from Green Bay to Manitowoc.

●

Dixie Metal Products Co., Bessemer, Ala., formerly owned by the Bessemer Coal, Iron & Land Co., has been sold to three Birmingham men who have formed a new corporation under the name of the Dixie Metal Products Co., Inc.

●

Meriam Co., Cleveland, Ohio, has changed its name to Meriam Instrument Co. Management remains the same.

●

Progressive Welder Co., Detroit, has opened a factory branch office at 1007 Broxton Avenue, Room 222, Los Angeles 24. Howard Dally and A. N. Seedorf are the local field engineers at the new branch.

●

Davison Chemical Corp., Baltimore, has announced the formation of the Process Division with E. B. Dunkak as manager.

●

H. M. Harper Co. has appointed Harris B. Carlock, 1329 North Highland Avenue, N. E., Atlanta, as its representative in that section of the country.

●

William H. Keller, Inc., Grand Haven, Mich., has changed its name to Keller Tool Co. There is no change in personnel or management.

FARVAL—

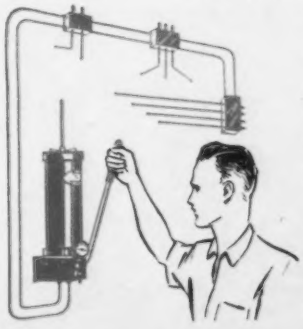
the Safe, Sure Way

from HERE to THERE

THE Farval Centralized System—typified by the genial little tyke who makes "special deliveries" right on the dot—feeds lubricant under hydraulic pressure to each bearing in the exact amounts required.

Whether your equipment is new or old—whether bearings are at floor level or high out of reach—the Farval System measures the lubricant required by each and delivers the correct amount at regular intervals, missing none.

This is no day for guesswork on anything—lubrication least of all. Farval will insure your present production against shut-downs caused by faulty lubrication—will help keep your peacetime equipment rolling on 24-hour schedules too.



Lubricate *your* bearings the Safe, Sure Way and you will save Time—save Men—save Power—save Lubricant—Increase your Production.

Farvalize in '44!

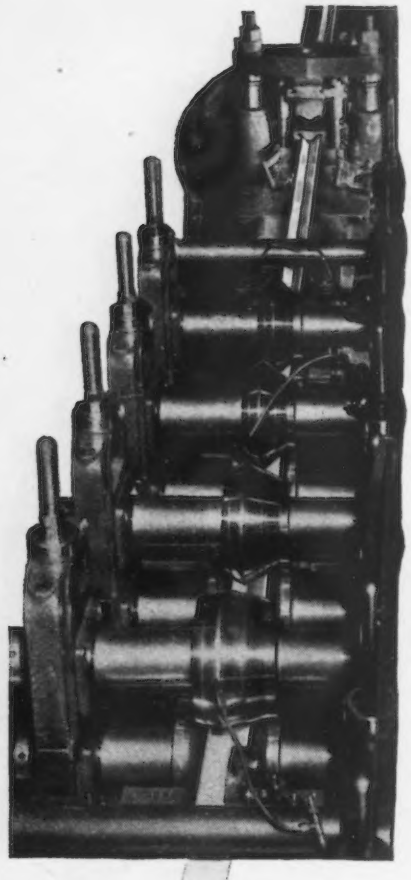
The Farval Corporation, 3252 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Automotive and Industrial Worm Gearing
IN CANADA: *Peacock Brothers Limited*

ARMY E NAVY

FARVAL

CENTRALIZED SYSTEMS OF LUBRICATION

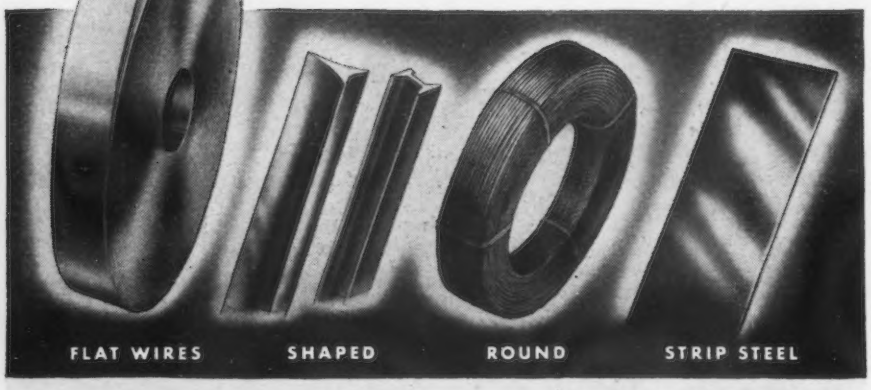


Where Flat Wire pays off!

RUNNING THROUGH the forming rolls, under the punching, shearing or drawing dies . . . that's where ROEBLING FLAT WIRE pays dividends. Dividends in the form of smoother production, fewer rejects . . . because dimensions are held to strict tolerances, steel analysis is right for the job, temper and finish are closely controlled.

Making steel like this is a specialty. So if your production schedules call for round, shaped, flat wires or strip steel to exacting specifications—team up with Roebling. We have the steel-making facilities, trained manpower and special production tools to deliver wire that will *deliver for you.*

JOHN A ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities



ROEBLING

PACEMAKER IN WIRE PRODUCTS

WIRE ROPE AND STRAND • FITTINGS • AERIAL WIRE ROPE SYSTEMS • COLD ROLLED STRIP • HIGH AND LOW CARBON ACID AND BASIC OPEN HEARTH STEELS • ROUND AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING AIRCORD, SWAGED TERMINALS AND ASSEMBLIES • SUSPENSION BRIDGES AND CABLES

Defense Plant Corp. Contract Award

• • • Defense Plant Corp., RFC subsidiary, has authorized the following contracts:

Boeing Aircraft Co., Seattle, Wash., to provide additional plant facilities in Renton, at a cost in excess of $2,500,000, making a total commitment of more than $21,700,000.

Reynolds Metals Co., Richmond, to provide additional facilities at a plant in Louisville, Ky., at a cost in excess of $600,000, making a total commitment of more than $2,500,000.

Pittsburgh Equitable Meter Co., Pittsburgh, to provide additional machinery and equipment at a plant in Oakland, Cal., at a cost in excess of $75,000, making a total commitment of more than $500,000.

Precision Castings Co., Syracuse, N. Y., to provide plant facilities at Fayetteville, at a cost in excess of $425,000.

Tyson Roller Bearing Corp., Massillon, Ohio, to provide additional equipment at a plant in Massillon, at a cost in excess of $100,000, making a total commitment of more than $400,000.

Carworth Farms, Inc., New City, N. Y., to provide additional plant facilities in New City, at a cost in excess of $60,000, making a total commitment of more than $145,000.

Silica Products, Oregon, Ltd., Eugene, Ore., to provide plant facilities at Eugene, at a cost in excess of $60,000.

American Viscose Corp., Wilmington, Del., for the acquisition of machinery and equipment for a plant in Front Royal, Va., at a cost in excess of $5,000,000.

McCrossin Engineering Co., New York, to provide plant facilities at Rusk, Tex., at a cost in excess of $2,500,000.

Frank Foundries Corp., Moline, Ill., to provide facilities at a plant in Muncie, Ind., at a cost in excess of $95,000.

Sprout & Davis, Inc., Whiting, Ind., to provide automotive equipment at a cost in excess of $30,000.

Lockheed Aircraft Corp., Burbank, Cal., to provide additional plant facilities at Burbank at a cost in excess of $370,000, making a total commitment of more than $8,000,000.

Packard Motor Car Co., Detroit, to provide additional equipment at a plant in Detroit at a cost in excess of $635,000, making a total commitment of more than $3,285,000.

General Electric Co., Schenectady, N. Y., to provide equipment at a plant in Bridgeport, Conn., at a cost in excess of $220,000.

Green River Distilling Co., Stamping Ground, Ky., to provide facilities at a plant at Stamping Ground at a cost in excess of $160,000.

Pascagoula Ice & Coal Co., Pascagoula, Miss., to provide equipment at a plant in Pascagoula at a cost in excess of $110,000.

Pennsylvania Salt Mfg. Co., Philadelphia, to provide equipment at a plant in Philadelphia at a cost in excess of $40,000.

Pressed Metal Products Advisory Committee Named

• • • **The Pressed Metal Products** Industry Advisory Committee has been announced with the following members:

Government presiding officer: O. F. Fancey. Committee members are: H. D. Adams, Adams Pressed Metals Corp., Galesburg, Ill.; Pierre McBride, Porcelain Metals Co., Louisville; J. J. Boehm, Boehm Pressed Steel Co., Cleveland; William J. Meinel, Heintz Mfg. Co., Philadelphia; Richard M. Dugdale, Farrington Mfg. Co., Boston; K. T. Norris, Norris Stamping & Mfg. Co., Los Angeles; O. L. Earl, Mullins Mfg. Corp., Salem, Ohio; Frederick R. Schaefer, Republic Steel Corp., Niles, Ohio; Benjamin W. Erickson, Consolidated Fruit Jar Co., New Brunswick, N. J.; T. J. Turk, Indiana Pressed Steel Co., Muncey, Ind.; J. B. Hower, Akron-Selle Co., Akron; Chester W. Turner, H. E. Wright Co., Charlestown, Mass.

STEWART

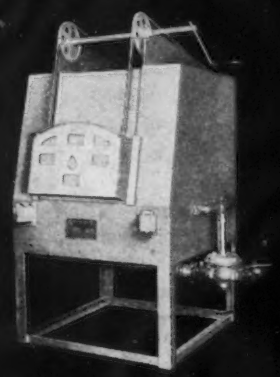
THE BEST INDUSTRIAL FURNACES MADE

ARMY E NAVY

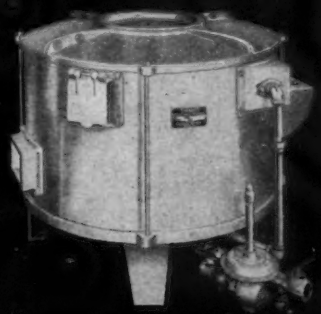
A TYPE FOR EVERY NEED

In addition to large units designed to meet specific production requirements, STEWART also builds these famous

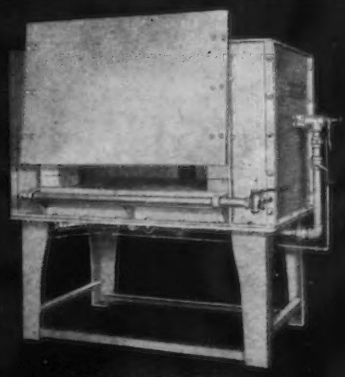
STANDARD INDUSTRIAL FURNACES



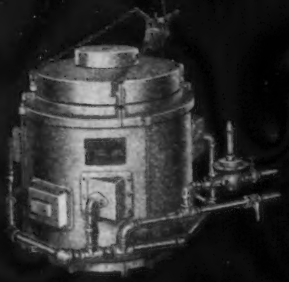
SEMI-MUFFLE OVEN FURNACE



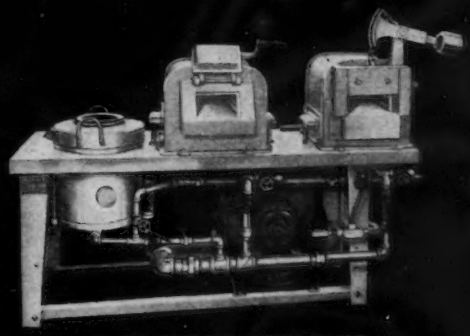
ROUND POT FURNACE



OPEN SLOT FORGE

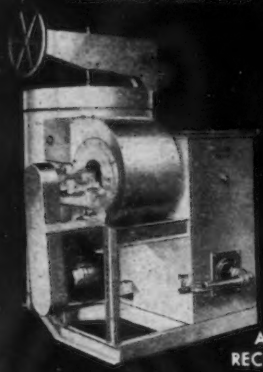


STATIONARY METAL MELTING FURNACE

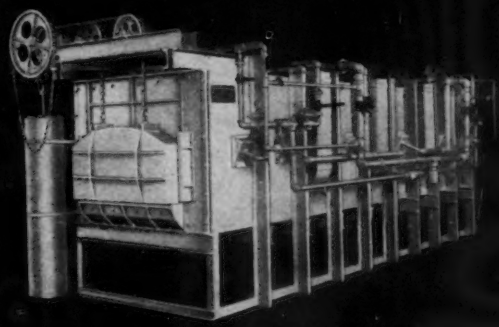


TRIPLE PURPOSE COMBINATION

SMALL FORGE



AIR DRAW RECIRCULATING FURNACE



HEAVY PORTABLE OVEN FURNACE

BENCH OVEN FURNACE

A letter, wire or 'phone call will promptly bring you information and details on STEWART Furnaces. Or, if you prefer, a STEWART engineer will be glad to call and discuss your heat-treating problems with you.

STEWART INDUSTRIAL FURNACE DIVISION OF CHICAGO FLEXIBLE SHAFT COMPANY

Main Office: 5600 W. Roosevelt Road, Chicago 50, Ill.—*Canada Factory:* (FLEXIBLE SHAFT CO., LTD.) 321 Weston Rd., So., Toronto

Both

PLOUGHSHARE AND SWORD

★ Udylite war production equipment requires no major conversion to meet the demands of peacetime use.

True, metal finishing requirements will change. New cycles will be required. New products will demand new handling but through it all your basic metal finishing tools will not change—the faithful "swords" of war will become the "plowshares" of peace.

Udylite metal finishing equipment has proved its worth under the strain of wartime performance, the same engineering and dependable quality which enabled it to withstand the rigors of forced production will make Udylite equipment doubly valuable in normal times.

Udylite's staff of experienced engineers offer you the country's most complete line of dependable polishing, plating and anodizing equipment backed by their years of technical "know how". Start RIGHT with Udylite equipment.

Call or write Udylite for your Metal Finishing requirements.

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit 11, Mich.

Chicago 12, 1943 Walnut Street | Long Island City 1. N. Y., 11-16 44th Drive | Cleveland 3, 4408 Carnegie Ave.

Continuous Casting

(CONTINUED FROM PAGE 65)

& Iron Co. The Williams patents (1,793,268; 2,206,888; 2,079,644, and 2,187,720) are concerned principally with mold design and methods of mold cooling and lubrication.

When reported on back in 1940, Williams was occasionally casting experimental heats of steel in 4 x 4-in. cross-section at speeds of about 8 ft. per min. It is rather obvious that to continuously cast molten steel at any worthwhile speed, the heat exchange between the mold wall and the coolant must be rapid and accurately controlled. Williams makes his mold of commercially drawn copper or brass tubing of about ¼-in. wall section, which mold is fastened into a very accurately machined cooling chamber. The wall of the heavy steel cooling chamber is only separated from the inner mold wall by a fraction of an inch, and a multitude of flutings in the cooling chamber press against the mold wall keeping it in shape and directing a very high pressure water flow along the mold wall to rapidly scour the heat away.

The Williams mold does not move. As the billet or ingot emerges from the bottom it passes through a series of sizing rolls that prevent bulging of the walls by ferrostatic pressure from the molten interior. Water sprays surround these sizing rolls and the ingot is quite cool when it gets down to a set of pinch rolls which withdraws the ingot from the mold. Mold lubrication is frequently used, and this is automatically introduced around the edge of the molten metal pool by a multitude of orifices, the volume of lubrication being controlled by the speed of the pinch rolls withdrawing the billet.

About a year ago, the Williams process was taken over by the Republic Steel Corp. for extensive experimental investigation at the Cleveland Corrigan-McKinney plant. So far the original Williams molds have been used, but a much larger associated structure has been devised to permit casting of quite long billets. A drawing of this structure and a superimposed picture of the mold section is shown on page 58. It will be seen from the drawing that facilities have been incorporated permitting the bringing of a sizable volume of molten steel (6 tons) in a ladle directly from the open hearth floor, elevating this ladle to the top of the structure for pouring theough the Williams

Production Records ARE BEING MADE WITH

H-W ELECTRIC STEEL FURNACE REFRACTORIES

FOR BASIC PRACTICE

- Star Silica Roofs
- H-W Improved Metalkase Sidewalls
- H-W Magnamix Bottoms

FOR ACID PRACTICE

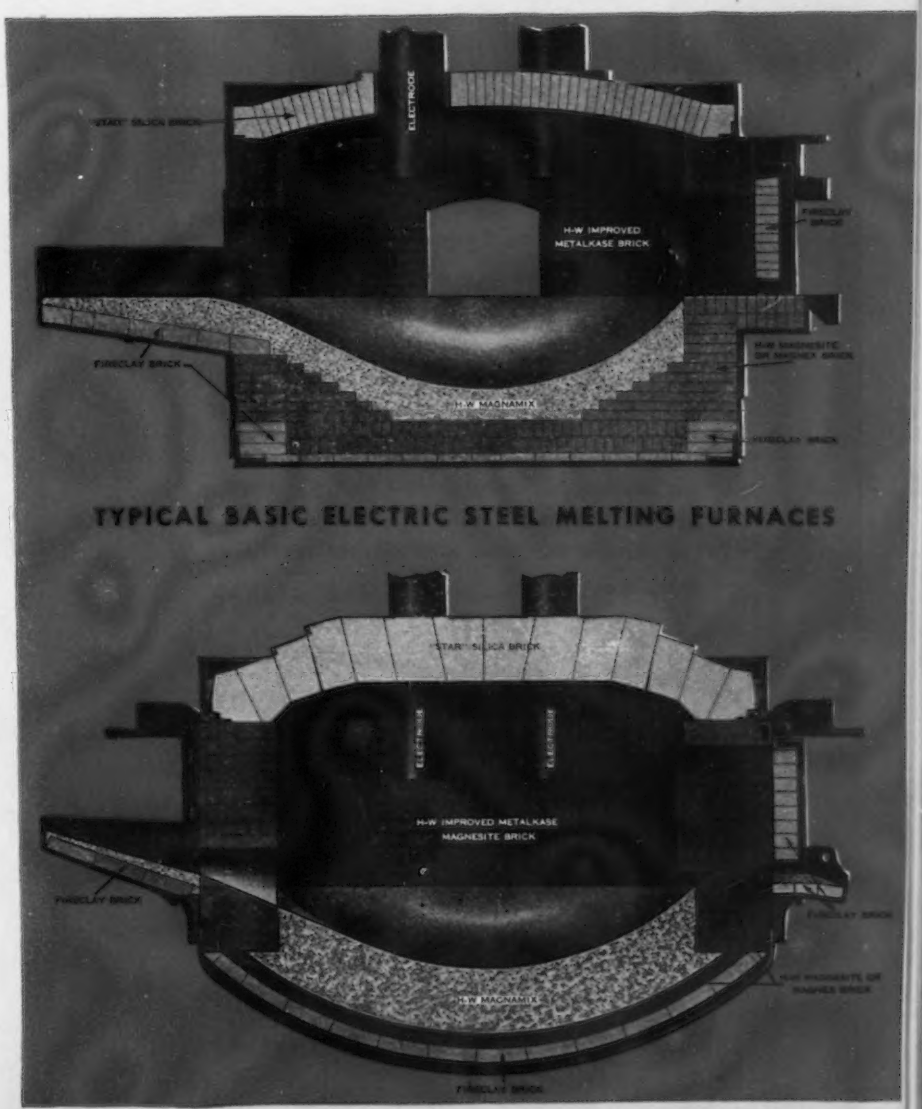
- Star Silica Roofs
- Star Silica Sidewalls
- H-W Ganister Bottoms

The excellent service secured with STAR silica refractories in the roofs of both acid and basic electric steel furnaces has resulted in their widespread adoption by producers of electric steel. STAR silica refractories are likewise preferred by many operators for sidewalls in acid electric steel furnaces.

The durability of H-W IMPROVED METALKASE linings in basic electric steel furnace sidewalls is reflected in the increased tonnages being produced in the many plants where they are established. A comparison of H-W IMPROVED METALKASE with other refractories in like service, we believe will definitely demonstrate their superiority.

Wherever a trial of H-W MAGNAMIX (a Washington magnesite ramming mixture) has been made in the bottom of basic electric steel furnaces, it has met with instant favor since it has proved to be economical, durable and easily applied.

Prepared by crushing ganister rock (quartzite), H-W GANISTER is established as a material of highest quality for use in the bottoms of acid electric steel furnaces.



TYPICAL BASIC ELECTRIC STEEL MELTING FURNACES

A COMPLETE REFRACTORIES SERVICE

TRADE MARK

REG. U. S. PAT. OFF.

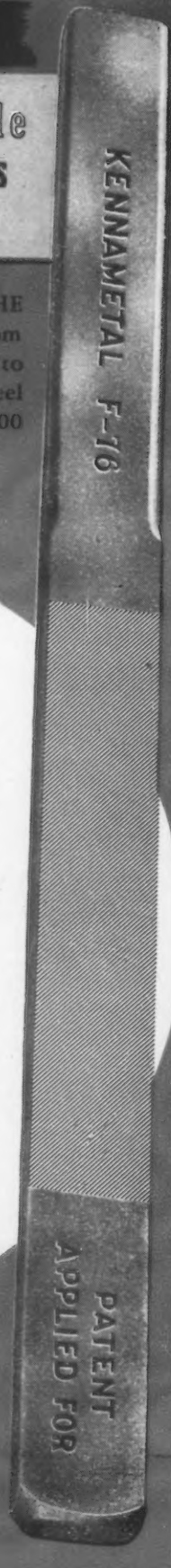
HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES • WORLD'S LARGEST PRODUCER OF REFRACTORIES • GENERAL OFFICES, PITTSBURGH, PENNA.

Another KENNAMETAL First!

New KENNAMETAL Lathe File Produces Sensational Results

One KENNAMETAL LATHE FILE removed the burrs from 100,000 shells as compared to 800 to 1,000 shells by a steel file—a production ratio of 100 to one!



Just as the introduction of KENNAMETAL-tipped milling cutters in 1939 is revolutionizing the milling of steel, the NEW KENNAMETAL LATHE FILE promises to establish new standards of efficiency and economy in the filing of steel and other metals. For example . . .

★ KENNAMETAL Lathe Files permit filing speeds of 3 to 10 times that possible with steel files, matching the unusually high cutting speeds of KENNAMETAL carbide tools.

★ KENNAMETAL Lathe Files do not burn up at high speeds but outlast steel files 50 to 200 times.

★ KENNAMETAL Lathe Files cut hardened steels up to 62 Rockwell C which the ordinary file will not touch . . . do a noteworthy job on cast iron and brass at surface speeds around 900 feet per minute, and efficiently file high-carbon, high-chromium steels at 800 surface feet per minute.

At present, KENNAMETAL LATHE FILES are available in one size—Style F-76, illustrated. It is 11" long, ¾" wide, and ¾" thick, having a substantial filing surface 4" long of grade K4H KENNAMETAL (80.6 Rockwell C), single cut with teeth at 30° shear angle, 40 per inch. Shank is shaped for convenient handling.

PRICES
1 to 9 files . . . $15.00 each
10 to 99 files . . . $13.00 each
100 or more . . . $12.50 each
F.O.B. Latrobe, Penna.

You too can save time and reduce filing costs with KENNAMETAL Files. Order one today and prove its merits for yourself.

KENNAMETAL

KENNAMETAL Inc.
144 Lloyd Ave., Latrobe, Pa.
SUPERIOR CEMENTED CARBIDES

FEATURE CONTINUATION

mold. Casts of lengths up to 50 ft. have been made.

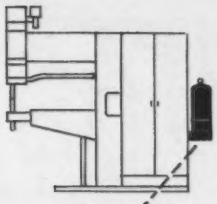
However, experimental data so far from Republic are scanty, as only 40 or so casts have been made, ranging from some very promising metal to worthless casts. These casts all went through a Williams mold essentially the same as that described back in 1940. While the billet lengths are far longer than those produced by Williams at that time, the technique and results otherwise have been little different. None the less, Republic engineers are convinced the operation has possibilities, and have come to some tentative conclusions, subject of course to alteration as experimentation continues.

It is believed that present mold design pretty well limits the casting of, say, a 3 x 8½-in. section at speeds of from 5 to 8 ft. per min. Since faster speeds are desirable some alteration in mold design may have to be evolved, for otherwise a great deal of trouble with bleeding and breakout can be expected. Like previously described in the discussion of the Junghans-Rossi machine, a very critical phase of the operation is that small time interval wherein the ingot shell has frozen and contracted away from the mold wall, but still is not subject to the stringent cooling of the water sprays located below the mold. Several ideas have been developed that may permit drastic cooling to proceed in this zone of operation. Furthermore, the great heat involved has a tendency to result in some mold warping, and here again a change will likely be made to minimize this. It has also been found that the mold wall can be thickened somewhat without interfering appreciably with heat transfer.

Republic is currently constructing new molds of sizes 5 x 10 in. and 6 x 6 in., incorporating therein some of the refinements already discussed. It has been found that 20-gage carbon steel molds work just about as satisfactory as does brass, and a trial with a 24-gage stainless steel mold showed little or no superiority over the carbon steel. It was further found that the mold wall could be ½ in. thick with no appreciable slowing of thermal exchange, although for certain design reasons a thin-walled mold is deemed more desirable.

On several trial runs the steel was poured at near the freezing temperature of 2600 deg. F., and the mold coolant rose about 15 deg. in temperature when circulating at 150 gal. per min. At this rate the water was picking

SCIAKY

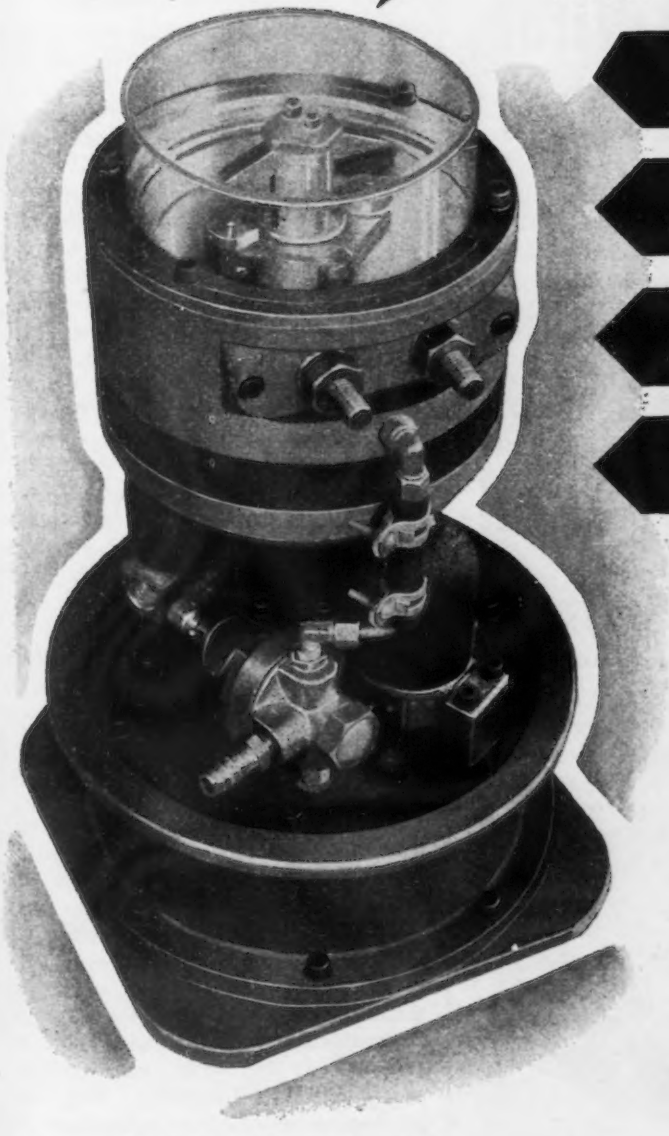


announces a significant achievement in the field of electro-magnetic stored energy resistance welding . . .

a d-c current interruptor — *without arc*

DYNATROL

PATENT PENDING



NO ROUTINE MAINTENANCE REQUIRED

ACCURATE CONTROL OF SECONDARY CIRCUIT DUE TO ABSENCE OF ARCING IN PRIMARY

INCREASED EFFICIENCY OF ELECTRO-MAGNETIC ENERGY SYSTEM — SHORTER CHARGING TIME

SPEED INCREASED 20% OVER MACHINES OPERATING ON CONTACTOR SYSTEM

THE SCIAKY DYNATROL provides the answer to contractor problems on electro-magnetic stored energy resistance welding equipment. This high-speed device performs the function of accurately interrupting the charging current to the reactor *without arc*.

....The problem of interrupting a d.c. current in a highly reactive circuit has always been considered difficult. On former Sciaky machines, this was accomplished by a contactor unit, which together with an arc-blowing device, arc-laminating shields, etc., produced a highly accurate interruption of the charging current.

However, in industrial production, the continuous arcing finally results in a deterioration of the contact tips, requiring periodical maintenance and replacement. It was considered desirable to solve this problem in such a way that the same consistent welds be produced without any maintenance of the interrupting device. To this end, the DYNATROL was developed and was found to be not only a means of more accurate and efficient current interruption, but also, because of the shorter charging time, *actually increases operating speeds 20%*.

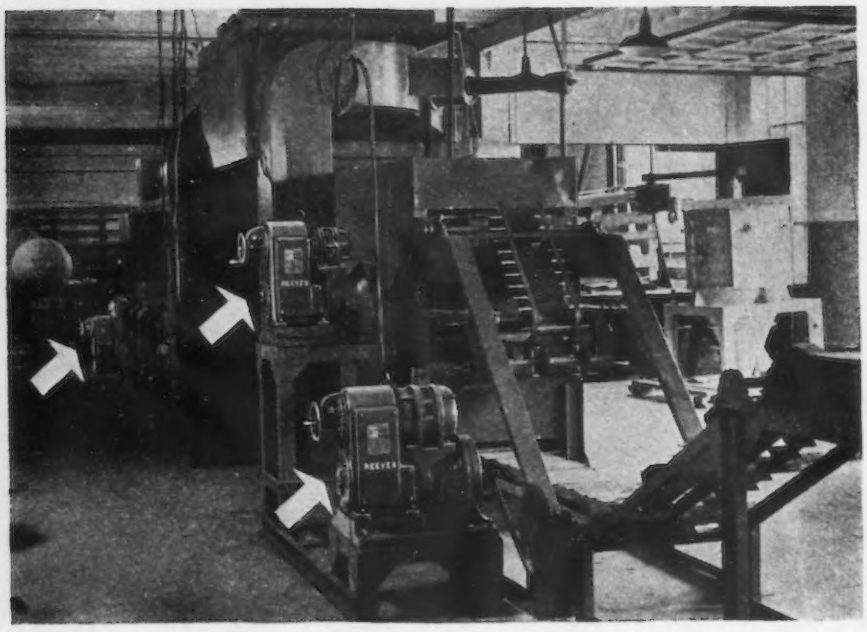
The DYNATROL is available on all Sciaky Stored Energy machines up to 50KW.

Descriptive bulletin 201-A ready soon. Write for your copy.

SCIAKY BROS.

Manufacturers of a Complete Line of A.C and D.C Electric Resistance Welding Machines

4915 W. 67th Street, Chicago, 38, Illinois



Three-deck oven showing three REEVES Motodrives

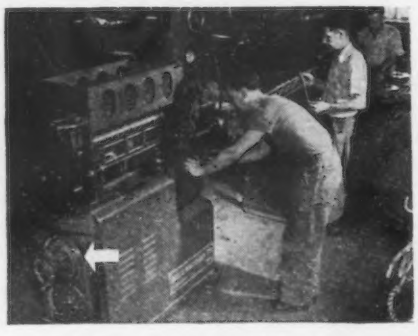
REEVES Speed Control Vital Aid in Welding Rod Production

● The Moslo Machinery Company, Cleveland, Ohio, manufactures a complete line of equipment for producing flux-coated welding rods, and standardly furnishes REEVES Vari-Speed Motodrives on machines in the line to insure fast, uniform high-quality output.

Automatic rod feeder is equipped with a REEVES Motodrive to set feed of electrodes, according to nature of flux and balance of production program. A REEVES Motodrive regulates speed of transfer conveyor to synchronize rod travel from die head with brushing operation, depending on wire size and production schedule. The brushing machine is equipped with a REEVES Motodrive to synchronize its operation with delivery from transfer conveyor and drying rate of oven.

The final operation is drying, and Moslo has developed a special three-deck drier, each deck controlled through a REEVES Motodrive to maintain accurate balance of time, temperature, humidity and flux.

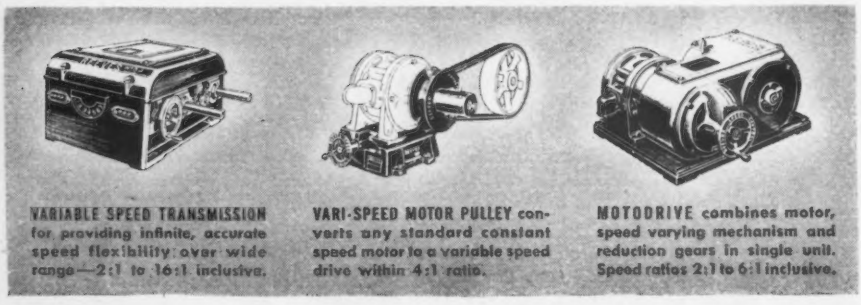
Moslo Machinery Company is only one of thousands of machine builders



REEVES-equipped Automatic Feeder

who furnish REEVES Speed Control as standard equipment to insure most efficient operation under all changing conditions. REEVES units are easily applied to machines in service. Send for copy of catalog I-435 giving complete information on REEVES Variable Speed Drives.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA



VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over wide range—2:1 to 16:1 inclusive.

VARI-SPEED MOTOR PULLEY converts any standard constant speed motor to a variable speed drive within 4:1 ratio.

MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed ratios 2:1 to 6:1 inclusive.

up about 18,000 B.t.u. in about 6 sq. ft. of mold surface. And, since in the very best of high duty boiler installations of modern Naval design the maximum heat exchange is on the order of 3000 B.t.u. per sq. ft. per min., the opinion was that at the 8 ft. per min. speed the casting of the 3 x 8½ in. section was progressing just about as fast as theoretically possible in order to freeze the entire cross-section to a solid.

In actual practice, however, only the outer skin of the ingot need be frozen in the mold, the interior being solidified as the result of water spraying below the mold. For the 3 x 8½-in. section, a total of, say 10 sq. in. of outer cross-section would be fully sufficient to solidify in the mold. This would permit a *theoretical* casting speed far above the 8 ft. per min. used in the experiment cited above.

Parenthetically, it might be pointed out that when Bethlehem experimented with continuous casting of steel in 1941, somewhat similar conclusions were reached. As seen from the photographs on page 61, the Bethlehem set-up was comparatively simple. The copper mold was water-cooled by means of five sets of copper coils fastened to the outside surface of the mold. Bethlehem cast 4-in. rounds, and made about 30 casts in all. Speeds of 15 ft. per min. were reached, but optimum speed seemed to be 8 to 10 ft. per min. Carbon steels, from 0.1 C to 0.5 C were tried, and thermal cracks were found in all analyses above 0.3 C. In general, the surface condition was poor, with laps, folds and bleeding, as may be seen in the photograph on page 61. The mold itself seemed to stand up well and the coolant showed no large rise in temperature. A secondary cooling spray was located around the bottom of the mold. The experiment, however, was abandoned because of pressure of other work, and not very many definite conclusions were established.

But, all the mold refinements being worked out by Republic, together with some alterations in the handling of coolant to additionally improve the scouring of heat off the interior of the mold wall, may possibly open the way to faster speeds and serve to stabilize the operation considerably, the result being that a year from now this unit can well be of great interest to the entire steel industry. For, like all continuous casting operations it may be a means whereby a relatively small capital expenditure can furnish immediate break-downs for rod and wire mills, and perhaps be a means of

BREECH BLOCKS AND HOUSINGS OF *Barium Steel* PROVIDE THE KICK OFF

Barium Alloy Steel again demonstrates its ability to handle tough assignments.

For the Breech Blocks and Housings of many of the guns in Uncle Sam's Navy are products of Barium's *Unified Control:*

Melted and refined in Barium's furnaces

Forged under Barium's giant presses and hammers

Scientifically heat treated and quenched

Machined in Barium shops

It is *team-work* like this that accounts for Barium success in furnishing hard-to-make ordnance. We invite your inquiries for Die Blocks, Hammer Rods and Heavy Forgings.

BARIUM

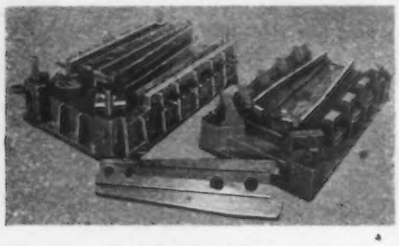
STAINLESS STEEL CORP.

CANTON • OHIO

Producers of Stainless, Alloy, and Carbon Steels

YOU CAN'T ESCAPE THE IMPORTANCE OF THESE FIGURES

Tractor top die (75% Strenes metal) 33⅓% less costly than like die of conventional metals. Weight 17,000 lbs. More than 500 hours of machining time, saved because the collapsible die, pressure pad, and cam blocks were so closely cast to shape. Important saving in raw stock also reported.



Tractor Top Die, 75% Strenes Metal

At the best, any tooling program runs into money. All the greater reason for using the most effective materials and saving time and money wherever possible. We make many and strong claims for Strenes metals, but can support them. Challenge us.

Automobile, truck, tractor and farm implement manufacturers.

Refrigerator, stove, and metal furniture manufacturers.

Casket and vault manufacturers.

Fan, blower, bicycle, vacuum cleaner and scores of other products involving sizeable forming and drawing operations.

Today while it is on your mind, investigate Strenes Metal.

THE ADVANCE FOUNDRY CO.

100 Seminary Street

DAYTON, OHIO

STRENES METAL

locating some small plants in remote areas to handle local requirements and to draw upon surrounding scrap supplies.

Goss Process:

The only other equipment in experimental operation with steel is that designed by Norman P. Goss, of the Cold Metal Process Co., Youngstown, Ohio. This method was just mentioned back in 1940, since at that time it had only been conceived and patented. Subsequently, however, a machine has been built and operated at intervals at the Duluth, Mich., plant of the American Steel & Wire Co. Conscious of the concern of Junghans-Rossi and Williams with the need for uninterrupted cooling of the ingot during that short interval after the skin is formed and pulls away from the mold wall, Goss in his patent (2,-225,373) provides for a mold made up of numerous sections, each section individually cooled. Particularly interesting is the means provided whereby as the metal skin freezes and pulls away from the mold wall a finely divided solid material is introduced through many orifices in the mold wall. This material is capable of remaining solid during the casting operation and also capable of accommodating itself to the interstices between the cast metal and die wall. In this manner the walls of the die are protected from abrasion and galling, and the congealing metal is also protected from run-outs and abrasion. This material also maintains a heat-conducting contact between the ingot skin and the die wall.

The Goss method also provides for sealing off the top of the mold and introducing above the metal pool an inert or reducing gas to prevent metal oxidation, and also under sufficient pressure to create considerable hydrostatic pressure, if so desired. Below, the mold, as in practically all continuous casting processes, there are provided a number of cooling sprays and a set of pinch rolls to withdraw the ingot from the mold.

Since the Goss method sets up a number of additional variables, such as many different and controllable zones of cooling, the pressure, volume and points of entry of the material to fill up the gap between ingot skin and mold wall, and the amount of gas pressure above the metal pool, it is apparent that many adjustments can be made in speed of casting, in condition of ingot surface, and in metal-

Stearns Suspended MAGNET at DUQUESNE PAYS FOR ITS OPERATION

This 65" Stearns Suspended Circular Magnet above the head pulley of the main belt conveyor at the Warwick mine of Duquesne Light Co. recovers enough scrap metal to pay for its operation.

But—the important feature of this magnet installation is that it protects crushers and other valuable machinery.

You too may have a problem of protection, reclamation or purification that can be efficiently, profitably solved with magnetic equipment. Consult Stearns Magnetic Milwaukee for advice and recommendations.

Spout Magnets

Magnetic Pulleys

Suspended Magnets

★

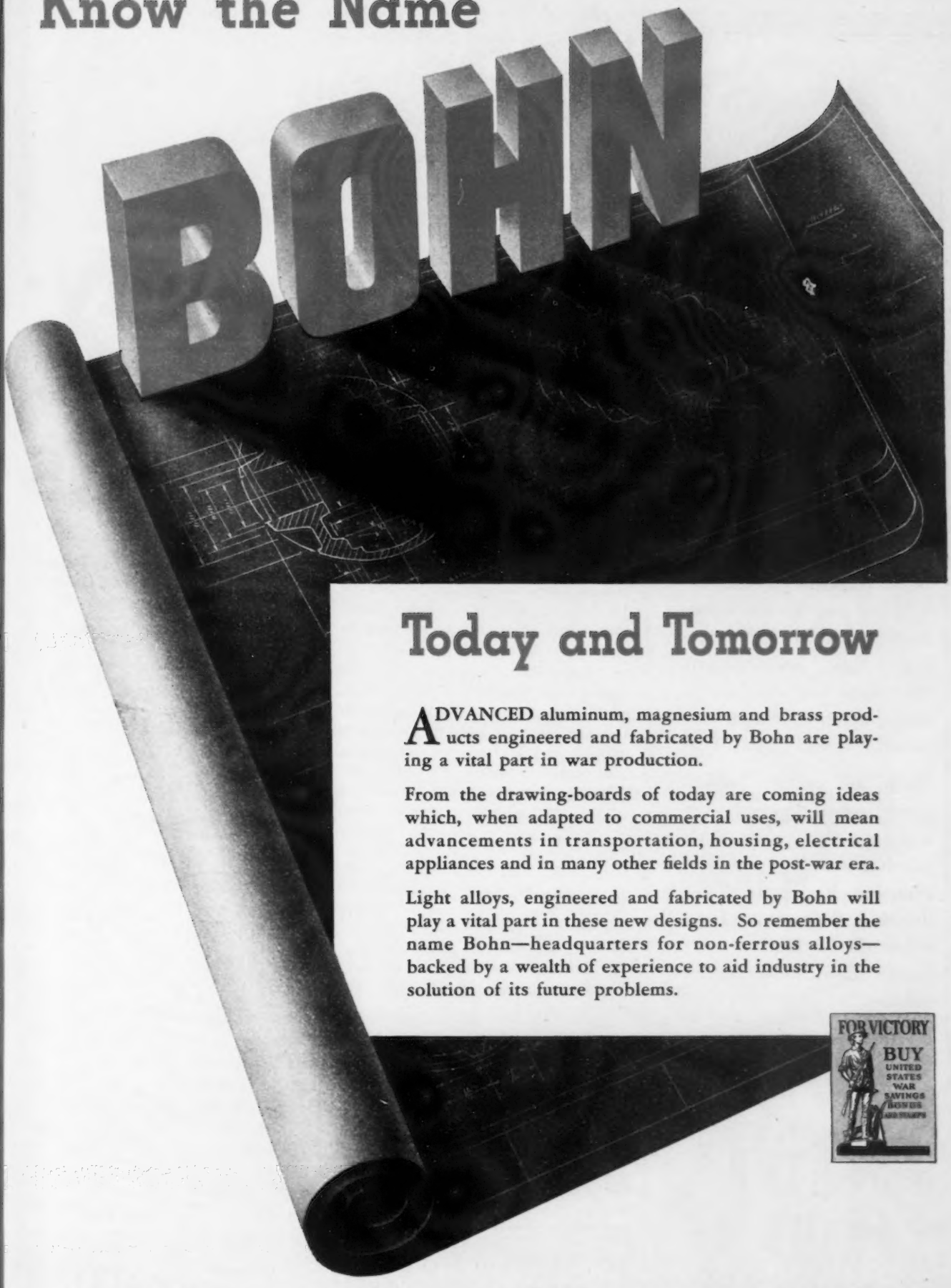
Magnetic equipment is a "must" in many industries, whether it be Suspended Magnets (Bulletin 25) Spout Magnets (Bulletin 97) Magnetic Pulleys (Bulletin 302) or other types of magnetic separators (Bulletin 800).

★

STEARNS MAGNETIC MANUFACTURING CO.

635 S. 28th St., Milwaukee 4, Wis.

Know the Name



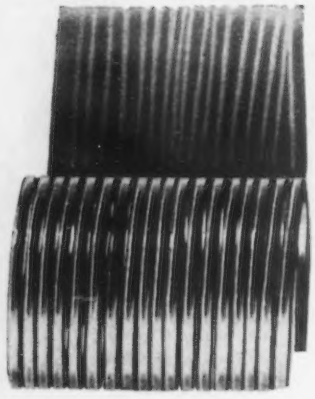
Today and Tomorrow

ADVANCED aluminum, magnesium and brass products engineered and fabricated by Bohn are playing a vital part in war production.

From the drawing-boards of today are coming ideas which, when adapted to commercial uses, will mean advancements in transportation, housing, electrical appliances and in many other fields in the post-war era.

Light alloys, engineered and fabricated by Bohn will play a vital part in these new designs. So remember the name Bohn—headquarters for non-ferrous alloys—backed by a wealth of experience to aid industry in the solution of its future problems.

BOHN ALUMINUM AND BRASS CORPORATION, DETROIT, MICHIGAN
GENERAL OFFICES—LAFAYETTE BUILDING
Designers and Fabricators—**ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS**



Keeps the bull in the barnyard

● **Few city folks know what an "electric" fence looks like, but any farmer will tell you how a waist-high strand of wire carrying a light, intermittent electrical current keeps farm animals within any desired area.**

Made of rustless phosphor bronze these springs actuate the clock-like mechanism of the fence charger. Paper thin, yet durable, they are another example of Holly's versatile manufacturing facilities.

Write, wire, or better still . . . phone us!

AMERICAN SPRING OF HOLLY, INC.
HOLLY, MICHIGAN

lurgical structure of the steel throughout the cross-section.

In the casts already made it has been determined that the mold is a feasible piece of equipment, that sound metal can be cast at fair speed, and a very smooth ingot skin can be secured. Here again, like the Williams process. The Goss method of casting steel needs considerably more experimental investigation, but can well be a method very much worth watching for the effect it could possibly have on the economics of steel production.

Users of Fork Trucks Queried as to Desires

Chicago

• • • **To guide its** engineers in designing materials handling equipment for postwar manufacture, Clark Tructractor, Battle Creek, Mich., a divition of Clark Equipment Co., has inaugurated a study of customer preferences, similar to those employed by the automobile industry.

A questionnaire has been circulated among industrial concerns to determine their materials handling habits and preferences. Dealing principally with fork trucks, users are asked, with regard to their needs and preferences, such questions as where the driver should be placed, type of power preferred, make of battery for electric trucks, tilting requirements, upright data, tires, ramp climbing ability under full load, underclearance data, speeds, turning radius, weight and width of machine, safety features, and for opinions on other features. The questions are illustrated by small drawings showing the features discussed.

The survey is based on the thesis that the present 30 to 50 per cent of unskilled men in industry must be reduced to 5 or 10 per cent if American industry is to compete with low cost foreign labor and that one of the ways to do this is to substitute efficient materials handling equipment for unskilled workers.

Patent List Omitted

• • • Omitted from this week's magazine are the seized metalworking patents, which have appeared in 15 preceding numbers. Publication will be resumed in an early issue.

ready-made skills *for trainees*

THE BEGINNER, like the veteran, merely peels off the .003 or .002-inch thick laminations to make the required accurate fit . . . A Laminum shim places precision in any man's hands!

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

Laminated Shim Company
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LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

He Never Has to Take His Eyes Off the Cutter and Work

DEVLIEG JIGMIL

Spindle start, stop and reverse—

Power vertical feed and rapid traverse movement—

Power horizontal feed and rapid traverse movement—

Power automatic table retraction and repositioning—

Power feed and rapid traverse to bar movement—

are all carried in a master switch on the spindle head—at the operator's finger tips.

Thus, the operator of the DeVlieg Jigmill can fix his vision on the cutter and work—never has to look at controls during operation.

The Jigmill is what a machine tool should be—a powerful and accurate extension of the operator's hand. The value in precision boring and milling is apparent.

It's a NEW Type Machine

Spacing Accuracy of a Jig Borer . . . Performance Qualities of a Milling Machine . . . Convenience and Flexibility of a Horizontal Boring Mill.

New speed of operation . . . New Standards of excellence of bored holes . . . New accuracy in milling . . . Automatic table retraction and repositioning dependable within .0002".

Many machines show 75% greater average daily productivity.

Write for Circular

DEVLIEG MACHINE TOOLS

DE VLIEG MACHINE COMPANY

450 FAIR AVENUE, FERNDALE (DETROIT), MICHIGAN

MACHINE TOOLS

. . . News and Market Activities

International Detrola Merger Explained

Elkhart, Ind.

• • • **In a move to diversify** its activities and find new uses for its working capital in the face of a slackening machine tool market, the International Machine Tool Corp., Elkhart, Ind., has acquired Detrola Corp., Detroit, which makes radio and other electronic devices. In explaining the merger, which was effected Dec. 31, 1943, C. Russell Feldmann, president of the new International Detrola Corp., stated that the machine tool firm possessed resources, particularly working capital, upon which it might be difficult to show an adequate return on the machine tool business alone in view of the present trend in sales.

The Detrola Radio Division, which on Dec. 31, 1943, had war contracts totaling about $19,100,000, on the other hand, had lacked adequate capital for expanding war work and to take fullest advantage of the civilian market after the war, Mr. Feldmann said. Civilian radios have not been made since May, 1942. Pre-war products of Detrola included portable and home radios, record changers and automobile radios.

By the addition of consumer goods products, Mr. Feldmann expects International to be able to iron out some of the violent fluctuations in machine tool production. Post-war activity in the radio division should place at the disposal of the corporation funds for research and product development in the machine tool divisions during periods of slack sales when engineering expense is ordinarily curtailed. Several long term projects of this nature have already been planned, one of them stemming from research in surface finishes as a result of the development of superfinishing equipment.

One of the immediate effects of the merger has been the retirement of a $2,400,000 V-loan which had been a Detrola obligation. A V-loan of $5,500,000 of the International Machine Tool Corp. had been paid earlier, leaving the International Detrola Corp. free from all bank indebtedness. International also retired during 1943 the remainder of its outstanding preferred stock.

Mr. Feldmann has been president of both Detrola Corp. and International Machine Tool Corp., as well as being board chairman and principal stockholder of Strong, Carlisle & Hammond Co., distributor of machinery, mill supplies and other items with main offices in Cleveland and a branch in Detroit. Since Dec. 12, 1942, and during 1943, Strong, Carlisle & Hammond acquired practically all of the common stock of Detrola Corp. The Cleveland firm now owns a large block of stock of International Detrola Corp. Capital stock of International Machine Tool Corp. was increased by 152,000 shares to effect the merger, making a total of 490,000 shares outstanding at a par value of $1. A seventh consecutive quarterly dividend of 25c. was recently declared.

Detrola stockholders received one share of International Detrola in exchange for 1.8 shares of Detrola Corp., with International holders retaining their present holdings.

Net sales (unaudited) of Detrola for the 12 months to December 31 were $11,746,248.72 and net profit $522,957.86 after provisions for Federal taxes and an estimated refund to result from renegotiation. Net profits of International for 12 months ending October 31, 1943, were $1,191,517.89 after Federal income taxes and provision for estimated refund to result from renegotiation.

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Tool Redistribution Explained

Cleveland

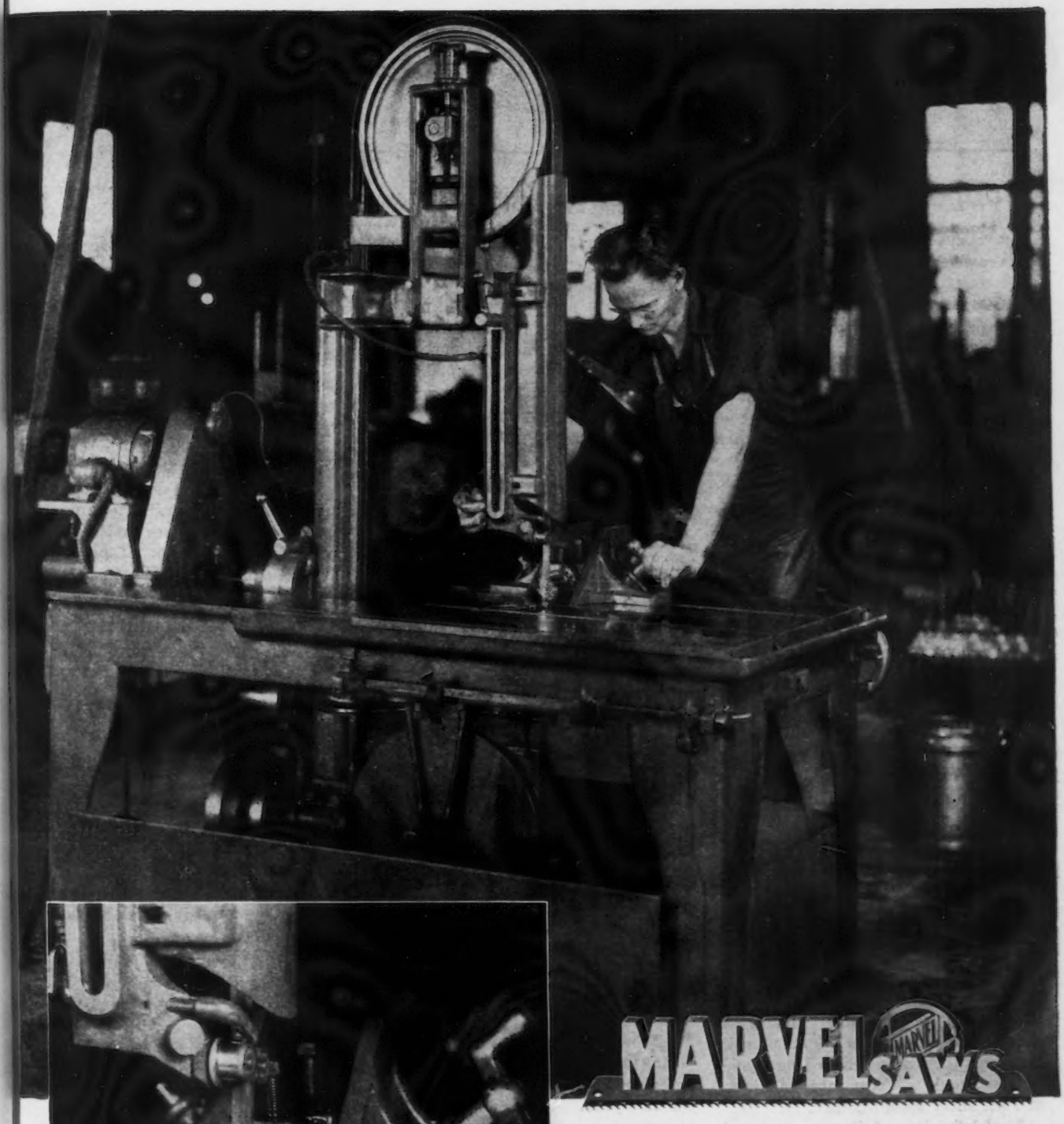
• • • **The local WPB** redistribution department reports January as the largest volume month in the 20 months' existence of this regional office for the referral of machine tools in the idle and excess categories to new war plant or essential civilian users. The dollar value of referrals of machine tools for the month of January totaled $2,057,296 on the basis of OPA used machine prices. These used tools originated from DPC, Army Ordnance, Navy, and both prime and subcontractors as well as second hand machine tool dealers. Listings of idle and excess machine tools on hand at the regional WPB office include a reasonably comprehensive list covering the entire nation, plus voluntary listings from local contractors and government and military agencies in the region.

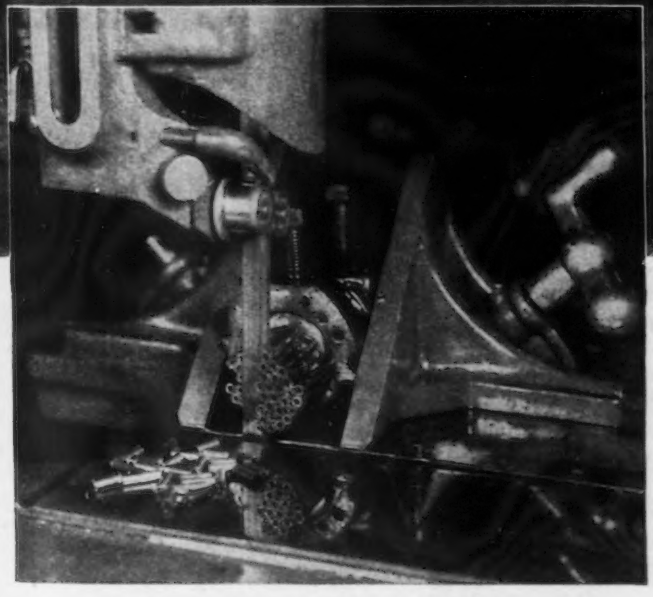
The WPB is reported to have sponsored an order which would make mandatory reporting of all idle and excess machine tools regardless of the holder. This would place all holders under the same restrictions as now govern used machine tool dealers and would serve to give the WPB a complete listing of all tools which might be available and also provide a picture of what the postwar supply of such tools might be. It is believed that issuance of this order is being withheld for inclusion with some over-all plan for the redistribution of tools in the event of serious contract cutbacks and during the postwar era.

The method of applying for tools today falls into roughly two general methods: Should a war plant or essential civilian producer have need for additional equipment, application for a new tool or series of tools can be made on either WPB-541 or 542. This application goes to the district WPB office where it is screened for necessity. During the screening process the possibilities of subcontracting the work rather than supplying a new machine are considered. If this is found to be impossible or unsatisfactory the application goes to the regional office which then offers, if possible, a substitute machine from among the listings of idle and excess machines. If such equipment is found to be satisfactory, a deal is consummated through the actual holder of the machine with the WPB redistribution division acting only as the intermediary.

RFC Loan Plan

• • • **RFC is offering** to loan manufacturers money to cover reconversion costs. RFC Chairman Charles B. Henderson on Feb. 14 made public a letter to the managers of all RFC loan agencies in which he said "the RFC must be prepared to carry out our responsibility to the national economy in the exercise of our statutory lending powers for demobilization, contract termination and reconversion to peacetime operations."





Cutting-off nested small diameter tubing—50 pieces per cut. On production jobs like this, the extreme accuracy and comparatively fine teeth of the blade produce smooth-edge, semi-finished pieces at very low cost.

MARVEL SAWS

"It has increased production about 30%" at Independent Pneumatic Tool Co.

Used to cut off a great variety of stock; cold drawn tubing (2335 S.A.E., 3115 S.A.E., and 3135 S.A.E.), angle iron, and round, hex and square bars in a wide range of sizes, this MARVEL No. 8 Metal-cutting Band Saw "has increased production about 30%" in the cutting-off department of the Independent Pneumatic Tool Co., Chicago.

The most versatile metal-cutting saw built, the MARVEL No. 8 is a truly universal tool. It handles work up to 18" x 18" cross section; cuts at any angle from 45° right to 45° left; does mitering, notching; saves warehouse delays and "cutting extras" and saves hours of machining by roughing work to size and shape.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Offices: 225 Lafayette St., New York, N. Y.

NON-FERROUS METALS

. . . News and Market Activities

Copper Requests Show Heavy Demand

• • • **Crude copper production** declined slightly in January, from 98,553 net tons to 96,004 tons, according to the Copper Institute. Refined output also declined 11,863 tons last month to 92,781 tons.

Deliveries to consumers declined from 115,850 tons in December to 101,586 tons in January. However, February and March deliveries will undoubtedly rise again. March requests for copper have been quite large as inventories which were permitted to drop to unhealthy levels are rebuilt.

Although the government agencies are reluctant to admit openly that copper cannot now be considered in the scarcity group, there has been some lifting on use restrictions. With the revocation of L-106, virtual freedom was given for the use of copper and copper base alloys for the civilian production of automobile radiators, gaskets, fuel and oil lines, brake and clutching lining rivets, and other essential parts that formerly incorporated copper in their composition. During the copper shortage these parts were made of substitute materials. Revocation of the order, however, does not permit the manufacture of any products with copper other than those specifically enumerated in L-158, which remains in force, and prohibits the use of copper and copper base alloys for decorative or other non-essential parts. Also remaining in force is conservation order M-9-c, which prohibits the use of these metals whenever substitution of a more plentiful material is practicable.

The revocation of L-106 will result in making available approximately 5,000,000 lb. of copper per quarter for the parts specified in L-158. The return to use of the more familiar material will also mean, it is estimated by industry, more satisfactory products, and considerable savings in manhours of labor for production, maintenance and installation of these parts in civilian cars.

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Copper Sheet Redefined

• • • **The definition** of an item of brass mill product, used in rules governing warehouse deliveries of such items, has been modified to indicate that difference in temper will differentiate one item of copper and brass sheet from another, WPB announced last week. Formerly, both length and temper would differentiate one item of such sheet from another.

The definition of items, contained in CMP Regulation 4, dealing with sales of controlled materials by warehouses, governs amounts of specific controlled materials forms and shapes of brass mill products that can be delivered by a warehouse. Limitations on deliveries are on an item basis, and as a result, the definition has a direct bearing on deliverable amounts.

•

Canadian Output Earmarked

Toronto

• • • **No difficulty** is expected in disposing of all the refined copper, lead and zinc that can be produced in Canada this year. All surplus production of refined copper and zinc, in excess of domestic requirements, is under contract to be sold to the United Kingdom. Although the supply position is easier in these two metals, the general expectation in the industry is that contracts will not be disturbed. Lead was not covered in the original war contracts, but the outlook is that it too will continue to be readily marketable. The position with respect to zinc concentrates is more obscure at the moment. Output of zinc concentrates is largely if not entirely under contract to the United States. This production, therefore, is more sensitive to the mounting surplus of metal stocks in that country. Metal consumption is divided into three classes for priority purposes: War uses, essential civilian uses and non-essential civilian uses. Supply is gradually becoming available for non-essential civilian uses and a gradual progressive relaxation of present restrictions may be expected as the year goes on.

•

Schedule Corrections

Washington

• • • **The portion of** schedule III of CMP Regulation No. 1 dealing with the time for placement of authorized controlled material orders for copper and aluminum was inadvertently omitted from the regulation revision on Feb. 2. Schedule III indicates the number of days in advance of the first day of the month in which delivery of controlled materials is required that orders must be placed with producers.

As a result of the omission, it has been necessary to insert the portion of the schedule dealing with copper and aluminum in the regulation by Amendment No. 1. There have been no changes in the number of days indicated in each case.

	Days Prior to First of Month in Which Shipment Is Required
Brass mill copper and copper base alloy products:	
Copper and non-refractory alloys	45
Refractory alloys	60
Wire and cable products:	
Bare wire and cable	35
Weatherproof wire and cable	35
Magnet wire	35
Rubber insulated building wire	35
Paper and lead cable	40
Varnished cambric cable	35
Asbestos cable (type H-F)	60
Rubber insulated wire and cable (mold or lead cured)	45
Foundry copper and copper base alloy products:	
Castings (rough castings, not machined—assuming patterns are available)	
Small simple castings to fit 12 x 16 in. flask	7
Large intricate and centrifugal castings	14
Aluminum, all forms and shapes	45

United States Copper Output and Deliveries, in Net Tons

	Production		Deliveries to Customers			Refined
	Crude*	Refined	Domestic**	Export	Total	Stocks†
1939	836,074	818,289	814,407	134,152	984,559	159,485
1940	992,293	1,033,710	1,001,886	48,537	1,050,423	142,772
1941	1,016,996	1,065,667	1,545,541	307	1,545,848	75,564
1942	1,152,344	1,135,708	1,635,236	....	1,635,236	65,309
1943	1,194,684	1,206,871	1,643,677	....	1,643,677	52,121
Dec., 1943	98,553††	104,644	115,850	....	115,850	52,121
Jan., 1944	96,004	92,781	101,586	....	101,586	45,993

* Mine or smelter production or shipments, and custom intake including scrap. ** Beginning March, 1941, includes deliveries of foreign copper for domestic consumption. † At refineries, on consignment, and in Exchange warehouses, but not including consumers' stocks at their plants or warehouses. †† Corrected.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

Railroad Steel and Cast Scrap Price Schedule

BASING POINT	No. 1 and No. 2 Heavy Melting; Wrought Iron and/or Steel Wheels; No. 2 Steel Wheels; Iron and/or Steel Axles; Uncut Bolster and Side Frames	No. 1 Bushelings; Steel and Iron Arch Bars; Boilers, Fire Boxes, and Tanks; No. 2 Cast Steel; Flues, Tubes, and Pipes; Limd Iron and Steel; Uncut Structural Wrought Iron and/or Steel; Destroyed Cars and Locomotive Tenders	No. 2 Bushelings	No. 1 Turnings	No. 2 Turnings, Drillings, and Borings	Uncut Frogs and Switches	No. 1 Sheet Scrap	No. 2 Sheet Scrap	Scrap Rails, Random Length; Iron Arch Bars, 3 ft. and Under	Rerolling Rails for Rerolling; Uncut Tires; Cut Bolsters and Side Frames; Angles and Splice Bars	Cut Rails, 3 ft. and Under	Cut Rails, 2 ft. and Under	Cut Rails, 18 in. and Under; No. 3 Steel Wheels; Spring Steel; Couples and Knuckles	Cut Tires	Solid Steel Axles For Rerolling or Reforging Use Only. Base Price For Other Uses
						(Dollars Per Gross Ton)									
Pittsburgh, Canton, Youngstown, Wheeling, Sharon, Steubenville	$21.00	$20.00	$17.50	$19.50	$15.00	$20.50	$16.00	$14.00	$22.00	$23.50	$24.00	$24.25	$24.50	$25.50	$27.00
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	20.50	19.50	17.00	19.00	14.50	20.00	15.50	13.50	21.50	23.00	23.50	23.75	24.00	25.00	26.50
Chicago, Philadelphia, Sparrows Point, Wilmington	19.75	18.75	16.25	18.25	13.75	19.25	14.75	12.75	20.75	22.25	22.75	23.00	23.25	24.25	25.75
Buffalo	20.25	19.25	16.75	18.75	14.25	19.75	15.25	13.25	21.25	22.75	23.25	23.50	23.75	24.75	26.25
Kokomo	19.25	18.25	15.75	17.75	13.25	18.75	14.25	12.25	20.25	21.75	22.25	22.50	22.75	23.75	25.25
Duluth	19.00	18.00	15.50	17.50	13.00	18.50	14.00	12.00	20.00	21.50	22.00	22.25	22.50	23.50	25.00
Detroit	18.85	17.85	15.35	17.35	12.85	18.35	13.85	11.85	19.85	21.35	21.85	22.10	22.35	23.35	24.85
St. Louis	18.50	17.50	15.00	17.00	12.50	18.00	13.50	11.50	19.50	21.00	21.50	21.75	22.00	23.00	24.50
Birmingham, Los Angeles, San Francisco	18.00	17.00	14.50	16.50	12.00	17.50	13.00	11.00	19.00	20.50	21.00	21.25	21.50	22.50	24.00
Kansas City	17.00	16.00	13.50	15.50	11.00	16.50	12.00	10.00	18.00	19.50	20.00	20.25	20.50	21.50	23.00
Seattle	15.00	14.00	11.50	13.50	9.00	14.50	10.00	8.00	16.00	17.50	18.00	18.25	18.50	19.50	21.00

SALES REGULATIONS: On and after March 15, 1944, no operating railroad not operating in a basing point named may sell or offer for sale iron and steel scrap to a consumer or his broker without obtaining prior written approval from OPA unless prior to that date it has filed with OPA a statement in writing setting forth maximum on-line price for No. 1 Railroad Heavy Melting Steel and describing the method used to calculate this price. The statement shall include: The most favorable basing point selected; the price at such basing point; the location of the scrap accumulation point; the lowest established charge for transporting scrap by rail from such accumulation point to the named basing point; and the foreign line proportion of such lowest established charge.

MAXIMUM PRICES: The maximum on-line price of any grade of steel scrap from an operating railroad operating in a basing point shall be the price set for the scrap at the highest priced basing point in which the railroad operates. For an operating railroad not operating in a basing point, the price shall be the price set for the scrap at the most favorable basing point less the foreign line proportion of the lowest charge for transporting scrap by rail from scrap accumulating point of railroad to such basing point. "Scrap accumulation point" is that point from which greatest tonnage was shipped in 1943. "Most favorable basing point" that the basing point which will yield the highest maximum on-line price. In no case need the on-line maximum price fall below $15.00 per gross ton for No. 1 Railroad Heavy Melting Steel. The maximum price of any grade of steel scrap originating from a non-operating railroad shall be the price established for the scrap at the most favorable basing point minus the transportation charges for rail, vessel, or motor vehicle shipment or combinations of these, and for established charges shown in OPA Price Schedule No. 4. Where the non-operating railroad is located in a basing point shown above, the following switching charge deductions will be applicable: Chicago—84c.; Pittsburgh—55c.; Detroit—53c.; Cleveland, Los Angeles, San Francisco, Sharon, and Youngstown—42c.; Seattle—38c.; Buffalo—36c.; Birmingham and Kansas City—32c.; Ashland, Canton, Cincinnati, Duluth, Kokomo, Portsmouth, Steubenville, St. Louis, Wheeling, and Wilmington—28c.; Middletown and Philadelphia—14c.; and Sparrows Point—11c.

SCRAP PREPARATION: With the exception of unprepared scrap prepared in-transit, railroad steel scrap prepared by a dealer or moving through a dealer's yard shall be deemed to have lost its railroad origin, and shall be classified and priced as steel scrap other than railroad scrap except in specified grades peculiar to railroad origin (listed in the schedule). For these listed grades the maximum shipping point and delivered prices shall be the same as those established for non-operating railroads for those grades. The maximum shipping point price of any grade of railroad cast iron scrap sold by a dealer shall be the same as that established for the railroad seller. "Unprepared scrap" shall have its customary trade meaning and shall not include such demolition projects as bridges or box cars which must be so priced that the prepared scrap will deliver to the consumer within the maximum delivered price established.

PREPARATION CHARGES: If unprepared scrap is purchased from an originating railroad, the consumer may designate a dealer to prepare such scrap on a preparation fee basis. The maximum preparation fee shall be the established differentials between the unprepared scrap and the listed grade for which the scrap is prepared. For example: $3.50 per gross ton for prepared No. 1 Railroad Heavy Melting Steel from Structural and/or Wrought Iron and Steel Uncut; or $2.50 for cutting rails 18-in. and under from Scrap Rails of Random Lengths; or $4.00 per ton for No. 2 Bundles prepared from No. 1 Sheet Scrap. For cast, an in-transit preparation fee will be applicable only for preparing Cast Iron No. 3 into Cast Iron No. 1, for which the maximum preparation fee shall be $3.50 per gross ton. (Previous dealer fee was $2.50.)

MAXIMUM PRICE ON PREPARED SCRAP: The maximum delivered price for railroad scrap prepared in-transit shall be the maximum on-line price for the unprepared scrap, plus the applicable rail transportation charges incurred in moving scrap to dealer's yard, plus the applicable preparation fee, plus transportation charges from the dealer's yard to point of delivery.

Cast Iron Scrap

Maximum on-line price, per gross ton, for any of the following cast grades will be the price shown at the highest priced zone in which the railroad operates or is located.

	Per Gross Ton		
	Zone A	Zone B	Zone C
Cast Iron, No. 1	$18.00	$19.00	$20.00
Cast Iron, No. 2	17.00	18.00	19.00
Cast Iron, No. 3	14.50	15.50	16.50
Cast Iron, No. 4	13.25	14.25	15.25
Cast Iron Brake Shoes	13.25	14.25	15.25
Malleable	20.00	21.00	22.00
Wheels, No. 1	18.00	19.00	20.00

Zone A includes Mont., Idaho, Wyo., Nev., Utah, Ariz., and N. M. Zone B includes N. D., S. D., Neb., Colo., Kan., Okla., Texas, and Fla. Zone C includes all states not named in zones A and B, and includes switching district of Kansas City, Kansas-Missouri.

CAST IRON GRADE DEFINITIONS: Cast Iron, No. 1—Cast iron scrap such as columns, pipe, plates and/or castings of miscellaneous nature, but free from stove plate, brake shoes, and/or burnt scrap. Must be cupola size not over 24 x 30 in. and no pieces to weigh more than 150 lb. Free of foreign material. No. 2—Cast iron scrap in pieces weighing over 150 lb. not more than 500 lb. and free from burnt cast. No. 3—Cast iron scrap in pieces over 500 lb., includes cylinders, driving wheel centers, and/or all other castings. Free from hammer blocks or bases. No. 4—Burnt cast iron scrap such as grate bars, stove parts, and/or miscellaneous burnt scrap. No. 5—Driving and/or car brake shoes of all types except composition filled. Malleable—Malleable parts of automobiles, railroad cars, and locomotives. No. 7—Wheels, No. 1, includes cast iron car and/or locomotive wheels.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled **"Switching Charges."** (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS
$1.50 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.

UNSEGREGATED TURNINGS
$1.30 per lb. contained W if 5% or more.
$1.00 per lb. contained W if 1 to 5%.
$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Revised price schedules, establishing dollars and cents differentials for railroad scrap and establishing revisions in cast iron scrap grades are shown on page 158. These schedules, amendment 14 to RPS No. 4, replace the previous schedules on Railroad Steel Scrap and Cast Iron Scrap sold by railroads.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 22, 1944	Feb. 15, 1944	Jan. 18, 1944	Feb. 23, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 22, 1944	Feb. 15, 1944	Jan. 18, 1944	Feb. 23, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 157-169.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Feb. 22, 1944	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 } Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 } Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto, Ohio; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo, Colo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery in U. S. except Texas and Oklahoma may use Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. when shipped outside Alabama, Mississippi, Louisiana, Georgia, Florida, Tennessee, Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base granted on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base granted on Kokomo, Ind., product; Superior Sheet Steel Co. granted Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-48 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
Philadelphia	$3.518	$4.872[8]	$5.018a	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.78[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.606[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.857	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .22	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago.... $54.80
6-in. and larger, del'd New York... 52.20
6-in. and larger, Birmingham 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

Per Gross Ton

Old range, bessemer, 51.50 ..... $4.75
Old range, non-bessemer, 51.50..... 4.60
Mesaba, bessemer, 51.50 ..... 4.60
Mesaba, non-bessemer, 51.50 ..... 4.45
High phosphorus, 51.50 ..... 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

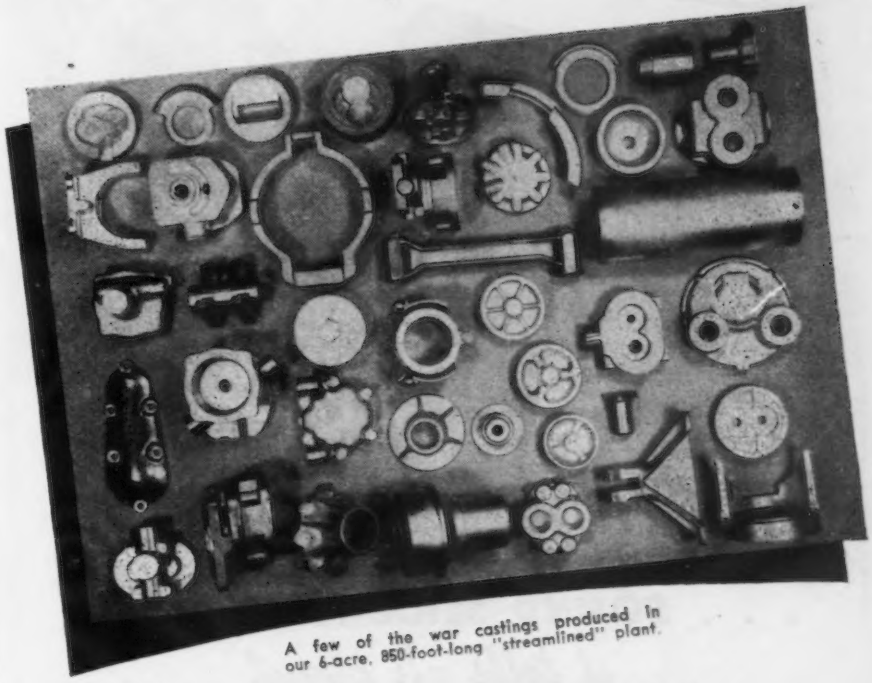
	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

PERMANENT MOLD
ALUMINUM CASTINGS
Prompt Delivery!



A few of the war castings produced in our 6-acre, 850-foot-long "streamlined" plant.

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PERMANENT MOLDS . . . completely engineered, designed and manufactured.

ALUMINUM ALLOYS . . . any alloy desired.

HEAT TREATED . . . to all specifications.

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DETROIT 8-254 Gen. Motors Bldg. BUFFALO 837 Potomac St.

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it tells all about
TOOL STEEL WELDING

The Welding Equipment & Supply Company presents two sound slide films about tool steel welding that should be of vital interest to master mechanics, superintendents, tool process and tool conservation personnel, designing and method engineers, foremen and welding operators. These sound films are the only complete technical information available *anywhere* on the proper procedure and application of tool steel welding. Technical information contained in these films will help to save material, man hours, and eliminate production delays.

These sound slide films will be shown to your organization without obligation, by merely writing us on your company stationery for an appointment.

These films are also available for instruction use in schools and industrial plants at a nominal fee. Wire or write us today.

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

WELDING EQUIPMENT & SUPPLY CO.
230 LEIB STREET • DETROIT, MICHIGAN

PRICES

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	Base price per short ton
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick	Per Net Ton
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....

	Base per 100 Lb.	Pacific Ports
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90

	Base Column	Pacific Ports
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)	Black	Galv.
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½

Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57

Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½

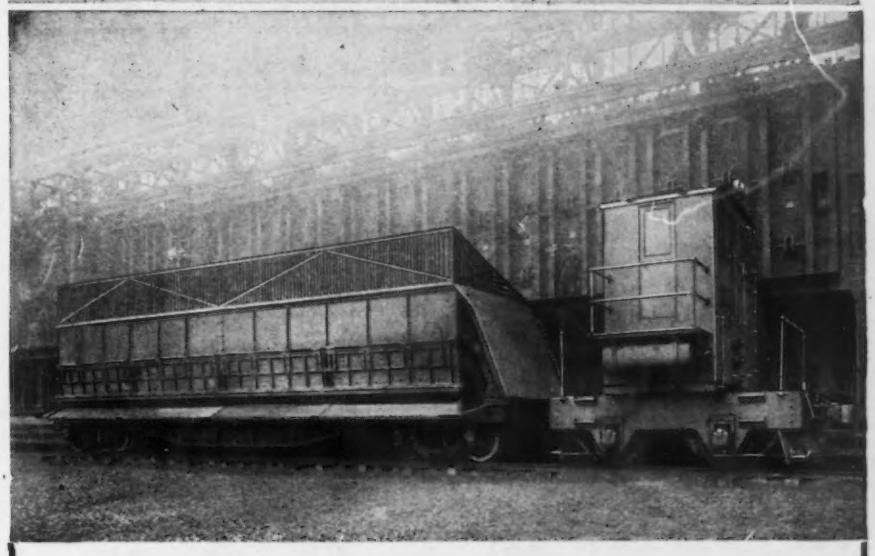
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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it tells all about

TOOL STEEL WELDING

The Welding Equipment & Supply Company presents two sound slide films about tool steel welding that should be of vital interest to master mechanics, superintendents, tool process and tool conservation personnel, designing and method engineers, foremen and welding operators. These sound films are the only complete technical information available *anywhere* on the proper procedure and application of tool steel welding. Technical information contained in these films will help to save material, man hours, and eliminate production delays.

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Furnace

	Per Net Ton
†Connellsville, prompt	$7.00

Foundry

†Connellsville, prompt	8.25
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	$12.60†
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.30†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

*Hand-drawn ovens using trucked coal are permitted to charge $7.75 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Nov. 29, 1943. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

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70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

INGOTS

Carbon, Rerolling grade

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25; Carnegie-Illinois Steel Corp. (Pencoyd Plant), $38.25.

Carbon, Forging Quality

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.85c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.35
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

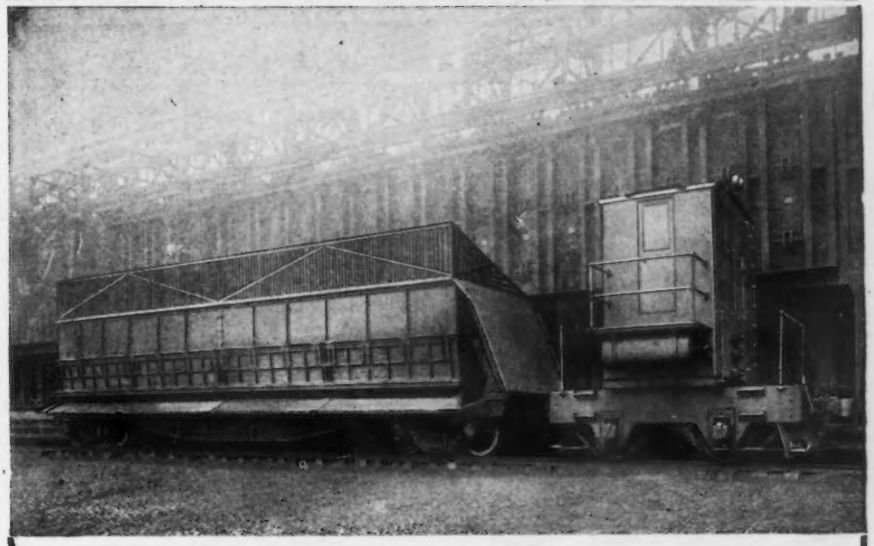
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

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Ore Transfer Cars
•
Scale Charging Cars
•
Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage
•
Turntables to

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.58	24.00	*35.46*	.....*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

		Seamless Cold Drawn	*Hot Rolled*	*Lap Weld, Hot Rolled*
2	in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½	in. o.d. 12 B.W.G.	20.21	17.54	16.58
3	in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½	in. o.d. 11 B.W.G.	28.37	24.62	23.15
4	in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

BRONZE BEARINGS
OILLESS BRONZE BEARINGS
GEAR BLANKS
MACHINED BRONZE PARTS

S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

Our equipment and manufacturing methods enable us to meet the most exacting specifications and design.

BETTER B BEARINGS

INDUSTRIAL BEARINGS

S. & H. Bearing and Manufacturing Co., Inc.
340-344 North Avenue, East
Cranford New Jersey

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

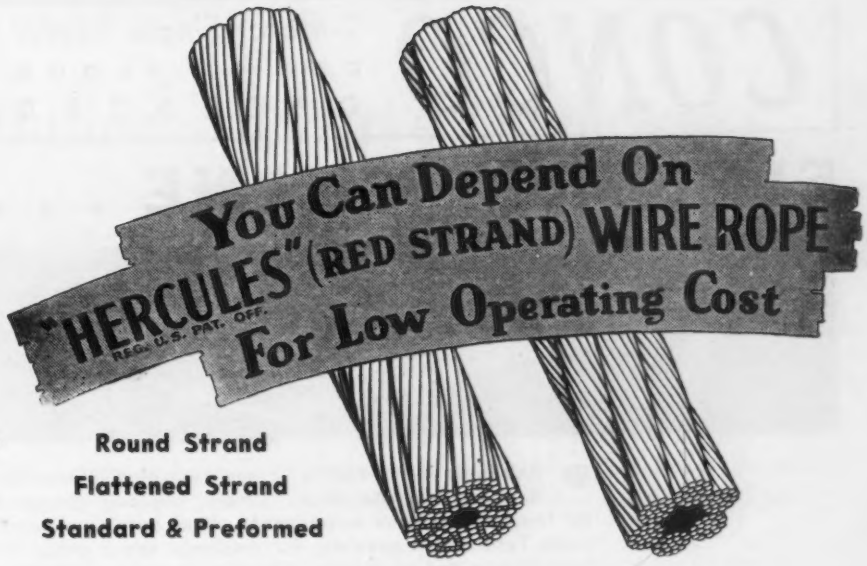
RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angles bars, 100 lb.	2.70
California Ports	3.15
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00



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Flattened Strand
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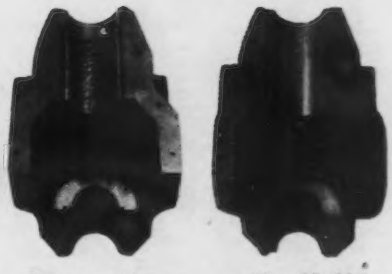

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After being welded with PHILLIPS "600" Electrode this cast iron housing was machined through the fusion zone.

This book tells what procedure is best for *your* cast iron welding.

Send for your copy TODAY

PHILLIPS "600" Electrode, a non-ferrous, flux-coated rod, produces deposits that are of the color of cast iron and are *fully machinable through the line of fusion.* It can be used in all positions with A.C. or D.C. and maintains a steady and quiet arc without excessive spatter. This electrode is salvaging many valuable castings daily in hundreds of foundries and machine shops. Complete procedure information is contained in our 12-page book on "4 Ways to Salvage, Reclaim and Conserve Iron Castings by Electric Arc Welding." A copy is yours for the asking.

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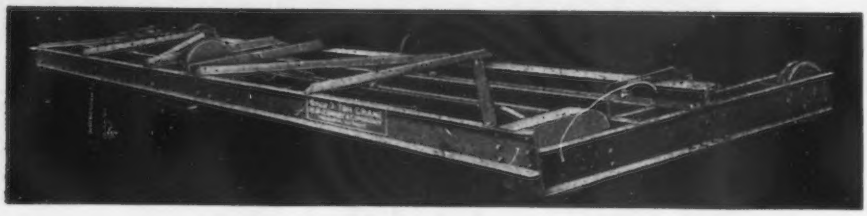

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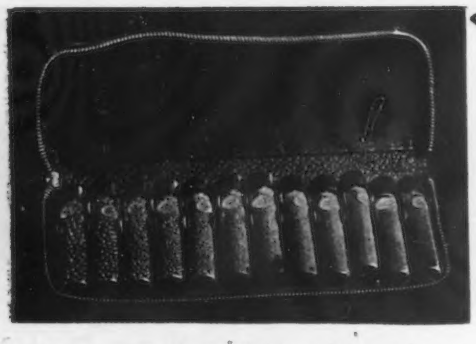
Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Meadota, Ill.

Builders Of Conco Torpedo Electric Hoist



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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(*65-72% Cr, 2% max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

The IRON AGE

ESTABLISHED 1855

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March 2, 1944

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Business and the Doghouse

I BELIEVE it was Eric Johnson, head of the U. S. Chamber of Commerce, who recently said that business, at last, was out of the doghouse. What he meant was that the performance of industry and business in meeting and even surpassing obligations connected with war production had succeeded in changing public opinion with respect to the efficiency of private enterprise.

Mr. Johnson wisely added the caution that the door to the doghouse is still open and that whether the vacancy continues therein will depend upon how the recent occupants behave and perform in the months to come.

The question naturally arises as to who or what put them in the doghouse to begin with. It is an interesting question because the answer might point the way to keeping out of it in the future.

Ask any number of businessmen this question and you will get a variegated list of answers. One will tell you that FDR booted them into the doghouse during the first term and slammed the door shut during his second. Another will say that it was the Russian influence acting through a combination of New Dealers and fellow-travelers. Another will say it was the labor unions. Vice-President and astrologer Wallace would probably say it was written in the stars and ordained by Heaven.

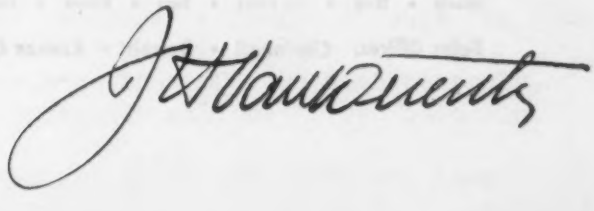
Personally I do not think that any of these were the real causes, although all of them undoubtedly helped. I believe that the people most responsible were businessmen and industrialists themselves. They went in under their own steam, or lack of it, to get out of the rain.

There are two schools of thought with respect to help in difficult situations. There is the "God help us" school and the "God helps those who help themselves" school. During the dark days of the depression, the former gained plentifully of adherents at the expense of the latter.

If children had refused to accept presents from Santa Claus, he could never have built up his enormous institution and following. Similarly, if so many businessmen and industrialists had not scurried to Washington for help and guidance in the 1930's, the chances are that bureaucracy would not have attained its present stature and that the doghouse might not have been built.

It was not the going to Washington for help that did the trick so much as the attitude of despair of many of those who went there with the "God help us" plea. Business has as much right to demand help when it needs it as labor or any other member of the American family. But, like labor, it should demand and not beg and it should go with a plan and not in a daze.

All of this is just a gentle reminder to business and industry that the doghouse is still there. Surely we will need the aid of government in solving our postwar problems, but it should be aid patterned on a plan drawn by business, industry and labor and not left to the beneficence of politicians.



Read this Shocking Truth!

Nearly 9,000,000 men and women have been killed, maimed or injured on and off the job since America went to war. Preliminary estimates for 1943 alone indicate that 4,300,000 war workers were killed or injured on or off the job—of this number 45,000 lost their lives. And, to make matters worse, non-fatal industrial accidents are increasing.

Here Is What You Can Do About It!

Study the safety organization within your own plant. Review its record. Find out whether or not it is inadequate, or has been outmoded, and cannot successfully cope with the hazards of new manufacturing methods, or greatly increased wartime employment. Satisfy yourself that it is being encouraged and equipped to perform at top efficiency. Check its program to determine whether or not employes are trained in safety for their protection when off the job as well as when on the job.

Utilize the information and opportunities for safety training offered by national agencies. Send your foremen and supervisors to the free safety engineering short courses offered at leading colleges.

If your community has a safety council, take an active interest in it. If such a council does not exist, become the leader and see that one is organized, bringing together industrialists, merchants, professional persons, civic leaders, and police, fire, city and school authorities—all the people who have the greatest interest in the accident costs of the community.

Take action today! Help conserve manpower for maximum war production—for an earlier Victory.

Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.

INLAND STEEL

Sheets • Strip • Tin Plate • Bars • Plates • Floor Plate • Structurals • Piling • Rails • Track Accessories

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The IRON AGE
MARCH 2, 1944

NEWS FRONT

► Ore operators again will present OPA with a formal price increase proposal. The operators have assembled figures showing the effect of rising cost factors in narrowing the profit margin.

► The Government already has sold approximately 4,000,000 tons of excess steel, and now has nearly 2,000,000 tons to sell, according to T. S. Fitch, WPB special assistant. Saying that 15-20,000,000 tons of steel may be in the surplus category on sudden war ending, Mr. Fitch recommended that the steel industry itself set up machinery for disposal, i.e. depend on no bureaucracy.

► Germany's current railroad locomotive position is similar to that of the last war, when General Ludendorff said: "This is the time when locomotives become more important than guns".

German plants each month must turn out 300 locomotives to make good those destroyed or damaged beyond repair, and another 100 needed as replacements for those worn out. Most trains now carry several anti-aircraft guns, but armor plating the cabs is undesirable because of the heat exhaustion of crews. Each night the majority of locomotives are dispersed over the countryside around those towns within reach of Allied bombers.

The Allied air attack on Kassel wrecked Germany's foremost engine factory, the Henschel A.G.; and Soviet raids on Koenigsberg, East Prussia, have extensively damaged the great locomotive repair shops there.

More than anything else, the great losses in rolling stock was a major reason for the German General Staff decision to shorten the front in Russia.

► The armed forces now have in use over 500,000 jeeps, which seems to be the most ubiquitous of military equipment.

► The Japanese captured a great many Garand rifles in the Philippines. Later they used them against Americans in the Buna and Lae-Salamaua campaigns.

► Steel shipments of the seven principal rail lines serving the West Coast in 1940 totaled 1,642,965 tons. In 1942 the figure rose to 8,109,972 tons. The latter figure involves considerable cross-hauling, and the net movement of steel to the Far West in 1942 is estimated at 5,000,000 tons.

This is equivalent to 1700 trains of 70 cars each.

► CIO is very proud of a new contract with the Douglas Aircraft Vernon plant. It guarantees merit increases, reviews wages automatically every 16 weeks, provides an 8 per cent per hour shift differential, and provides against discrimination.

► Grass seed is being shipped to Italy by air transport. It is being planted around airports to keep down the volcanic dust which is injurious to aircraft engines.

The Allied armies in Italy must be no end confusing to the Germans and Italians. There are the Americans, English and Canadians; the French troops are primarily Goumiers, which means Berbers, who are not Moors but are white men who are remnants of the great Vandal kingdom in North Africa; the Indian troops with the British are not Indian but are Gurkhas, who are Mongolian mercenaries from the Kingdom of Nepal, which is not part of India.

► The Canadian Government has enacted a national code in wartime labor relations affecting 2,500,000 of the estimated 3,500,000 industrial employees in the Dominion. The code provides definite procedures for settlement of disputes and also provides definite penalties for both management and labor.

► Price uncertainty is holding up distribution of 1944 commercial trucks to a vehicle-hungry trade. OPA already has allowed Ford an increase of 11 per cent on the retail price of one truck model, and Reo has been permitted increases on five models.

Chevrolet has an application in for price increases straight through its line, but OPA as yet has made no decision.

► Machine tool executives now think that no more than 500,000 machine tools of the original 800,000 units built in the war emergency will be thrown onto the market as idle and excess equipment.

Arsenals, technical schools, China, the Soviet Union and other war torn nations are expected to absorb the 300,000.

A Machine Tool Builder Makes

Navy Diesel Engine Cases

. . . Faced with a rapid decline in turret lathe business, Warner & Swasey, Cleveland, took a contract for machining destroyer and submarine type diesel engine cases and developed some unique ideas in setup and tooling.

By GEORGE L. KLUTER

Works Manager,
Warner & Swasey Co., Cleveland

IT is usual to set up plant facilities to handle a given quota and type of production. Recently Warner & Swasey Co. has had to reverse the procedure and fit production to existing facilities.

In the wake of its all-time peak output of turret lathes, some 75 per cent of the total capacity of Warner & Swasey plants became available for subcontract war work. Selection of the wide range of jobs, now in progress, was made with the view to fitting them together, like parts of a jig saw puzzle, into an overall machine load that would match the capacity of existing equipment. Obviously, this was possible only in a rough way. The jobs were not readymade to fit the established setup. In replanning them, the company made some ingenious departures in operational sequence and tooling.

Among the first subcontract jobs to undergo such revision was the machining of six and eight cylinder diesel engine cases for power plants of the type used on the Navy's submarines and destroyers. The work was assigned for handling on equipment formerly devoted to production of beds of Warner & Swasey turret lathes. In contrast to the precision castings from which the turret lathe beds were machined, the diesel engine cases are a composite structure of forgings, boiler plate, and stampings, all welded together and delivered in rough form, as shown in the cutaway view, Fig. 1.

To handle existing equipment and at the same time to meet or exceed output schedules, a survey of the experience of other engine case subcontractors was made. This, when reflected against Warner & Swasey's own background of machine tool production, focussed the planning effort on simplifying the extensive drilling and boring operations required. It was concluded that the bulk of these operations could be handled more rapidly on radial drills than on the boring mills usually employed for such operations, because of the reduced time required for locating each hole in sequence.

Throughout the entire machining of these engine cases, considerable time was saved, in even the more usual processes employed, by revising setup operations to assure precision results. For example, use of two planer tables, to permit location and positioning of one engine case while a second case mounted on the other table is being planed, both speeded and improved this phase of operations. All alinement is taken from layout lines scribed at either end of each case by the welding contractor. After the required rough cuts are taken on the planer, the engine case is laid-by for a period of at least a week so that stresses released by removal of the outer surfaces of the structure have time to equalize.

Rough Planing

In all rough planing operations the case is mounted directly on the planer table as shown in Fig. 2, without use of the customary parallels in order that the fullest possible bearing surface be utilized to reduce strain on the structure. The bearing surface is shimmed and care is taken to clamp directly over such packed positions to avoid setting up stress.

During part of the finish cut, the planer is used to rough out the camshaft bearing for alinement. The lower halves of the cam bearings, welded integrally with the engine case, are 4-in. thick boiler plate in which the bearing surface is cut out with an acetylene torch.

In a subsequent milling operation, to rough and finish the camshaft groove and leave 0.003 in. for reaming stock, a large convex form cutter is used on a planer miller, shown in Fig. 3. The mating halves of the camshaft bearings are machined separately, being clamped in a turning fixture chucked in a turret lathe and bored to fit interchangeably, preparatory to reaming after assembly.

A special gage block for setting a dial indicator to the required depth of both halves of each camshaft bearing makes possible fast and accurate checking of this work.

Illustrative of the method employed to drill, countersink, ream and tap the considerable number of holes for dowel pins and attachment, lug and holddown bolts is the operation by which 32 1-in. holes are drilled in the cylinder deck. A plate jig permits full utility of the flexibility and quick positioning features of the radial drill used for the entire sequence. Four holes are provided around each cylinder bore and each is reamed to size. To save time in the final hand tapping operation, these holes are tapped to 0.002-in. undersize. The 14-pitch thread must meet specifications for a Class 5 fit, or a tolerance of —0.000 and +0.0018 in.

Cylinder Bores

To extend the advantage of radial drill operations to the roughing and finishing of cylinder bores, however,

presented an unusual problem. The cylinder sleeve bores of the eight cylinder engine cases as received consist of torch-cut openings through the 1½-in. boiler plate of the top deck and rough forgings welded integrally with the structure approximately 8½ in. below each opening.

Machining Bores

The special tool shown in Figs. 4 and 5 was designed to make a pilot cut, rough and semi-finish cut in each pair of upper and lower bores simultaneously. A second such tool gives them final finish. Since the lower of the two bores, which support the cylinder sleeve when the engine is finally assembled, requires a recess for water circulation, a third tool, with an internal expansion device activated by the drill feed, was provided.

To aline these tools for cutting the cylinder bores with a radial drill, a fixture of difficult design and structure was indicated. To simplify this phase of the tooling problem, it was decided to make the engine case itself serve as part of the necessary fixture. The tooling setup of this arrangement is shown in detail in Fig. 6.

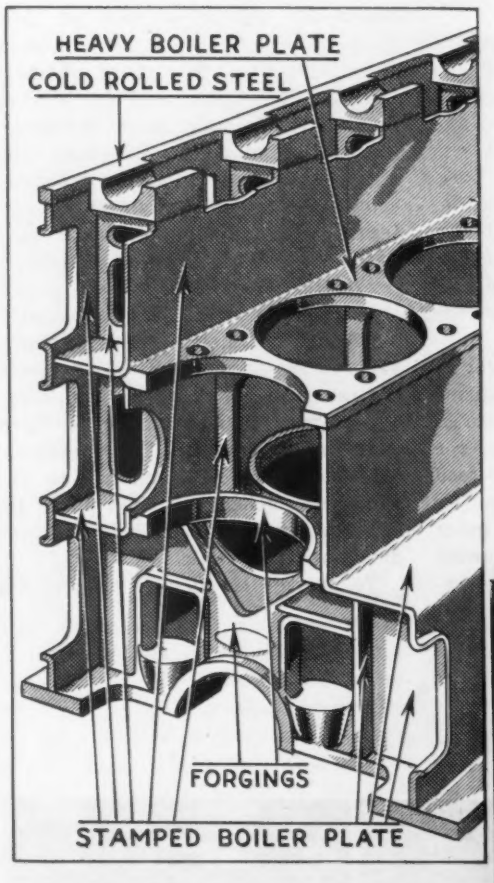
This, of course, made it necessary to impose close tolerances on the overall planing of external surfaces of the engine cases. However, it is axiomatic that increased precision achieved in one operation simplifies its attainment in the remaining operations of a given machining sequence.

The setup for roughing and finishing the cylinder bores, with the previously mentioned special tools on a radial drill, employs a lower and upper guide plate. The lower guide plate is part of an auxiliary base for the radial drill. On it, the engine case is located against hardened and ground blocks, being brought into position by push screws. Bronze bushings are provided in the lower guide plate directly under each cylinder bore. The upper guide plate, which has inset blocks of hardened and ground steel for locating points, is supported above the cylinder deck and clamped to the camshaft structure.

In this manner, the accurately planed external surfaces of the engine case are used to reference the openings in the template with the bronze bushings in the lower plate. Together, they hold the boring bar on which the special cutting heads are mounted in alinement for cutting both upper and lower cylinder bores simultaneously, as shown in detail in Fig. 6.

The boring bar has a bushing to fit the template. Each of the two heads is equipped with a pilot cutter, to bring the bores into round ahead of the rough cutter. The latter is mounted on the opposite side of the head and slightly in advance of the pilot tool.

Additional cutters, mounted in the head, chamfer the bores and semi-finish the upper bore and the upper half of the lower bore. This leaves the lower half of the lower bore about 0.045 in. smaller in diameter, which



LEFT

FIG. 1—This sketch is a cutaway of the type of diesel engine case being machined under subcontract by Warner & Swasey. Its welded structure consists of four separate types of materials, as indicated.

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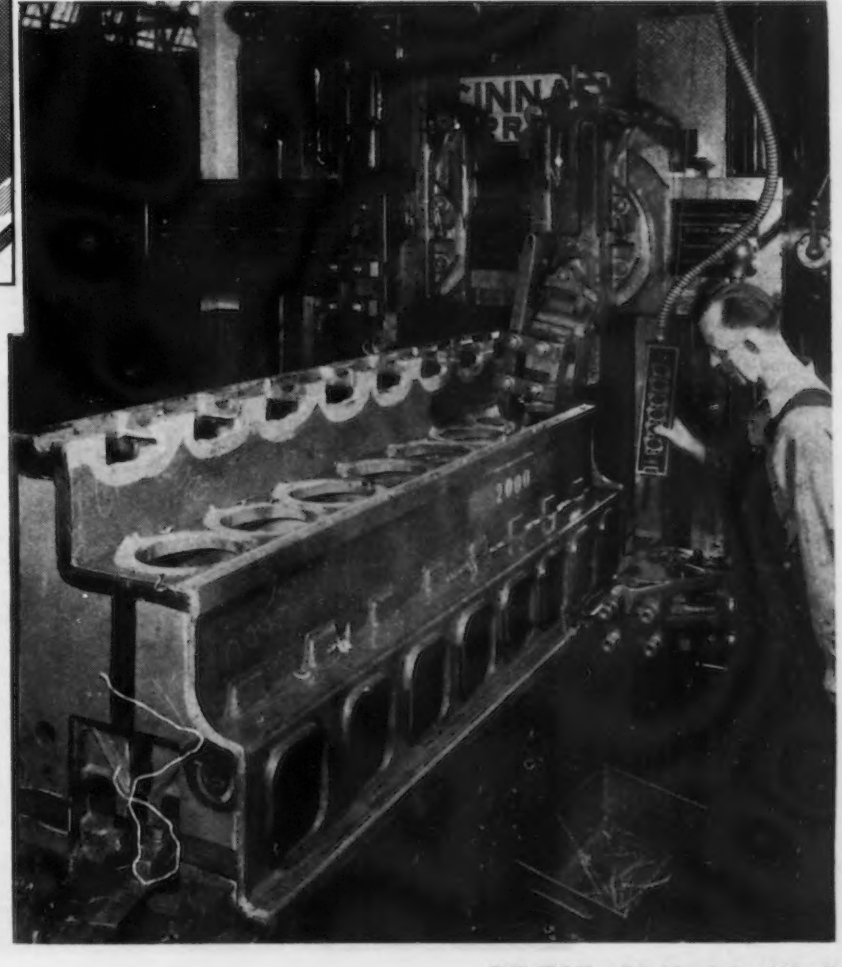
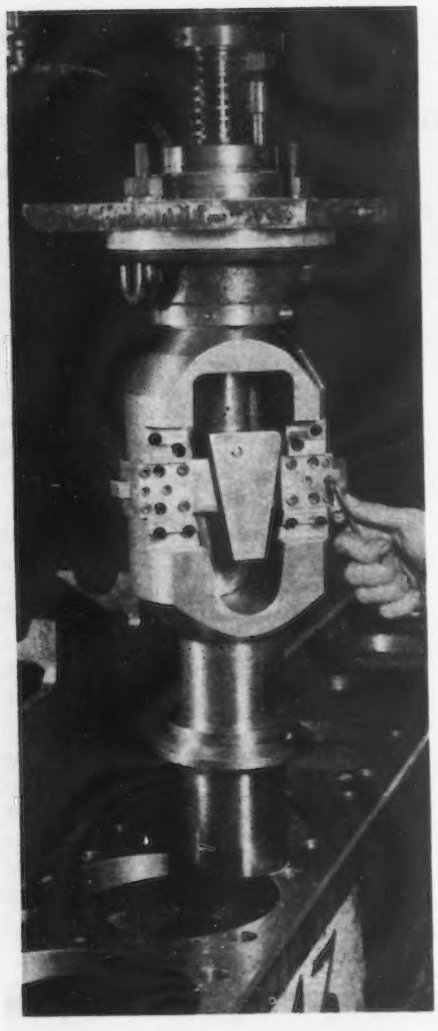
BELOW

FIG. 2—The use of three heads simultaneously speeds the planing of external surfaces of the cases, which are mounted directly on the planer bed to avoid setting up distortional stress.





actually constitutes a third cylinder bore.

All eight cylinders are rough and semi-finished in this manner, it being only necessary to hoist the boring bar with its cutting heads from one opening to the next and swing the radial drill into position to continue the work. The bores are finished in similar manner, except that the cutting heads used for this operation have only three cutters in place of four, the pilot cutter being eliminated.

Finishing Cuts

On completion of the finishing cuts, the upper guide plate is removed and the upper bore is used in place of it to control alinement of the special tool used for cutting the recess between the two diameters of the lower bore. A bushing on this special tool is located in the upper bore. A plate attached to the bushing bears on the cylinder deck and supports the cutting head at the level of the desired recess in the lower bore.

A drive shaft, chucked in the radial drill, is connected to a wedge inside the cutting head. Since the head is supported by the bushing plate, the downward pressure of the drill feed causes the drive shaft to force its connected wedge between the inner end of the two cutting tools mounted in the head, pushing them out to increase the diameter of the recess as it is cut.

A bar, amounting to an extension of the lower end of the cutting head, extends into the bed plate bushing, which functions with the plate bushing in the upper bore to control alinement. The entire tool is lifted from one cylinder bore to the next by action of the arm of the radial drill.

Finishing of the crank and camshaft bores, after the mating halves of the bearings are assembled, presented an interesting problem. The detachable halves of each of these types of bearings must be completely interchangeable, making it essential that the dowel pins used for locating them be equidistant from the center line of the bearing. The detachable half of each bearing is machined separately from the half that is integral with the engine case. Each half, likewise, is drilled separately.

For the lower half of the crankshaft bearings, the dowel pin holes are 1-in. in diameter. They mate with holes in the half of the bearing welded integrally with the crankshaft. These mating holes have a ½-in. radius at the bottom. The attachment bolt holes are of similar size and spherical washers are used under the head and nut of each bolt for even distribution of stress.

To provide the double radii of 1½

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ABOVE

FIG. 4 — This special tool was designed for machining the recess between the diameters and the lower cylinder sleeve bore of diesel engine cases. The cover plate of the tool is removed to show the function of the wedge arrangement which is activated by the downward thrust of the radial drill feed.

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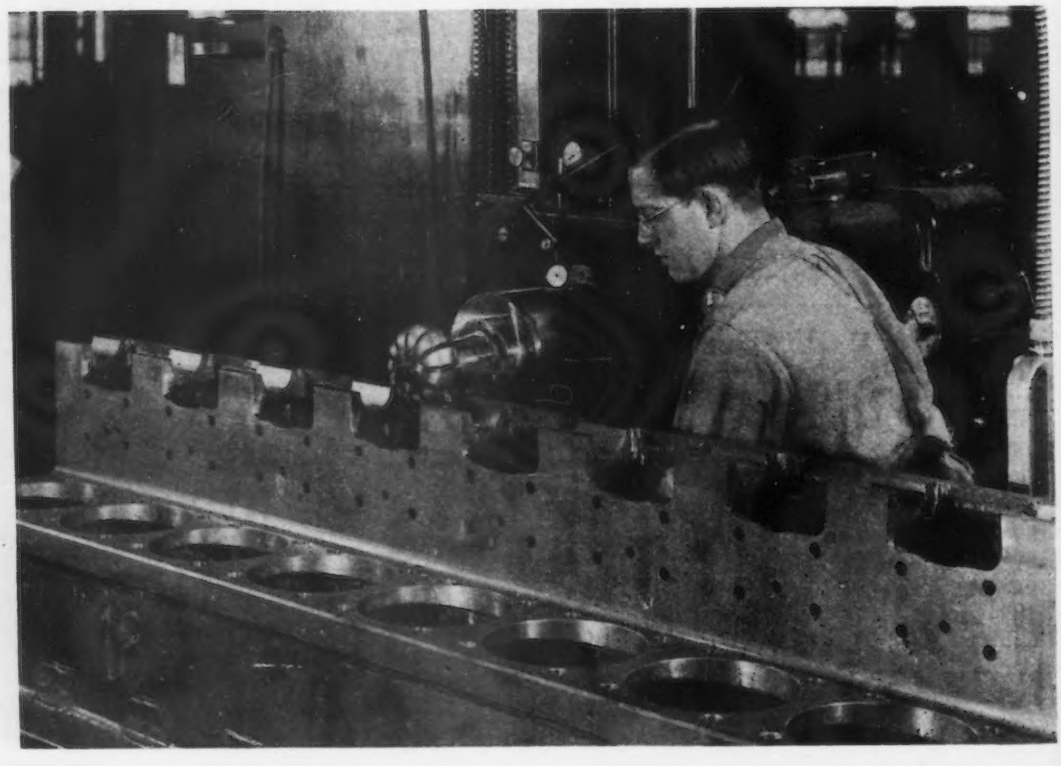
FIG. 3—The camshaft groove, roughed out for alinement in a planing operation, is milled with this special convex form cutter.



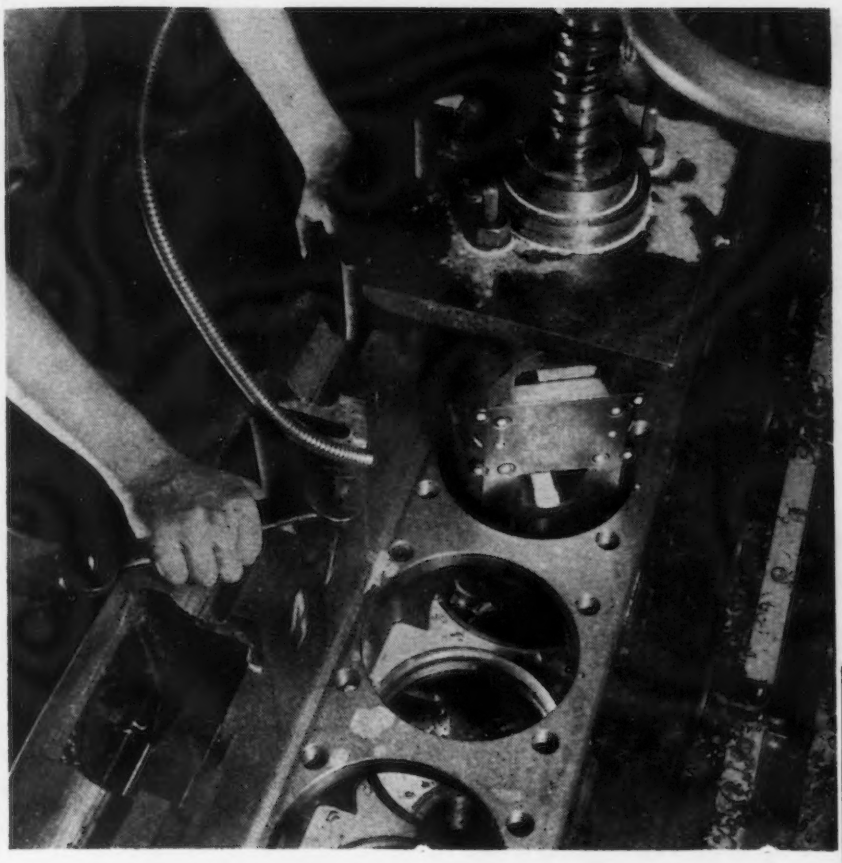


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FIG. 5—The tool shown in Fig. 4 is lowered into the cylinder bore to cut the recess in the lower bore. Recesses in the bore of the first two cylinders can be seen. The bushing plate, above the cutting head, seats on the cylinder deck and the lower end of the boring bar rotates in the bushing of the lower guide plate which forms part of the auxiliary bed on which the case is mounted.

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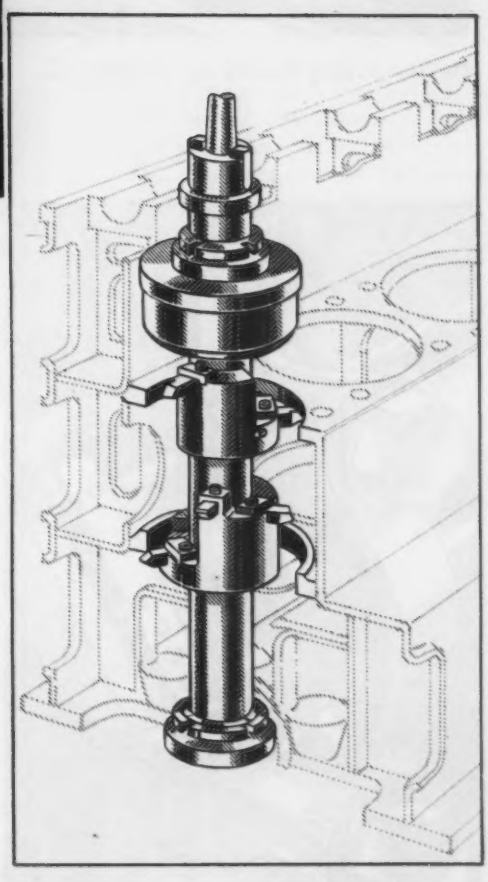

and ½ in., respectively, under the nut, a flat cutter is used for roughing and a specially ground round cutter is used for finishing.

The spherical washer mates with the 1½-in. radius and the ½-in. radius provides relief around its upper edge. The cutting is accomplished as a back spotfacing operation on the integral half of the bearings, with 1/32-in. clearance held to accommodate the castellations of the nut. A 1½-in. radius is spot faced in the detachable halves.

Several further drilling operations intervene before the bearings are assembled and the engine case mounted on a horizontal boring mill for finishing the crankshaft bore. For this, gang cutters are mounted on a boring bar that is held in a fixture with three steady rests. The gang cutters rough bore, rough face and rough backface each of the nine bearings simultaneously.

For finish boring, a special floating tool was developed, shown in Fig. 7. The cutting tool shank consists of a short, square bar, about 1-in. in cross-section, at each end of which non-integral cutters ground for shearing action are mounted. These tools, Fig. 8, one for each bearing, are held in the boring bar slots by a spring and steel ball, like the device for holding the ratchet handle on a socket wrench. This permits sufficient lateral movement for each of the cutters to adjust

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RIGHT

FIG. 6—This cutaway shows the operating position of the tool used in machining the cylinder bore recesses. The lower bushing receives the boring bar. The upper bushing fits the opening in the top guide plate, which would be secured to the camshaft structure. The tool is operated by a radial drill.

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itself and provides accurate gang finishing of the nine crankshaft bearings. The operation is largely dependent upon a close tolerance roughing job, but since both the roughing and finishing can be acomplished in a gang operation, the work is greatly expedited.

Very close dimensions must be held from side to side of each bearing and from each bearing to the next. A special facing cutter, shown in Fig. 9, is used for this purpose, the bearings being faced one at a time to prevent accumulating error. The facing cutter head clamps on the boring bar, being a hinged and bolted collar. It is secured in position solely by its grip on the bar. Two cutting tools are mounted in this head so that adjustment of the boring bar, either to the right or left, permits finishing the faces of adjacent bearings.

Camshaft Bore Finish

The method of finishing the camshaft bore is distinctly different from the crankshaft operation. After interchangeable mating halves of the cam bearings have been assembled, the engine case is located for reaming the cam bearings on a horizontal boring mill. The first two bearings are brought down to finish size. There-

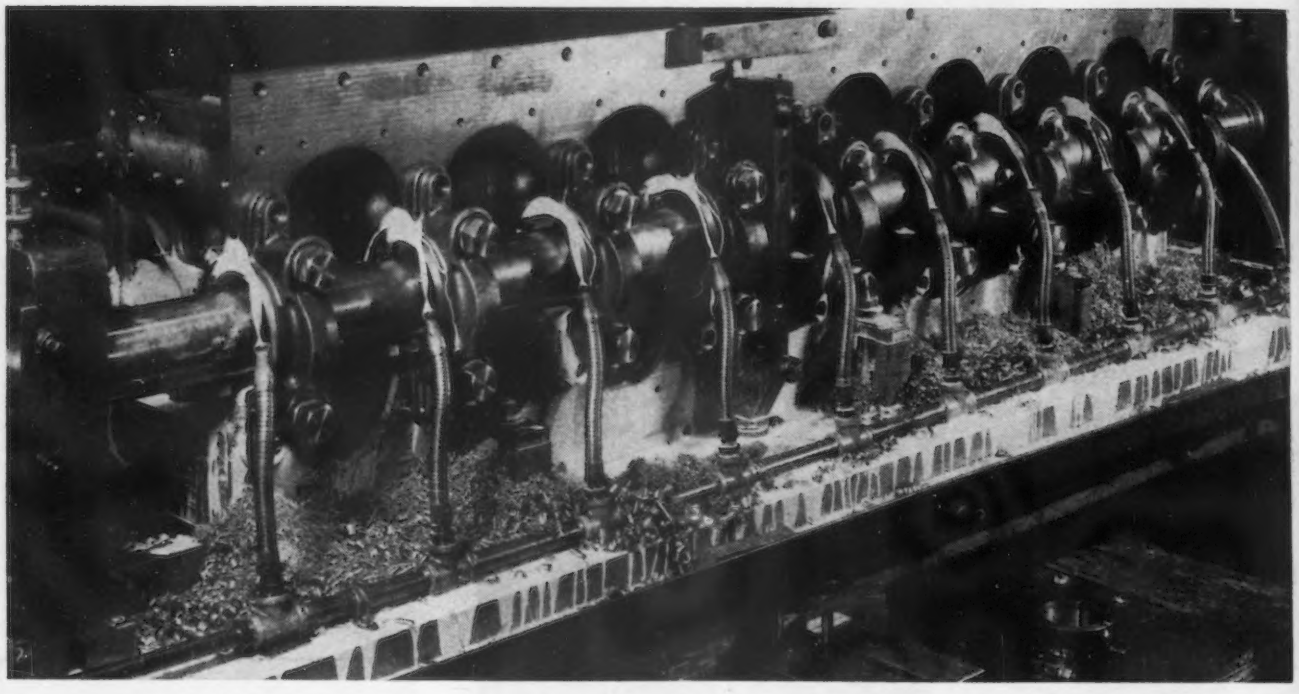
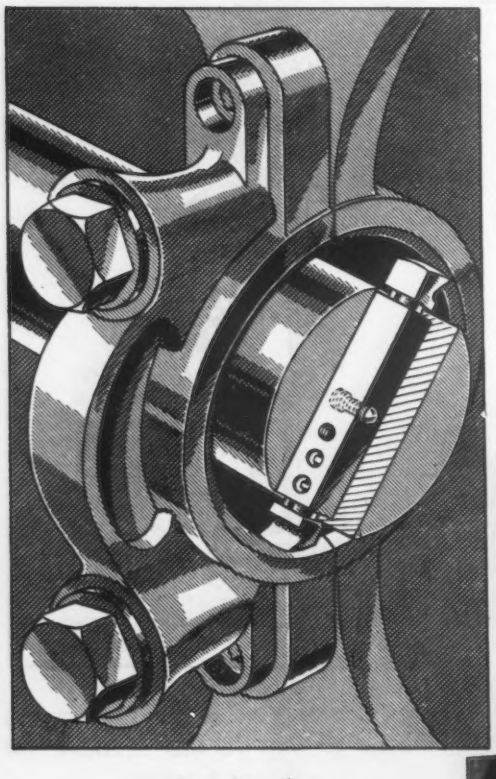


Fig. 7—For gang finishing the crankshaft bearings, special floating tools are mounted on a boring bar supported by three steadyrests.



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ABOVE

FIG. 8—The special floating cutter for gang finishing crankshaft bearings is shown here in detail. The cutter is secured in the boring bar slot by a steel ball, backed up with a spring that allows lateral movement for self-adjustment. Set screws aid initial adjustment of cutting edges which are specially ground for shearing action.

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after, these two serve as bushings to pilot the line reamer through the next bearing.

The reaming head is mounted on a bar of the same diameter as the finished camshaft bore. Hence, as each bearing is finished in sequence, it acts as a pilot bushing for reaming the next bearing in line. The reamer is specially ground to push the chips ahead of it and the boring bar is extended with spacing sections at appropriate intervals. A test bar is passed through the completed bore to check results.

With the exception of these two operations on the crankshaft and cam bearings, and the further one of boring the large holes in each end of the

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BELOW

FIG. 9—For facing the crankshaft bearings, this special cutting tool is clamped on a boring bar as shown. Adjustment of the bar permits facing of adjacent bearings with either of the two cutting edges.

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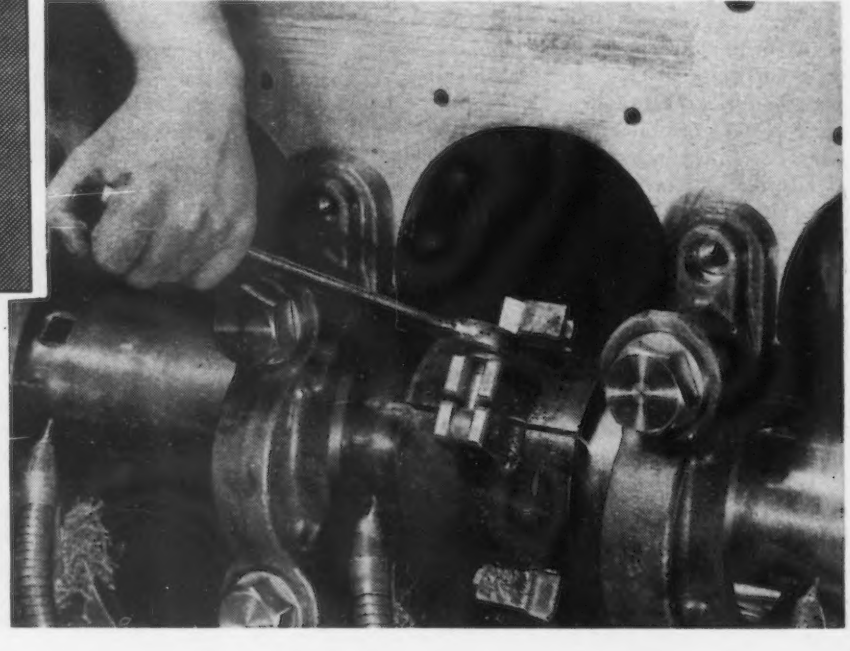

engine cases, the radial drills are consistently employed throughout the work sequence. Some deviation from standard was necessary to carry out this advantage. As an instance, the 31 holes in each end of the engine case are drilled on a 3-ft. radial drill which had to be equipped with a 4-ft. spacer to extend the column sufficiently to accommodate the 81-in. length of the engine case. A platform raises the operator to sufficient height for advantageous use of this extension, as shown in Fig. 10.

In standard operations, an additional number of holes are provided throughout the case, including those which are drilled and tapped in the welded bracket of the handhole covers at the rear.

This drilling operation, and the one in which attachment holes for the camshaft bearings, including those for dowel pins, are drilled, precedes finishing of the bearings. Holes for attachment bolts in the camshaft are both drilled and tapped on a radial drill to close tolerances, with final hand tapping operation holding the threads to Class 5 specifications. The entire case is then burr filed and hand washed.

Inspection amounts to the checking of results for each operation in sequence and the rechecking of overall dimensions. The welded assembly of these engine cases was planned to provide a high strength-weight ratio. The crankshaft bearings, for instance, comprise a forged assembly of interesting contour. They are designed to distribute the main strain of the explosion pressure throughout the engine case structure itself, which mainly consists of boiler plate.

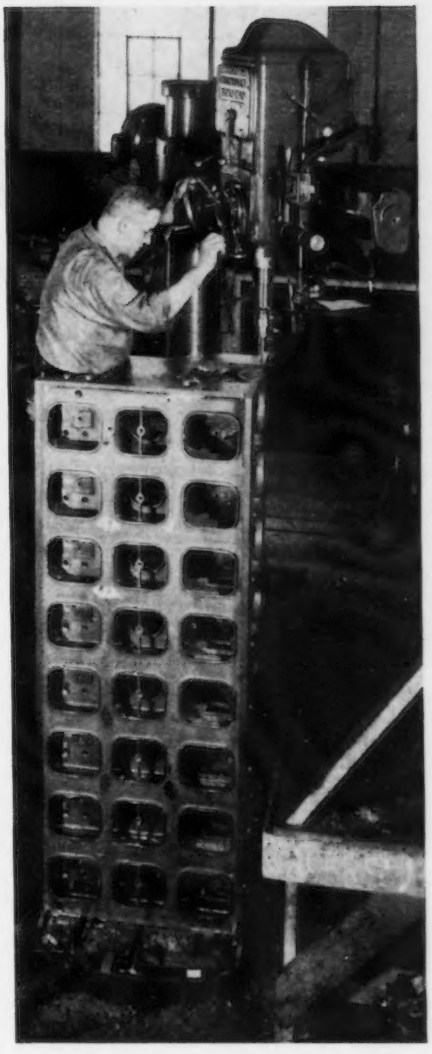

FIG. 10—A 4-ft. spacer extends the column of this radial drill sufficiently to permit its use in boring the ends of this 8-cylinder diesel engine case. The operator stands on a platform.

To facilitate this, a 34-page booklet of instructions is supplied. A copy of it accompanies each engine case throughout the entire sequence. Page by page, the booklet carries diagrammatic descriptions of each operation, graphically describing the procedure for locating the engine case, detailing both the special and standard tools to be used and summarizing results to be accomplished, in terms of the methods employed and tolerances required.

Each operation, on completion, is checked and approved by an inspector, who affixes his signature to the page on which that particular operation is described.

This special booklet, which governs all machining and finishing operations on the engine cases, was prepared with exacting consideration for their unusual design which provides a strength-weight advantage to the Navy's fighting craft. The ingenious innovations and departures in procedures, which grew out of the need to fit this job to existing Warner & Swasey facilities, have imposed more exacting demands on machine tools, with consequent saving in time and improvement in quality.

Final pages of the special booklet provide for checking of dimensions and quality of workmanship on each engine case, as a guarantee that the same precision results accompany the output of this subcontract job as those which were characteristic of the turret lathes they replaced in Warner & Swasey production.

Drop Hammer Dies Made from Cerrobend

DROP hammer dies for protype and sample parts are being made from Cerrobend metal cast from plaster patterns in the Detroit and Los Angeles plants of the Castoloy Corp. The procedure used embraces the following steps: The construction of a master model or template of plaster production of a plaster pattern of this master model by casting; the casting of dies, from the plaster pattern. This process not only produces a die for the stamping of the parts, but also provides a means of casting checking fixtures for other subsequent operations on the part.

The dies are cast directly from full-size plaster patterns of the part, in a large tank containing circulating, cooling liquid. The cooling of a die is accomplished in approximately 45 min. The metal used, a low melting point alloy supplied by the Cerro de Pasco Copper Corp., can be pumped through a long rubber hose to any mold that is ready for pouring. As Cerrobend does not shrink upon cooling, the die is an exact duplicate of the master model. Anchor lugs and cores for holding the die in the drop hammer are mounted and cast in place during the pouring. Fitting of templates and all grinding, filing, chipping and polishing operations are unnecessary. Allowance for thickness of the sheet metal is made by means of a special spraying technique. Aluminum, steel and plastic parts can be made in quantities of from one to 50 or more, depending on the type of material, thickness and accuracy required.

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PHOTOGRAPH shows on the left solid Cerrobend male punch; center foreground is original plaster model; center background is the die set showing location for drop hammer mounting. Right, solid Cerrobend female die.

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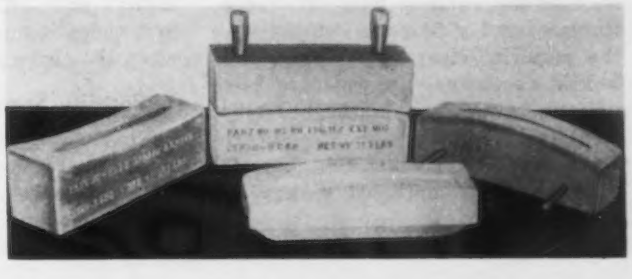


Efficient Sintering

By M. V. COVER
Allen Park, Mich.

PROPER control should make possible about 1000 gross tons of sinter a day on a six wind box Dwight Lloyd machine 72 in. wide, when the sinter being produced contains 60 to 61 per cent iron.

The tonnage rate of a Dwight Lloyd sintering plant for a given material depends upon the sintering rate which is the speed at which the sintering zone travels down through the bed of material to be sintered and the per cent of hot return fines. A sintering rate of 1 in. per min. has been considered satisfactory for this type of machine, but is dependent on: (1) Ignition, (2) porosity, (3) vacuum, (4) carbon, (5) moisture, (6) uniformity of mix, (7) per cent hot return fines, (8) depth of bed, (9) materials in the mix, (10) intelligent operation, (11) condition of equipment.

Ignition is undoubtedly the most important item. Unless there is good ignition produced by a flexible furnace, high efficiency in the other items will not produce maximum results. Good ignition depends upon: Type of furnace; fuel used; proper mixing of air and gas; temperature and proper application of flame; length of time flame is in contact with material; uniform and continuous band of ignition flame across the sinter bed; uniform piling of material; per cent of moisture; per cent of carbon, and a properly smoothed surface of material.

With any type of ignition furnace the air and gaseous fuel must be properly mixed, and have sufficient pressure to force the flame down onto the material. For best results individual control of the air and the gas is essential, and a wide even continuous band of flame in contact with the material clear across the sinter bed is necessary. In order to have uniform, even ignition the bed must be of even depth throughout and carefully smoothed down. The material must not be compressed to any extent.

The flame should be in contact with the material long enough and be high enough in temperature to ignite the carbon thoroughly and start it burning rapidly. Too much moisture and too little carbon are detrimental to good ignition, as is poorly mixed material. The top of a properly ignited sinter bed will be of a uniform bluish color, will not be baked but will be hard and firm, and will not be dried out.

Where the ignition fuel to be used is fuel oil, an oil gas generator can be used. About 20 gal. an hr. of fuel oil would be required. With 550 B.t.u. coke oven gas, about 3500 cu. ft. of gas an hr. is required. The ignition fuel necessary is practically independent of the depth of bed or the speed of the machine.

The coke oven gas pressure should be not less than about 15 in. H_2O per sq. in. The gas and air should have individual control valves. A covered gas line with provision for steaming out and not less than 6 or 8 in. in diameter should be provided. It would be best to have this size line come up to as near the control valve as possible.

The small orifice necessary to measure the gas accurately is not practical in a coke oven gas line. For this reason, the orifice necessary for periodical checking of the gas flow should be placed in a by-pass line. An ordinary monometer similar to a Meriam with a properly graduated scale will indicate the hourly gas flow and give a reading that is as accurate as that of any gas flow meter using an orifice. With the ignition furnace described above, the gas regulating valve is set for best results and is not changed, except when the gas pressure varies appreciably. An extra shut-off valve should be used to shut the gas off when the plant is down. The setting of the regulating valve is not changed. Since the gas is always shut off last and turned on first there is no danger of explosions when the above procedure is followed.

Porosity Second in Importance

Next to ignition, porosity is the most important item in affecting the sintering rate. It should be as high as possible and uniform across the entire sinter bed. The most important things that affect porosity in a given material are: Moisture; amount and kind of hot return fines; grate bar opening; properly and uniformly mixed material; delivery of material onto the bed; uniform depth of bed; smoothing shoes, and carbon content.

The amount of moisture necessary for best results varies with the materials being sintered, but is about 10 per cent of the total mix. A very slight change in moisture content from the optimum will affect porosity adversely. Porosity increases with the percentage of hot return fines.

The amount of grate openings should be as high as possible, the limiting factor being the amount of material that is pulled through the grate bar openings into the wind boxes. This varies with the fineness of the material being sintered and inversely with the segregation of the coarse material to the bottom of the pile. Materials must be thoroughly mixed in the pug mill so that they will be uniformly distributed across the bed. If a swinging spout is used, means must be provided to insure the fluffy piling of the material onto the bed. It is also necessary to have the coarser materials segregate and pile uniformly across the pallets and at the bottom of the pile. Having the bed the same depth across the pallets is very important, because the porosity must be uniform to obtain even results. The smoothing shoes should not be so heavy as to compress the material to any appreciable extent, but should leave it light and fluffy.

The amount of carbon necessary for greatest porosity like moisture, also varies with the material being sintered, but for best results is around 3.50 to 3.75 per cent dry basis. Any variation of this amount in either direction begins to affect the porosity of the material adversely.

Proper vacuum is also of very high importance in securing the best sintering rate. The vacuum should be adjusted to the depth of bed and to the materials being sintered. Best results would be obtained with a fan that would give a variable vacuum. With a constant vacuum fan the butterfly valve in the wind line must be kept partly closed unless the bed depth is arranged to suit the maximum

with a Dwight Lloyd Unit

. . . How to increase the amount of sinter made in a Dwight Lloyd machine by the use of proper materials and efficient design is herein described in detail. Also fully discussed are the other critical factors influencing output.

vacuum. This depth must then be varied with any pronounced changes in the material mix. Too much vacuum for a given bed depth lowers the sintering rate and causes excessive wear on the fan. It also fills the wind box with unsintered material. Nine thousand cu. ft. of air a min. per wind box seems to be about the right amount of air. The maximum vacuum of 24 in. or 25 in. commonly used is very probably not high enough to obtain a maximum sintering rate and the bed depth necessary for highest production.

A bed 13½ in. deep has been found to give very good results when running about one part dry flue dust to three parts clayey ore. With about equal dry dust and ore a bed not over 12 in. is desirable. When about 6 per cent open hearth dust is used in the total mix the 12 in. bed is too deep. With a variable vacuum the vacuum could be raised or lowered to suit conditions. Changing the opening of the butterfly valve in the wind line is not a satisfactory method of controlling the vacuum.

A variable speed coupling between the motor and the fan would be ideal for vacuum control. A coupling of this type would also be of very great advantage in starting the fan. The fan motor may take five or six times as much current for starting as it requires while running. The benefits that would be derived from gradual speed increases in starting the fan are quite obvious.

In maintaining the full benefits of the vacuum available, one of the main sources of vacuum loss can be avoided by using wear plates on the hubs of the pallets. The ordinary method of taking care of these hubs is to take the pallets out of service and build up the hubs by electric welding. When this welding is delayed too long the sealing edges of the pallets will be battered back and considerable vacuum is lost due to air pulled through these spaces. A method that works out much better than welding is to burn the hub to a radius ½ in. less than the original radius and then weld 50 to 60 point carbon wear plates on the hubs. Plates of this kind after 26 months of service show little wear. The distance between pallets at the discharge end of the machine does not increase and vacuum is not lost as a result of battered surfaces. Some of the original hubs may have as much as ½ in. worn off them in about three or four months.

Pallets should originally be made with wear plates on the hubs. The wear plates could be held on with countersunk head machine bolts. New plates could then be installed without either removing the pallet or stopping the sintering machine. Usually one or two of the hubs wear much more rapidly than the others. With wear plates only the individual plate would be removed. The average life of the plates would be more than a year, instead of a few months, and the sealing surfaces would not be battered back.

By using two spreaders with a sling at each end and two trolleys, pallets can be changed with only a 3 to 5 min. delay of the sintering machine.

When coke breeze is used for the sintering fuel it should be screened at least to ⅛ in. The finer the better. Coarse breeze is segregated down onto the grate bars and causes stickers and scabs. Considerably less breeze is required if it is fine. Too little carbon makes soft sinter. Too much carbon makes sinter that is very brittle, unless the percentage of carbon is very high. When carbon content is very high the sinter is fused into a hard mass with very little porosity, and a uniform bed of sinter is probably impossible to obtain. Such sinter is not desirable for blast furnace use.

When the sinter material is dry it has practically no porosity and it is impossible to ignite it properly. The porosity increases rapidly up to about 10 per cent moisture content, above this amount porosity decreases rapidly. With 14 per cent moisture, for example, the material is very hard to ignite and great difficulty is experienced in handling it because of its "muddy" condition. When flue dust having 10 per cent or more carbon is being sintered, more than 10 per cent moisture is needed. Most of this additional moisture should be added after ignition rather than before. A shallow bed is necessary for best results. High moisture increases the ignition loss and increases the fuel cost. If the "mix" is too dry it causes considerable trouble due to pulling through the grates.

Material Weighed Hourly

To insure the uniform mix that is so essential to a high sintering rate, hourly weights of each material should be taken. These should be held as nearly uniform as possible. A good spring scale that will weigh accurately ½ oz. to about 50 lb. plus a pan placed on the belt as needed at each feeder should be provided. From these checks the percentage of each material, its tonnage, the per cent of return fines and tonnage of sinter made can be checked fairly accurately. Nothing should be added to the feeder tables, such as rings, that interferes with the smooth even flow of the material to the belt. Only one pug mill is necessary. However, it must do a thorough job of mixing at all times. All returns should be so handled that there will be a steady flow of them back to the feed belts. Whenever there is a radical change in the mix, the weights for each material should be determined ahead of time.

Getting the best amount of returns requires some study. With a clayey ore and not too high a proportion of dry flue dust, 10 to 18 per cent for example, about 20 per cent returns have been found to give the best results. With 20 per cent returns the sintering rate may run as high as about 1.35 in. a min. With about 30 per cent returns this can be raised to about 1.45 in. a min. However, for maximum tonnage about 20 per cent returns should be used. The amount of returns made is governed by the total grizzly bar opening and by the width of the openings, as well as by

the kind of sinter that is being made.

With the usual 24-in. vacuum and materials that are not too fine, best results are obtained with a sinter bed of about 14-in. depth. Greater bed depth will give the following beneficial results: Much higher production; increased life of the grate bars; increased life of the fan blades; increased tonnage life of the pallet bearings; lower percentage of unsintered returns, and lower cost of sinter.

A good blast furnace sinter will haxe maximum porosity and will not be too coarse. It must, however, have enough structural strength to support the over burden. It must present the highest possible surface for contact with the reducing gases.

A good open hearth sinter will be as compact and as heavy as possible. It will present as little surface as possible to contact with other fusing materials. Porosity, as such, will not be detrimental to the sinter as long as it does not increase the "surface contact."

The kind and quantity of sinter made is largely dependent upon the materials available for sintering. For blast furnace purposes a more friable sinter must be made, but for open hearth purposes the sinter should be fused to as great an extent as is practical. If too much fuel is used considerable trouble will be experienced due to "scabs" and "stickers." It has been found that, with free silicon up to 5 or 6 per cent no appreciable amount of Fayolite will be formed up to the point of "sticking."

With a fine granular ore, high in iron, good open hearth sinter can be made without over-fusion. In general, for open hearth sinter fine granular material is desirable. For blast furnace sinter, coarser material that results in a more porous product is desirable.

Open hearth sinter should be handled without cooling water and should be stored in bins to cool before loading into cars. It should not be handled with a crane but can be loaded directly into cars as made, with cooling water sprayed onto the sides of the cars and not onto the sinter.

Conveyor Design

Belts for a six wind box machine should be able to handle as much as 1800 tons of total material mix in 24 hr. There have been cases in existing plants where motors and gear reducers on conveyors have been too small to perform their duties properly. Belts that have been stopped with a load on them sometimes will not start without assistance. Motors overheat and bearings, especially those on high speed shafts fail after being in service a very short time. The remedy for this is, of course, to use more power and heavier bearings.

One mistake is sometimes made in conveyor drive design. Instead of using a holdback to prevent inclined conveyors from running back when stopped while loaded, a worm gearing with a high reduction is used. The starting efficiency of this gearing must be less than 50 per cent and the running efficiency will probably be approximately 60 per cent. This means that the motor must have about 50 or 60 per cent more power to start the conveyor, and about 25 per cent greater operating power is required than would be required if helical reducing gearing and a back stop is used.

In designing handling equipment the weights of various materials may be assumed to be about as follows:

Material	*Lb. Per Cu. Ft.*
Ore	125
Flue Dust	90
Scale	175
Breeze	40
Mix	100
Sinter	100

Material should be delivered onto rubber belts exactly on the center line. If a belt is rather long self-alining idlers should be provided. Satisfactory belt scrapers other than rotating scrapers are hard to find. If a stationary scraper is used the arm holding the rubber should be rather short, but extra wide and thick and the rubber should be applied at an angle of about 45 deg. to the belt instead of at 90 deg. The short arm will prevent vibration and the scraper set at 45 deg. will peel the material off the belt instead of scraping it off. Junction boxes should have deflection plates or other means provided to insure delivery of the material to the center of the succeeding belt. These boxes should have vertical sides so as to avoid sticking of material and should have loose liners where wear occurs to facilitate replacement.

When feeders have been down for some time they are hard to start. In some cases the motor is not powerful enough. In others the clutches slip. The reducing gearing under the table in some cases consists of a worm and gear that has a reduction ratio as high as 60:1. The starting efficiency of these drives is likely to be less than 50 per cent. This means that 25 per cent or more of the motive power is lost in friction. A larger motor must be used to overcome this. Considerably more operating power is necessary for this layout than would be necessary for a design having a worm gearing of not over 20:1 reduction. With the higher ratio there is excessive wear on the worm and gear, and due to over-heating the bearings do not stand up nearly as well as they should.

Rubber belts will carry material up a slope of about 20 deg. The belts carrying the discharge from the shaker screen should have a slope of not over 10 or 15 deg. On greater slopes than these the coarse material will roll back. Belt conveyors are far more satisfactory than bucket elevators. Feeder belt speed of approximately 100 ft. per min, is quite satisfactory. With this speed a belt 24 in. wide will take care of up to 1600 tons of material in 24 hr. The belt that carries the hot fines should not be run much faster than the other feeder belts, so that sufficient protection from the hot fines will be provided for the belt by the other materials. The storage belts should have a higher speed so as to deliver most of the material to the storage bins on the day turn. However, for this purpose more storage capacity than is usually provided is needed. More receiving bins are also necessary.

The angle of the conical section of the feeder bins with the cylindrical section should be less than is sometimes used. This will cut the apparent capacity of the bin somewhat. The real capacity of the bins, however, will be increased. With the larger angle the material hangs on the conical sides of the bin and only a core about the diameter of the feeder table feeds down through. This cuts the real capacity of the bin to probably less than half of the rated capacity, especially for clayey ores and flue dust.

The leg from the hopper under the front end of the sinter machine should come straight down to the belt. A rubber skirt made from belting is placed on the bottom end of the leg and pressed down onto the belt. This arrangement keeps dust out of the feeder room and provides a steady feed for these returns.

Feeders, conveyors, pug mill and swinging spout should be connected in sequence but the sinter machine should not be in sequence. When the material feed falls off for any reason the sinter machine can be stopped until the shortage is made up. This prevents uneven piling of material.

The shaker screen should be placed in line with the belt that brings the material up to it and not at right angles to this belt. When the screen is at right angles to this belt the material sticks to the junction box chute and this causes the material to flow

onto the shaker screen at one side instead of evenly across the screen. This is very hard on the screens, slows the screening process, and causes a considerable amount of fine material to go out with the coarse material. An adjustable baffle in the junction box will partly overcome this difficulty, but much better results would be obtained by having the screen in line with the conveyor. A baffle plate suspended on cables or chains in the chute just ahead of the shaker screen will prevent coarse pieces of ore, etc., from flying off, and will protect the screen from much damage. The screens should be of the quick change type and have rectangular rather than square mesh with the long side of the rectangle in the direction of material flow. If this is not the case wet materials will pile on the screen and cause serious trouble.

Rectangular Pug Mill

Pug mills of various designs are used. One type that gives satisfactory service is a rectangular mill with square shafts and paddle assemblies. Wear plates protect the paddles and need to be changed about every fourth week. About every twelfth week the compelte shaft assemblies with coupling seals and bearings should be changed. This takes about the same time, 3 to 4 hr., that it takes to change the wear plates. Proper inspection of all these parts is nearly impossible without removing them. One should make sure that the couplings are a driving fit on the shafts and that the keys are a good fit and ample in size. Much damage can be done in a very short time when couplings become loose.

Means should be provided to lift the shafts out of the mill. The plate on top of the mill should be loose and the junction box should be split at an angle with no more than four bolts in the joints. This will be found very advantageous when changing the wear plates.

Rings around the feeder tables extending 1½ in. or so above the table level are sometimes used since it is believed the material will pack on the table inside the rings and thus prevent wear on the table tops.

It has been found, however, that when the material is at all coarse it will not pack. On receiving bin feeders where the material is quite coarse, the material catches under the bin skirt rings and wears the table top much faster than would be the case if these table rings were not used. With fine material the bin skirt rings must be kept down to close to the table to keep the material from feeding out under them instead of out of the gate. The most serious fault of the table rings, however, is due to the damming back of the material. This causes uneven feeding of the material which is quite detrimental to the sintering operation. With fine wet material the feed may be dammed back so much that the material will not feed at all without manual assistance.

Even if the material does pack more or less hard inside the table ring, the cleavage between the packed material and the material being fed is much greater than the cleavage of the material to the smooth table top. This means that more power must be used to turn the table. It is best to use wear plates of 50 to 60 point carbon steel on the table tops. These rings of about 1 in. thick last about one year or more, flue dust or scale.

Washer Dust

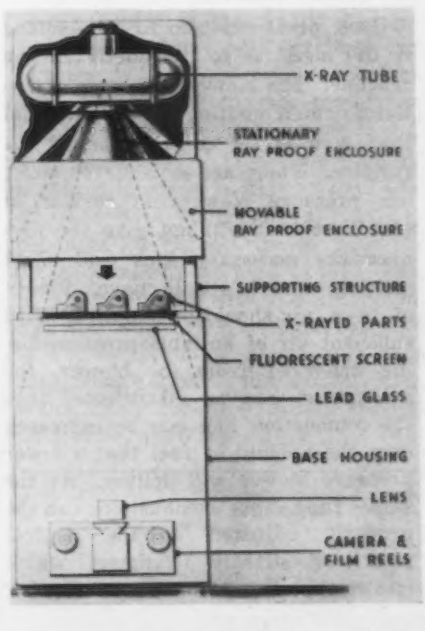
Proper handling of wet dust requires considerable engineering supervision of the design of the sludge and the filter cake handling machinery. Ample suction lines to the sludge pumps must be provided. Proper choice of a filter must be made. If a drum type filter is used then the removal of the cake from the cloth requires considerable engineering thought. Junction boxes for belts must be carefully designed. Scrapers that are entirely satisfactory for other materials will not work at all satisfactorily on filter cake. The plough that prepares the other material, including the filter cake to receive the hot fines, should be specially designed or the belt going to the pug mill will be burned up. Furthermore, a swinging spout, that will handle other materials satisfactorily will not handle high percentages of wet dust at all.

Proper drainage for the settling basins and the filter must be provided. If this is not done, plenty of trouble will be experienced.

If wet dust equipment is well engineered all the way through, then adding wet dust to sinter mix will increase the amount of sinter that can be produced, possibly by as much as 10 per cent. Up to 25 per cent of the total mix may be wet dust, and up to 40 per cent or more may consist of wet and dry dust.

X-Ray Negatives Made on Miniature Film

USE of a high speed camera to make 2-in. film negatives of any image cast upon a fluorescent screen 1 ft. square enables X-ray inspections to be made for 5c. a "shot" instead of $1.50 for 14 x 17 in full size X-ray negatives. About 300 exposures can be made on a single 50-ft. roll of film. In order to adopt the unit to production lines without endangering personnel, the machine, which was developed by Westinghouse, is designed so that no special lead lined surroundings are needed. As the diagramatic sketch shows, the tube itself is housed in a ray proof enclosure and a lead sheathed shield is dropped down over the work after it has been laid on the fluorescent screen. The camera is mounted in the base. Industrial radiograph equipment of this type, although limited to certain varieties and sizes of product, should extend the application of X-ray inspection methods to other than critically important work to which it has been largely limited because of cost of apparatus and film.



Better Copper

By H. E. McGOWAN
H. E. McGowan Co., Los Angeles

WITH the rapid development of copper alloys like the tin bronzes, nickel silver, manganese bronzes, aluminum bronzes, silicon bronzes, manganese-aluminum bronzes, and beryllium bronzes in very recent times, the foundryman will find, by some study and inquiry, that he can offer castings from these recent developments for industrial use that were not in existence a few years ago. They require some additional understanding and care in handling beyond that for ordinary red brasses, but they are here to stay and the more that is known of them, the more successful the foundry business will be.

The first important consideration is the melting practice in the foundry. It is essential that gates and ingots are melted down as rapidly as possible under proper conditions of combustion. This sounds simple enough, but there are many foundrymen who do not appreciate how important this is. Furnaces should be so constructed that the linings will radiate the highest possible amount of heat in the shortest length of time. For crucible style furnaces, silicon carbide shapes are an excellent recommendation as a material well suited to this type of furnace lining. These shapes should be backed up with one or two layers of insulation so that the heat created in the lining will remain inside the furnace, instead of being lost through the furnace shell. The more B.t.u. that can be kept inside the furnace, the faster the melting time will be with a given amount of combustion. Up to date furnaces with the right blower setup and combustion controls are maintaining furnace temperatures close to 3000 deg. F. and the answer is better quality castings.

Back pressures should be avoided if the metal is to lie quietly in the crucible. The blower is just as essential to rapid melting as the material that is used for construction of the furnace. There are entirely too many low pressure blowers in service in the West that will not give the furnace the necessary kick and short melting time it should have. Plenty of 16-oz. air should be supplied. With sufficient air of suitable pressure being delivered from the blower, the amount of gas or oil injected into the combustion line can be increased over the amount of fuel that a lower pressure blower will deliver. At the same time, this combustion can be properly adjusted at the neutral point, or slightly oxidizing, which means that the foundryman is going to get all possible B.t.u.'s into his furnace by obtaining the proper proportion of clean air and fuel. Blowers should have fresh air wherever possible. The gas company in every city is willing to take a reading of the furnace combustion and recommend proper adjustments, or an experienced supplier of furnaces can help at this point.

During the breakdown period when gates or ingots are becoming cherry red, but have not yet broken down into molten condition in the crucible, the metal is very susceptible to gas absorption and this gas cannot be entirely fluxed out or eliminated as a general rule before the metal is poured into the mold and sets up in the casting, resulting in porous castings.

Low pressure blowers do not deliver enough air to take as much gas or oil as they should which results in a reducing flame, that is, there is more gas or oil in the furnace combustion than will combine properly with the amount of air delivered from the blower. Roughly, there should be 10 or 11 parts of blower air to one part of fuel, to create a neutral or slightly oxidizing flame in the furnace.

Proper Combustion Essential

With an overdose of gas or oil in the combustion, the surplus or unburned portion of fuel will be rapidly absorbed into copper base alloys during the breakdown period that the metal has to go through before it is molten in the crucible. This is a critical period and the combustion should be neutral or oxidizing, preferably oxidizing, during this period. After the entire charge has become molten in the crucible, additional oil or gas can be turned into the combustion line more safely, as molten metal does not have the tendency to pick up gases that cherry red metal has. But automatic controls are available for either gas or oil fired furnaces, and most foundrymen know this, but a surprising number of foundries have been slow in taking advantage of this development. Certainly with green help today, furnace combustions by the guess method vary more widely from heat to heat than ever before.

Of course, proper combustion space, exact burner tip diameters, height of base block, distance of crucible from top of furnace, proper lining materials, proper blower air volume and pressure and automatic combustion control to maintain desired combustion from low to high flame, all enter the picture. This has all been brought to a very high degree of perfection and is available. Results of these improvements are definitely, (1) better quality metal from the furnace, (2) shorter melting time, (3) fuel saving, and (4) increased life of crucibles and furnace linings.

In some areas there are two suppliers of electric power, one delivering 60-cycle current and the other one delivering 50-cycle current. All foundries using 50-cycle current are automatically put at a disadvantage when it comes to blower performance. Their blowers turn over about 15 per cent less c.f.m. than they would on 60-cycle, and both the cu. ft. delivered per min. and the pressure of the air delivered drop off about 15 per cent. This should be overcome by belted blowers so that the r.p.m. in such shops is stepped up to 3450—and then these blowers will do as well as those direct drive jobs in shops using 60-cycle current.

Alloy Castings

. . . Good castings of uniform quality are the result of the combination of correct furnace construction, controlled combustion, proper sand specification and shakeout time. In this talk before the Los Angeles Chapter of the American Foundrymen's Association the author discusses the necessary controls for a copper alloy foundry.

Good or bad sand conditions can be the answer to the quality of castings, when all other factors are correct.

Sand that is weak, or too fine, will cause porous castings, and to be about right, sand should be as follows: Permeability, 25; green strength, 7; grain size, 100, and clay content, 10 per cent when moisture is at about 6 per cent. Slight variations are not injurious but to avoid porosity in castings, sand should not carry much more than 6 per cent moisture. If a greater percentage of water is needed to get a lift, the clay has been burned out or the sand has been used too long and too many fines have accumulated. These fines plug the desired openings between sand grains and reduce the permeability. Then it becomes necessary to add additional water for artificial temporary strength to replace the loss of bond, or clay, and together with accumulated fines interfering with the passageway between grain particles, the increased moisture causes excessive steam in the mold. This steam cannot get away from the casting and out into the mold so it kicks back on the molten metal. The metal is at this time starting to solidify and steam is trapped in the metal—resulting in porosity in the casting. A permeability tester and a moisture tester should be used to test the sand *before* molding, thus preventing many porosity troubles. Actually, sand should be ordered to the specifications desired.

Test Bars

Proper test bar procedure involves several points that are a mystery to many foundrymen even yet. For instance, the proper test bar for the alloy in question must be selected; the pouring temperature of the test bar in this alloy must be closely followed, and then the bar must be shaken out of the sand at a definite time after casting. Any error in one or more of these steps will either distort physical properties, or will vary the results for a series of test bar castings from the same melt.

Even red brass test bars shaken out at various times from 30 min. to overnight will give strange physical results. Good practice is to leave test bars in the sand not over an hour.

A rather thorough discussion of manganese bronze control will serve as an example to demonstrate a number of controlling factors.

Besides furnace combustion, pouring temperature, correct test bar pattern, and correct shake-out time, another factor of importance enters into the melting procedure for manganese bronze castings and test bars. This is the flaring (or burning off of some zinc while the metal is in the furnace). This is quite important and so is the proper replacement of zinc in the next heat for gates and risers that have been melted once. Flaring of the metal works as a de-oxidizing action and is helpful. A recommended procedure follows:

(1) Melt in a clean crucible or in a crucible that has been used previously for manganese. That is necessary to avoid lead contamination.

(2) Melt fast and bring metal to about 1950 deg. F. and flare or flash strongly.

(3) Use coarse, dry charcoal or glass as a cover, or a good flux.

(4) Furnace combustion should be neutral if possible or slightly oxidizing.

(5) Stir thoroughly but avoid flapping the metal.

(6) Flare zinc for about 1 min. but no longer in order to retain the tensile strength.

(7) Add 1 to 1½ per cent of electrolytic zinc or Horsehead zinc for the weight of gates or risers in the heat. None should be added for the original ingots. This reestablishes the copper-zinc ratio.

(8) Skim thoroughly and pour molds with crucible as close to sprue as possible and pour evenly to avoid surges or splashes. Agitation during pouring, or molten metal flowing against sharp angles in the mold causes an oxidation within the mold that is detrimental. This alloy will oxidize easily. Inverted horn gates, strainer cores, or skim and choke gates should be used, wherever practical. Castings should be fed at bottom and a straight run of metal in the mold is desirable. Heavy risers and feeder heads must be generously used to overcome both external and internal shrinkage, which this metal has.

(9) For pouring the test bar:
(a) Skin dry the mold.

(b) Pour at the temperature for best physical properties.

(c) Shake out after about 45 min. Leaving bars in sand for a longer time makes the metal brittle. Although the tensile strength will not be altered much elongation will be lost.

(d) When the bars are machined, the machine shop should be cautioned against heavy cuts or allowing the bars to get too hot. Machining can harm the physical properties of an otherwise good bar.

(e) If the feeder or riser section of the test bar does not show a decided shrink on the top section, the bar should be discarded.

(f) One bar should be broken in a vise before machining and if any bright yellow spots are apparent the bar has not been fed properly and shrink areas are present which rapidly lower the physical properties.

To demonstrate the importance of avoiding too long a flaring time and also the need of replacing 1 to 1½ per cent of highest grade zinc for the gate sand risers used in each heat, it is known that with the aluminum, iron and manganese contents constant of 70,000 lb. manganese, there is a very wide variation in physical properties by a variation of the copper-zinc ratio. For instance:

	58 Copper 41½ Zinc	57 Copper 40½ Zinc	58 Copper 39½ Zinc
Tensile	80,000	75,000	67,000
Elongation, Per Cent	27	33	45

This proves that burning out too much zinc by prolonged flaring reduces the tensile strength sharply while elongation will go higher than needed and the best amount of tensile and elongation can be obtained at the same time by some study of the flaring time. Yield points are better if tensile strengths are kept high and elongation just above the required minimum.

Only a 2 per cent change in the copper-zinc ratio is therefore capable of affecting the tensile strength 13,000 lb. downward and at the same time the elongation is upped as much as 18 per cent. From this it can be seen that no foundry can afford to be careless when working with manganese bronzes. Even the shake-out time of the castings should be carefully timed to deliver the best combination of tensile strength and ductility.

Summary

To deliver the best possible quality of metal into the casting and the test bars, the following should be noted:

(1) Melting conditions should be the fastest possible with correct air-fuel ratio.

(2) Sands should be consistently close to proper specifications.

(3) Pouring temperatures must be consistent together with consistent shake-out times both for test bars and castings.

(4) More controls are necessary in casting into manganese bronzes, aluminum bronzes, silicon bronzes, beryllium bronzes and nickel silvers. Each alloy must be understood thoroughly if best average results are to be obtained.

Vernier Gage Blocks Read to Hundred Thousandths

TO meet the trend toward finer tolerances in machining operations and the corresponding need for smaller increments in measurement, the vernier principle has been applied to DoAll precision gage blocks, permitting gage block combinations to be made up in steps of 0.000 01 in. instead of the conventional range of "tenths" (0.0001 in.). Two gage blocks in what is otherwise a normal set have a precision taper on their mating faces, with two index marks on one and a vernier scale on the other divided into 10 parts between index marks.

When the taper faces of the two blocks are wrung together, with the taper index marks coinciding at each end, the combination forms a block with a height of 0.70000 in. By sliding the vernier scale block to the right, the height of the combination is increased one hundred thousandth for each graduation because of the taper. Sliding the block to the left, the height of the vernier gage is decreased a like amount for each graduation. The vernier gage has a total range of plus or minus 0.0001 in., thereby enabling dimensions to be made in increments of 0.00001 in. above or below any dimension which can now be made with a standard set of precision gage blocks.

Gage blocks used in combination with this vernier increase the versatility of a set of gage blocks and eliminate the cost of producing special gages where the dimensions must be held to split tenth accuracy. Practically all types of snap gages, Fig 1, can be quickly set up. A simple setup will produce height and depth gages to millionth accuracy with a fraction of the cost of a special gage. No special skill is required in setting the gage, which is wrung together in the same manner as standard gage blocks. In combination with gage blocks, a precision sine bar, Fig. 2, can be set to angles within 2 sec. of arc.

Toolmakers and inspectors can quickly measure any dimension to within hundred thousandths of an inch. Continental Machines, Inc., 1301 Washington Avenue South, Minneapolis 4, developed this DoAll vernier gage.

FIG. 1—The DoAll vernier gage blocks used in combination with standard gage blocks and gage holder quickly makes up a snap gage measuring to hundred thousandths with millionth accuracy.

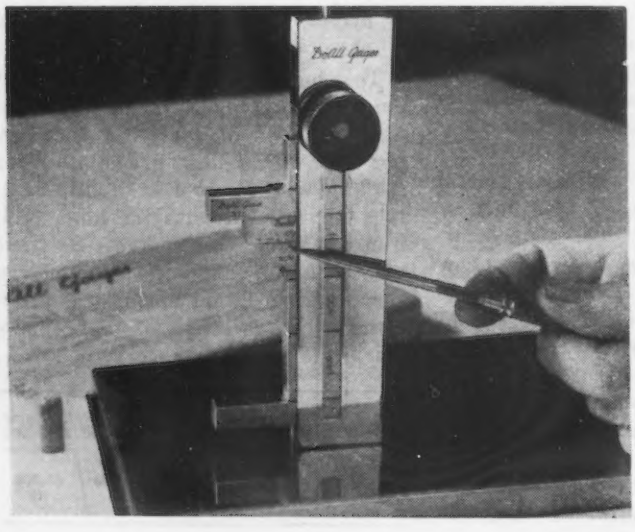
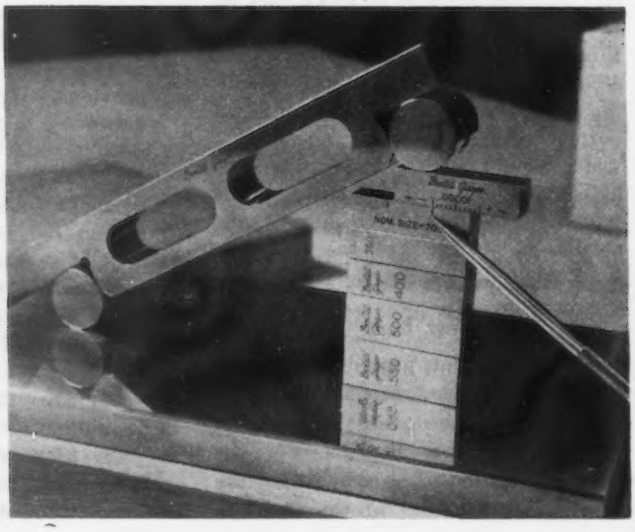


FIG. 2—The DoAll vernier gage in combination with standard gage blocks, master flat and sine bar, for measuring the accuracy of any angle to within 2 sec. of arc.



A. I. M. E. Discusses War and Postwar Problems

. . . At their third wartime annual convention, the mining and metallurgical engineers assembled to hear about new research on the powers of boron, powder metallurgy and magnesium reduction.

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TOPPING last year's attendance, approximately 3000 members met in New York last week at the third wartime annual convention of the American Institute of Mining and Metallurgical Engineers to hear a four-day program, Feb. 21 to Feb. 24, of technical papers, round-table discussions and symposia.

Among the noteworthy events was the awarding of the eighth Robert W. Hunt gold medal and certificate at the Institute of Metals banquet on Wednesday evening, Feb. 23, to Clarence D. King, chairman of the operating committees, United States Steel Corp. of Delaware, for the work done and summarized in his paper, "Washing of Pittsburgh Coking Coals and Results Obtained in Blast Furnaces," presented to the 1943 Cleveland conference of the Blast Furnace and Raw Materials Committee. Mr. King reported that by a relatively simple washing treatment applied to Pittsburgh coking coal, pig iron production could be increased 8 per cent, net furnace coke consumption decreased 8 per cent and flux consumption decreased 15 per cent. In addition, improvement was noted in the regularity of the analysis of the pig iron.

To Alfred H. Geisler, research metallurgist at the Aluminum Research Laboratories, Charles S. Barrett and Robert F. Mehl, both of the Carnegie Technological Institute, went the 11th Institute of Metals Division award for their paper "Aging in the Solid Solution of Silver in Aluminum."

The 18th recipient of the J. E. Johnson, Jr., Award was Leonard A. Tofft, general foreman of the new war-plant blast furnaces of the Inland Steel Co. for "Use of Inwall Temperatures in Determining Improper Gas Flow."

James T. MacKenzie, chief metallurgist of the American Cast Iron Pipe Co., Birmingham, delivered the 21st Howe Memorial lecture on "Cast Iron—Steel Plus Graphite." Mr. MacKenzie discussed the mechanical performance of cast iron and the relation of this performance to the concept of cast iron as steel plus graphite.

Chester A. Fulton, new president of the A.I.M.E., spoke at the Institute of Metals Dinner where Arthur Phillips, new division chairman, made his inaugural remarks. Inducted as chairman of the Iron and Steel Division was William A. Haven, vice-president of Arthur G. McKee & Co.

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Protecting Boron Additions to Liquid Steel

A STIMULATING paper presented by R. W. Gurry of the research laboratories of the United States Steel Corp. at the Steelmaking and Deoxidation session on "The Relative Deoxidizing Power of Boron in Liquid Steel and the Elimination of Boron in the Open-Hearth Process" raised the question as to what extent any boron present in the scrap charged into the open hearth is oxidized out during melting and subsequent refining. This question is significant because the optimum concentration of boron in the finished steel, which is fairly critical, would be very difficult to attain if the boron in the charge were largely retained in the metal. Moreover, unless boron is substantially eliminated in the open-hearth process, its use on a large scale would eventually make it impossible to produce boron-free steel except by restricting the charge to virgin material.

Although there is at present virtually no satisfactory direct evidence to provide an answer to this question, there are indications from practice that boron is oxidized out in the open hearth in the production of medium or low carbon steel. It may be retained, however, if the carbon content is fairly high; that is, if the oxygen is kept fairly low.

From thermodynamic calculations it has been shown beyond doubt that boron is an effective deoxidizer for iron and should, therefore, be almost entirely removed during the open-hearth process; more specifically, the deoxidizing power of boron is greater than that of silicon, vanadium or

titanium and approaches that of zirconium or aluminum.

The relatively high affinity of boron for oxygen indicates that boron, unprotected, tends to oxidize out during teeming; hence, if "fading" is to be avoided, the boron must be protected by the addition of a more powerful deoxidizer, which means that preferably the steel should be thoroughly deoxidized before the boron is added.

If the boron is introduced as ferroboron, the steel should first be deoxidized with aluminum or some other very powerful agent; if boron is added in the form of a complex alloy containing a good deoxidizer like aluminum or calcium, the presence of these elements in relatively high concentration usually suffices to protect the boron, although the extent of this protection varies significantly with such conditions as the original oxygen content, the temperature of the liquid steel and the composition of the deoxidizing alloy.

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Sintering vs. Hot-Pressing Compacts

REPORTING on "Some Properties of Sintered and Hot-Pressed Copper-Tin Powder Compacts," Claus G. Goetzel, assistant director of research, American Electro Metal Corp., Yonkers, N. Y., described the results of experiments on powder mixes corresponding to 95-5, 90-10, 85-15 and 80-20 Cu-Sn.

All sintered bronze compacts underwent only negligible changes in weight during heat treatment, with maximum weight gains of 0.29 per cent and maximum weight losses of 0.67 per cent. Volumetric changes, on the other hand, were considerable. For low tin compositions alloy powder compacts shrink less than mixed powder compacts in the low pressure range, but this is reversed for the tin-rich compositions, for which shrinkage figures above 30 per cent by volume were observed for very lightly briquetted material.

Pre-alloying of the powders promoted increased homogenization in all hot-pressed samples, but it was much less effective in sintered specimens, with virtually no effects on the 95-5 and 90-10 compositions. Other features of the microstructure are decreased porosity with rising pressures and grain growth and normalization of the structure during sintering. For hot-pressed material, greatly increased densification is coupled with only partial recrystallization and substantial retention of a structure of closely agglomerated powder particles.

Specimens hot-pressed at 572 deg. F. show lowest physical properties, with the sole exception of the hardness of cylinders pressed at 50 tons per sq. in. Specimens hot-pressed at 932 deg. F. reach theoretical densities, high hardness and compressive properties comparable with normal alloys of similar composition. Sintered alloys have intermediate density and compressive-strength values and, of course, lowest values for hardness. The kind of initial material has the following effects: Density of the sintered compacts is improved by pre-alloying and the opposite is found in most instances for hot-pressed compacts; specimens of the tin-rich compositions pressed at 932 deg. F. at high pressures are the only exception. Hardness values show a similar trend, except that low-tin pre-alloyed powders form harder compacts when hot-pressed. The use of alloy powders leads to improved compressive properties in all compositions made by both methods.

When comparing the cold-press and hot-press methods, the superiority in density and hardness of hot-molded materials is most striking. Using the relatively low temperature of 932 deg. F., completely dense alloys with a hardness comparing favorably with wrought metal are obtainable. Die life at such temperature is still reasonably long for high hot strength alloy steels. At the same time high strength and ductility are achieved if proper care is taken to make alloying effective. Possibly all these properties can still be improved if higher molding temperatures are employed.

The hot-press method offers definite possibilities for the production of certain solid bronze parts and bearings, where closest tolerances, high density and good mechanical properties or corrosion resistance are required. In the manufacture of porous parts, like self-lubricating bronze bearings, the conventional cold-press and sintering process has its established merits. However, the experimental results show that a porous bronze of the 90-10 composition with about 25 per cent porosity and a hardness of about 50 Brinell needs approximately 20 tons per sq. in. briquetting pressure against 2 tons per sq. in. or less when hot-pressed at or above 932 deg. F. At the same time the entire sintering and final sizing operation can be eliminated.

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The Pidgeon Process for Mg Production

DESPITE the success in producing metallic magnesium by the electrolysis of a molten salt, there were sufficient inherent objections to justify the search for a direct reduction method. Direct thermal reduction of magnesia offers many attractive features. It widens the choice of raw materials, relaxes the rigid electrolytic requirements of raw material purity, and by obviating direct current, offers simplicity of plant equipment. With this preface, Dr. L. M. Pidgeon and W. A. Alexander went on to describe the pilot plant development of the Pidgeon process which subsequently formed the basis of operation of six commercial plants—one in Canada and five in the United States.

Because magnesium, unlike aluminum, is volatile at relatively low temperature, they explained direct reduction methods can be used where they are impossible with aluminum.

The basic reaction is $MgO + X \rightleftarrows XO + Mg$. If X is non-volatile, the reaction may be forced to the right at high temperatures by the evolution of magnesium vapor, despite the large negative value of the heat of reaction which is almost bound to follow the use of any available commercial reducing agent.

The cheapest "X" is, of course, carbon, but this notable advantage is modified by the production of a volatile oxide CO so that both Mg and CO are evolved simultaneously. Elaborate devices are required to shock cool the equilibrium mixture in order to prevent back reaction. At best a pyrophoric powder is produced requiring redistillation to provide marketable metal. The practical development of this process is due to the work of F. Hansgirg and his methods have recently been given a trial on a grand scale in the plant at Permanente, Cal.

A second class of available reducing agents they said are those which produce non-volatile oxides. When XO and X are non-volatile, magnesium is the only volatile member of the sys-

tem. It may be evolved in a simple distillation step and condensed without the formation of powder.

Two basic requirements must be fulfilled in order that such a reaction may proceed:

1. The reducing agent when heated to a reasonable temperature in the presence of MgO must result in the production of an appreciable equilibrium vapor pressure of magnesium. This magnesium must be removed continuously.

2. A supply of heat must be maintained.

In order to fulfil (1), operations must be conducted in vacuo or in a stream of H_2. Owing to its greater efficacy and relative safety, vacuum was employed in the work they described.

The choice of a suitable reducing agent formed the subject of an extensive series of small scale experiments which examined the reactions between calcined dolomite, magnesia and calcined serpentine, and such reducing agents as silicon, aluminum, calcium carbide and calcium silicide. The greatest commercial possibilities were offered by the reaction between calcined dolomite and silicon in the form of ferrosilicon.

$$2CaO + 2MgO + (XFe)Si \rightleftharpoons (CaO)_2 SiO_2 + 2\,Mg + (XFe).$$

The availability of dolomite is an outstanding advantage. The lime forms a silicate in the residue thereby preventing loss of available magnesia by a similar reaction. Ferrosilicon was the cheapest reducing agent (in dollars per equivalent) of this type available at the time this work was initiated. Aluminum and aluminum-silicon alloys are chemically more attractive, but the former is too expensive in normal times, while the latter has been unavailable in commercial quantities and has yet to be produced as cheaply as ferrosilicon on an equivalent basis.

The reactants are solids and the residue remaining after magnesium vapor is evolved is a solid. Under such conditions, the ferrosilicon and calcined dolomite must be reasonably finely ground to permit the reaction to proceed to completion. From small scale experiments carried out at the National Research Council at Ottawa it was found that small briquets would react at reasonable velocities at a temperature of 2012 deg. F.

The difficulties of developing apparatus for conducting this reaction on a commercial scale are evident from the following requirements:

(a) Heating calcined dolomite and ferrosilicon in briquetted form to a reacting temperature and maintaining a supply of heat at this temperature sufficient to overcome the endothermic reaction.

James T. MacKenzie, chief metallurgist of the American Cast Iron Pipe Co., Birmingham, was this year's Howe Memorial lecturer.

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(b) Receiving a solid charge of briquets and discharging a residue of similar shape and form. The reaction zone must be in vacuo during the evolution of magnesium vapor.

(c) Removing magnesium vapor continuously and completely under non-oxidizing conditions.

(d) Condensing the magnesium vapor in a form capable of safe handling and ready conversion to ingots or other marketable form. The purity of the latter must be as high or higher than that of ingots already available by established commercial production methods.

Because of the problems presented, it was considered that a continuous apparatus was beyond the available technique and pilot plant research facilities.

That the reaction system must be loaded, unloaded, and evacuated, suggested a retort or autoclave, with the minimum number of openings heated at the closed end, with the open end protruding from the hot zone, water cooled and fitted with a vacuum tight closure. Such an apparatus may be loaded and unloaded as a batch operation, and may readily be evacuated. Since the magnesium vapor is condensed in the cool part of the apparatus soon after formation, all handling of this very reactive gas is obviated.

Early experiments with horizontal retorts were considered sufficiently promising to proceed with the construction of a large pilot plant. For the preliminary pilot plant, 8-in. heat resisting steel retorts with a wall thickness of ⅞ in. were chosen and such retorts have given nine months' life without collapse in full scale plant operation, while 90 per cent of the retorts were still in operation at 359 days. Later a 10 in. retort with a 1 in. wall was designed.

The calcined dolomite and ferrosilicon in briquetted form reacted in these retorts in vacuo at temperatures of 2100 deg. to 2120 deg. F., giving 70 to 80 per cent reaction of the silicon.

The metallic magnesium is deposited in a simple tubular condenser inserted in the cold end of the retort. A massive deposit of crystals is secured by correct condenser design and temperature. Alkali metals must be separated effectively from the magnesium since the admission of air will cause the hot alkali metals to ignite. Fire was generally transmitted to the magnesium crown resulting in partial or total loss. The crown of magnesium is pressed from the condenser and the latter is returned to the retort. Crowns may be melted to ingots with not more than 3.5 per cent loss. The magnesium is exceedingly pure, they said, Mg content being greater than 99.9 per cent.

The dolomite should be largely $CaCO_3MgCO_3$. Since high purity stones are of widespread occurrence, there would appear to be no need for considering a dolomite with a $CaCO_3$-$MgCO_3$ content lower than 97 per cent. Alkali metals should not be present in large concentration. For the ferrosilicon, a grade of 75 per cent was found to be the most economical to employ under existing market conditions.

At operating temperatures of 2100 deg. to 2120 deg. F. in a direct gas-fired furnace, a retort with i.d. 8 in., wall thickness ⅞ in., and composition 35 Ni 15 Cr steel has a life of at least 6 months. Heat resisting steels may be cast into retorts which may be made vacuum tight. Pressures of about 0.1 mm. Hg are required to produce good deposits. However, pressures below 0.5 mm. while they do not increase yields, do improve metal deposits. Pressures as low as 0.002 mm. Hg were tried without improvement in the yield.

With the high purity dolomites employed, over a limited range calcination temperature is not a vital factor in the reactivity of the charge itself. Calcination, however, does affect briquetting and therefore the process as a whole.

Particle size of calcine and ferro-

silicon was not found to be critical provided a reasonably fine subdivision is achieved. For ferrosilicon 65 mesh and 30 per cent—30 plus 100 and 30 per cent = 200 mesh for calcine are suitable. In general, grinding should be adjusted to facilitate briquetting.

Strong, dust free briquets of density in excess of 2.0 are most desirable. From experiments with two types of piston press the following observations were made:

1. Crystalline dolomite produced calcines more readily briquettable than the microcrystalline variety.
2. A wide range of particle sizes assists briquetting.
3. Precompression assists briquetting, and is, in fact, essential to some calcines.
4. Lubricants such as graphite did not improve briquetting when added in the small amounts permissible.

Retort output and silicon efficiency with different cycle times are to a certain extent inversely proportional.

Cycle time hr.	Si Efficiency per cent	24 Hr. Output* lb.	Lb. per 24 Hr. per Sq. Ft. of Hot Retort Surface
4	65	66.0	7.8
6	77	52.2	6.2
8	80	40.7	4.8

*Assuming 8-in. retorts holding 100 lb. of charge.

The externally heated retort, if fuel fired, permits the production of magnesium by the use of approximately one-half the electrical energy of the established electrolytic process, they pointed out, and this energy is a.c. and not d.c. This is shown in the table below where it is assumed that 1 net ton of 75 per cent ferrosilicon required 8000 kw-hr.

Silicon Efficiency per cent	75 per cent Si Consumed per lb. Mg Produced	Basic Power Kw.-Hr. per Lb. Mg.
65	1.21	4.84
70	1.12	4.48
75	1.05	4.20
80	.98	3.92

When dolomite is present in excess, silicon efficiency is highest but metal output per retort may be lower. The choice of an ideal ratio depends upon many factors and is beyond the scope of the pilot plant.

One Plant's Experience:

FOLLOWING Dr. L. M. Pidgeon's discussion of the pilot plant development of the ferrosilicon process, Andrew Mayer, chief engineer of the National Lead Co., New York described in a paper entitled "Plant for Production of Magnesium by the Ferrosilicon Process" his company's experience at its Luckey, Ohio, plant.

This plant was constructed at the request of the government and operated by Magnesium Reduction Co., a wholly owned subsidiary. Plant capacity was rated at 5000 tons of magnesium annually.

From tests made under Dr. Pidgeon's guidance it was found that the dolomite should contain not less than 21 per cent MgO and not more than 2 per cent acid-insoluble material. Second, the dolomite should contain less than 0.10 per cent sodium plus potassium in order to avoid serious fires caused by spontaneous ignition when the retort is opened.

The dolomite is calcined in coal-fired shaft kilns, and the calcine and ferrosilicon are ground and mixed. The mixture is then briquetted to an average density of 2.15 grams per cc. No suitable binder for the briquets has as yet been found and production of strong briquets, which are essential for efficient operation of the process, has been a difficult problem, Mr. Ware said, involving high power consumption and excessive maintenance costs.

These briquets are charged into tubular retorts of chrome-nickel steel which are set horizontally in a furnace with the open ends projecting outside the front wall. The furnace is fired by low-pressure velocity burners made by Surface Combustion Co. which are supplied with air at 20 oz. pressure. There are three zones of temperature control, one in the middle and one at each end. The temperature of each zone is controlled by a Bristol pneumatic indicating recording controller, which regulates the gas flow to the top burners. The bottom burners are adjusted manually when the furnace is started and thereafter the gas flow to them is virtually constant under normal operation conditions. The gas flow to both top and bottom burners is reduced automatically if the furnace temperature should become excessive and is shut-off automatically if the supply of 20-oz. air should fall.

Into each retort, five paper bags of briquets (225 to 250 lb.) are charged by hand and the retort fittings are inserted. After a "burn-off" period of 10 to 30 min., to reduce the proportion of combined water, the retort is closed and the vacuum is applied. Average time under vacuum is about 9½ hr.

Magnesium is liberated according to the reaction

$$2(MgO, CaO) + Si \rightleftharpoons 2\,Mg + 2\,CaO, SiO_2$$

The temperature of the furnace is so adjusted that the temperature of the retorts is 2130 deg. F. toward the end of the retort cycle. There is a slight rise in temperature when the retorts are opened, he explained, followed by a distinct drop upon charging. For the rest of the cycle, however, it remains fairly constant.

Average pressure in the furnace is 0.05 in. water and the air-gas ratio is adjusted so that the waste gases contain about 1 per cent oxygen. Each furnace consumes about 6200 cu. ft. of gas per hr. at the beginning of the cycle and 2800 at the end.

Cooling water is recirculated through the water jackets of the retorts at an average rate of 1 gal. a min. Water temperature and rate of flow is not critical but the jackets must be kept filled.

At the end of the 9½-hr. period, vacuum is broken and the retort is opened to remove the fittings and condensed magnesium. Most of the retort residue is discharged mechanically, a small remainder being hoed out by hand.

With a mix ratio of 28 lb. silicon to 80.6 lb. magnesia, 235 lb. of briquets will yield 31.5 lb. of recovered magnesium, making the silicon efficiency 65 per cent.

The magnesium deposit, in the form of a "muff" is driven out of the removable sleeve by a pneumatic hammer provided with a steel disk that fits inside the sleeve. These magnesium muffs are transferred to the melting and alloying department where they are melted down and alloyed by the usual methods.

A few lots of unalloyed magnesium ingots have been produced at the plant, Mr. Ware said, with the following typical spectrographic analysis: Copper, <0.005 per cent; lead, <0.005; iron, 0.003; nickel <0.005; manganese, 0.001, and silicon, <0.008.

Estimated life of the retorts has been estimated at about 250 days. In general, failure has been due to scaling and to cracks caused by "blowing up" after collapse had become extensive.

Additional Developments:

CONTINUING the discussion on the Pidgeon process, W. M. Peirce, R. K. Waring and L. D. Fetterolf of the research division, technical department of the New Jersey Zinc Co., Palmerton, Pa., called attention in their paper "Some Developments in the Production of Magnesium from Dolomite by the Ferrosilicon Process" to the major advantage of this ferrosilicon process which is that the retort is not cooled down

C. S. Barrett, Robert F. Mehl and Alfred Geisler (left to right) received the Institute of Metals award for "Aging in the Solid Solution of Silver in Aluminum." Dr. Mehl is now delivering the second of a series of lectures on metallurgy at the Escola Politecnica of the University of Sao Paulo, Brazil.

between charges. Earlier investigators, they recalled, had used apparatus that necessitated cooling and reheating of the retort between charges.

Although in his original work, Pidgeon briquetted the dry mixture of calcined dolomite and ferrosilicon in a plunger press under very high pressure, plans for commercial practice called for briquetting in a roll press. After several weeks of experimentation, no satisfactory dry briquets were made in any roll press available at the start of the investigation. This led to experiments with wet briquetting. Sufficient water was added to slake the lime and to provide excess water to give a plastic mix. The excess water was then removed by drying at 230 deg. F. and the water of hydration was removed by heating the charge to 1112 to 1292 deg. F. in an externally heated muffle. Excellent briquets were produced by this procedure and after several months' work, the following process was developed:

1. A mild calcination of the dolomite to yield a calcine that would hydrate readily.

2. Hydration of the calcine with about 12 per cent excess water followed by addition of the ferrosilicon and thorough mixing. This can be done in a heavy muller, a paddle mixer or a cement mixer.

3. Densification of the mix by passage through smooth, corrugated or briquetting rolls.

4. Briquetting of the densified mix by passage through briquet rolls exerting a pressure on the mix of about 2000 pounds per square inch.

5. Removal of free water from the briquets in a drier.

6. Removal of water of hydration and preheating the briquets in an externally fired steel tube. This tube was inclined at about 45 deg. and was 8 or 10 lb. in. in internal diameter. A tube of a larger diameter was tried and found to have a lower capacity because of the difficulty in driving heat to the center of the charge with the limitation in firing temperature imposed by oxidation of the silicon. The tube was fired at a temperature of 1562 deg. F. Use of a higher temperature had an adverse effect on the recoveries obtained in the subsequent reduction, presumably because of oxidation of silicon.

7. Charging the preheated briquets into the reduction retort.

A serious drawback to this wet briquetting process in commercial operation would be the low capacity of the externally fired preheaters. Heating in an internally fired rotary kiln was found to be simpler and cheaper than preheating in indirectly fired muffles.

Some dolomites were used in which part or all of the magnesia hydrated, resulting in a decrease in the density of the preheated briquet of about 1.7 to 1.3 grams per cc. Of the various remedies tried to retard magnesia hydration, the use of 1 per cent sodium chloride or calcium chloride was found to inhibit hydration partially. Further work on this possibility is in progress.

Production of usable briquets was tried with the Komarek-Greaves press which is a high-pressure roll press designed for briquetting dry materials. Even with this press, it was a difficult matter as this press works too near the limit of its capacity in handling the power input necessary to produce a briquet of good strength. The operating load must be limited to avoid excessive maintenance and roll breakage.

A number of interrelated variables influence the quality of the briquets, and the optimum values that are universally applicable do not exist for each of these variables. Important factors affecting briquet quality are the nature of the dolomite, method of calcining, size to which the calcine is crushed, method of operating the feeder and press, and the moisture and carbon dioxide content of the briquets. If the moisture and carbon dioxide content are allowed to be above 1 per cent in the briquets as they are charged into the retorts, they disintegrate during the reduction treatment. This disintegration becomes increasingly severe as the moisture and carbon dioxide content increase.

The addition of 1 to 5 per cent fluorspar to the dolomite prior to calcination profoundly influences the nature of the calcine and makes it possible to attain a briquet density of about 2.5 grams per cc., thereby permitting a proportional increase in the weight of briquetted material which can be charged to the retort, and under normal operations, with some dolomites may lead to an increase in magnesium yield of nearly 25 per cent. The fluorspar addition also makes the calcine less susceptible

to absorption of moisture and carbon dioxide.

The disadvantages of wet briquetting are the necessity of a hydration step, a preheating setup and a lower density briquet resulting in a lower charge weight in the retort. The advantages of this method are simpler and less expensive briquetting with high press capacity, production of a much stronger briquet of any desired size, freedom from disintegration of the briquets during reduction. The consequent absence of fines in the retort charge makes it feasible to obtain more complete utilization of silicon and to use a shorter reduction cycle.

The disadvantages of dry briquetting are a difficult and expensive briquetting operation with low press capacity, a relatively weak briquet of small size and a strong tendency to form fines in the charge due to the weakness of the briquets and to their tendency to absorb moisture and carbon dioxide. The presence of fines in the charge causes less efficient utilization of silicon and lower yields of magnesium per unit weight of charge.

The outstanding advantage of dry briquetting is the higher briquet density, which permits higher charge weights and greater magnesium yield per retort.

Earlier in the investigation, it seemed that taking all factors into consideration, the wet briquetting method was preferable. In view of the recent experience with very small dry briquets and particularly the discovery that dry briquet densities in excess of 2.5 grams per cc. can be attained by use of fluorspar, the investigators are inclined under most conditions to favor dry briquetting.

Reduction tests were made in a block of four individually oil-fired retorts. The retorts were of the standard 10-in. i.d. alloy-steel type with 5 ft. of their length in the heated zone. Each retort was connected to a Stokes mechanical vacuum pump of 28 or 50 cu. ft. capacity, so that individual operation was possible.

Charging of wet-process briquets involved handling hot preheated briquets at about 1292 deg. F. and these were weighted in buckets, deposited on a trough and pushed into the retort which was connected to the vacuum line immediately after charging was completed.

The silicon efficiencies obtained were 70 to 75 per cent in 7½ hr. at vacuum at 2102 deg. F. At a temperature of 2225 deg. F., silicon efficiencies of 78 to 80 per cent were achieved in 7½ hr. at vacuum. Under optimum conditions, comparable efficiences were reached with dry-process briquets.

Dry briquets were normally charged cold and were weighed out and charged in paper bags to facilitate handling and to avoid breakage. The retorts were left open for 15 to 25 min. prior to evacuation to burn the paper bags and any oil adhering to the briquets. Vacuums of 200 to 250 microns of mercury in 1 to 1½ hr. and final vacuums of 50 to 100 microns were considered to be satisfactory. These conditions were not obtained unless the briquets were low in carbon dioxide and water and the vacuum pumps in good operating condition.

From tests made in a special laboratory furnace it was found necessary to maintain a vacuum of 0.1 to 0.3 mm. in order to obtain a dense metal deposit in the condenser. With increased pressure the condensed metal becomes more porous, with the resultant tendency to burn and with increased losses during the subsequent melting step.

Many materials were tested in the laboratory reduction apparatus to determine whether their inclusion in the calcine-ferrosilicon mix might catalyze the magnesium reduction reaction. Of those tried only CaF_2 and MgF_2 showed catalytic effects. The addition of fluorspar up to 5 per cent substantially increased the magnesium yield.

Laboratory tests with aluminum powder, aluminum-silicon alloys and various aluminum scrap confirmed the advantage of aluminum over silicon as a reducing agent, as to temperature and time.

To get good magnesium deposits there must be good vacuum, freedom of the briquetted charge from volatiles like water and carbon dioxide, and good separation of the alkali metals which are contained in various amounts in the dolomite.

Vacuum Engineering:

THROUGH the use of high vacuum, the distillation or sublimation of many reactive metals such as magnesium can be done industrially at much lower temperatures, and hence in much simpler equipment, than was heretofore thought possible, W. B. Humes, director of research and development, reported in "Vacuum Engineering as Related to the Dolomite Ferrosilicon Process."

The main function of vacuum in the ferrosilicon process and hence in most vacuum smelting processes is to lower the temperature at which the metal may be rapidly distilled or sublimed from the reduction mixture. A secondary function is to protect the newly produced metal from attack by the furnace atmosphere and to permit the formation of a dense condensate.

In the ferrosilicon process, the metal is produced from a briquetted charge at a free air pressure of about 0.100 mm. (100 μ) of mercury. This low pressure is not needed for the reaction but rather serves to protect the metal vapor from the oxygen or nitrogen of the atmosphere and permits the formation of a dense condensate relatively free from sodium.

However, at pressures above 500 μ the metal yield begins to decline. This does not necessarily mean that the reaction is impeded by the high pressure. It may be that the magnesium vapor oxidizes upon formation and thus remains in the charge. Sight gas observations confirm the fact that actual burning of deposited magnesium occurs at pressures as low as 100 μ (1.0 mm.).

The effect of pressure upon the quality of the condensate has been clearly demonstrated. At pressures above 500 μ, a deposit containing relatively large quantities of oxide, nitride and pyrophoric dust is formed. If sodium and potassium are present, as in the case of most dolomites, these metals usually burst into flame and ignite the pyrophoric magnesium during the discharging of the retort. At lower pressures, a dense metallic crown is formed, low in impurities and difficult to ignite.

It has been found in plants using the ferrosilicon process that the economical temperature for alloy retorts is about 2150 deg. F. and that an 8-hr. cycle is optimum. Under these conditions, it is desirable to maintain an operating pressure of 100 μ or lower and to reach that pressure within 1 hr. from the time of charging. Vacuum pumps perform two functions: (1) To provide for the initial evacuation in which large volumes of gas are produced at relatively high pressures, and (2) supply pumping speed at low pressures for the remainder of the cycle.

During the construction of the magnesium plants, industrial diffusion pumps using both oil and mercury were developed for the process. These pumps, which have extremely large

gas handling capacities at pressures below 100 μ, must be used in combination with a suitable backing pump, such as a rotary mechanical pump. Steam jet ejectors have been employed successfully in one plant which used a small number of very large retorts. A long evacuation cycle plus the large unit vacuum system makes steam jet ejectors particularly applicable in this installation. When suitable protective devices are available, it is possible that they will receive wider use. It is probable that for future operations, various combinations of these three pumping means will be evaluated to provide maximum efficiency.

Most ferrosilicon process plants have used retorts 8 ft. long and 10 in. i.d., making a volume including the condenser space of about 6 cu. ft. Four of these retorts are connected to a manifold and operated as a unit. The time necessary to evacuate this volume is given by the equation:

$$T = \frac{VK}{D}$$

where T is the evacuation time, V the volume of the system, D the pump displacement in cu. ft. a min., and K a constant depending upon the desired pressure.

In the ferrosilicon process the evacuation time is approximately 2 min. since

$V = 24$ cu. ft.
$K = 8$ for .100 mm.
$D = 100$ cu. ft. a min.

Actually this condition is realized only when there is no impedance in the pipe lines between the vacuum system and the pump and no leakage or outgassing. In actual plant operations this has not been feasible and in many cases the pumps are placed at different levels from the retorts necessitating pipe lines approximately 50 ft. in length. It has been calculated that when pumps with high capacities in the lower range be used, either the pumps must be placed close to the retorts or large pipes must be used.

Although piping carries only a relatively small external pressure, it must be made extremely non-porous because of the tremendous expanded volume of a small leak at atmospheric pressure. Considerations of the leakage problem led to the use of welded piping and forged steel fittings. Threaded joints are treated with resins paints like "Glyptal." Rubber or composition gaskets are cleaned and wet with grease and oil before assembly. Lubricated plug valves, up to 6-in. pipe size, have been used with success, although care must be exercised with regard to the lubrication and the condition of the valve seat surfaces.

It has been found that new piping systems are best subjected to an initial pressure and "soap bubble" test, and that final tests can be made under vacuum. Where thermocouple gages are used, vacuum leaks may be detected by spraying the suspected point with autone or other volatile liquid or hydrogen. As the vapor or hydrogen leak replaces the air leak, rise in pressure is noted on the gage.

o o o

Basic Magnesium Enterprise

THE combination of electric power from the Boulder Dam, water from Lake Mean and magnesite ore in Gabbs Valley led to the initial proposal to erect a magnesium reduction plant in southern Nevada.

The process used by Basic Magnesium to extract the metal from the ore is the electrolytic reduction of magnesite, developed initially by the I. G. Farbenindustrie and operated extensively in England by Magnesium Elektron Ltd. of Manchester, C. J. Ball, chairman of the board, Magnesium Elektron, Ltd., England and vice-president Basic Magnesium, Inc., revealed.

The first stage in the reduction process consists of the preparation of the raw materials. The magnesite materials are finely milled and then mixed with certain proportions of coal and of peat moss. The peat is added to give porosity to the pellets and to provide for the more rapid action of the chlorine upon the magnesium oxide content. Magnesium chloride solution made in the recovery and neutralization plant is added as a binder. The mix is then briquetted and dried, and coked in oil heated rotary kilns. The coked briquets are then fed into a shaft furnace or reaction tower lined with special refractory bricks and heated internally using carbon resistors and electrodes. The solid charge rests upon a network of carbon blocks which are heated by their resistance to the passage of 3 phase a.c. As the briquets pass from top to bottom of the reaction tower or chlorinator, which operates at a temperature around 1832 deg. F., they meet a stream of chlorine rising from the bottom of the furnace. The carbon in the briquets acts as a reducing agent and the magnesium oxide is converted to absolutely anhydrous magnesium chloride.

The fused chloride is tapped periodically from the bottom of the reaction tower and fed into special electrolytic cells. Chlorination and electrolysis take place in one building in which, for the purpose of easy tapping and feeding to the cells, the chlorinators are located in a line along one side of the cell room. The exhaust gases from the chlorinators are washed and the resultant hydrochloric acid solution concentrated, clarified and neutralized with magnesium oxide to provide magnesium chloride solution used in the process.

Each unit contains eight chlorinators and 88 cells, the latter built in eight banks, each of 11 cells, with a capacity of 5600 tons a year.

Electrolysis of the fused magnesium chloride is carried out in electrolytic cells lined with refractory and insulating bricks to take care of the comparatively high working temperature. The electrolytic consists of a salt mixture which inhibits the tendency of anhydrous magnesium chloride to decompose when molten and favorably influences the conductivity, viscosity and specific gravity of the electrolyte.

Provision of electrode surfaces of maximum area and the maintenance of a fixed ratio between the depth of immersion of electrodes and their distance are essential combinations of maximum economy.

The cells are so designed as to allow the separation and collection of the chlorine by use of ceramic curtain walls of high density and of particular properties forming a part of the cell and built in between the parallel electrodes.

Cast steel cathodes and graphite anodes are used. The chlorine which is quite dry and concentrated, collects in the anode compartment, and is drawn off, filtered and recirculated to the chlorinators.

The cell is not externally heated, the electrical input of about 20,000 amp. being sufficient to maintain the temperature of the charge. The power consumption is approximately 9 kw.-hr. per lb. of metal. The magnesium metal collects at the cathode, floats to the surface of the melt and is dipped out every 24 hr.

Hand ladles are used to remove the molten metal and a fairly clean separation can be made between the metal and the fused chloride metal. Under normal operating conditions and with reasonably trained operators this should be more than 98 per cent pure.

This metal then passes to a refinery where it is either refined for sale as pure metal 99.7 per cent or better or alloyed for sale as one of the constructional alloys.

In the refinery the metal is first melted in large cast steel crucibles of 2-ton capacity; during this process Basic Melting flux is used to minimize local oxidation. When the charge is molten, the alloying additions are made—aluminum and zinc directly; the manganese being added in the form of manganous chloride. The charge is then refined with a refining flux, Basic E, which is stirred into the melt to carry down the suspended particles of chloride from the electrolysis metal and to remove the remains of the melting flux. The refined metal is then poured into a clean crucible and superheated under cover of refining flux at a temperature above 1472 deg. F. for over 15 min. The charge is then cooled rapidly to 1328 to 1382 deg. F. and poured either onto a continuous ingoting machine or into 300 lb. crucibles which are then poured off into extrusion billets or rolling slabs.

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Fluxes in Magnesium Refining

INASMUCH as all melting and refining processes for magnesium and its alloys require the use of fluxes, C. E. Nelson of the Dow Chemical Co.'s metallurgical department emphasized their unique characteristics and proper use in his paper on "Melting and Refining of Magnesium."

Four main types of melting were discussed: Open-pot; crucible; reverberatory, and die-casting. The open-pot method makes use of a flux having the composition 55 KCl, 34 $MgCl_2$, 9 $BaCl_2$ and 2 CaF_2. The flux provides protection during melting. It is stirred through the molten metal bath and agglomerates oxide or similar foreign bodies; then on quiet standing separates away, leaving the refined metal ball floating in an encircling layer of molten flux. It forms only a thin fluid film over the surface of the molten metal, which may be parted for hand ladling processes and tends to cover the metal again after the ladle is removed.

The open pot method is used generally in the following process: 1. Alloying and secondary smelting in the production of magnesium ingots; 2. in sand foundries for premelting and to a lesser extent for the production of small castings requiring hand ladling; 3. in permanent mold foundries for premelting and also direct ladling to castings; 4. for continuous methods of preparing metal in the production of billets or ingots from which wrought products are fabricated, and 5. in general scrap recovery.

For the crucible process of melting and refining magnesium, a flux is used that is thinly fluid at the start and then dries out or thickens to leave a protecting crust on the pot surface until the time of casting. Such a flux contains 20 KCl, 50 $MgCl_2$, 15 CaF_2 and 15 MgO. When pouring, the crust can be readily skimmed off or held back, so that the molten metal is not contaminated with the flux.

Crucible melting is used principally in sand and permanent mold casting as a single step melting, refining and pouring operation, or more commonly as a second step following the transfer to a casting crucible of molten metal from premelting units like large open pots or tilting crucibles. It is also used in the batch method of melting, alloying and pouring billets or ingots from which wrought products are fabricated and in the refining of die-casting scrap.

Successful experiments in melting magnesium in the resistor-heated type of Detroit electric rocking furnace led to further experiments with a reverberatory hearth furnace having a capacity of 1500 lb. of magnesium and using oil and gas as fuels. Based on these preliminary experiments, a furnace with a capacity of approximately 12,000 to 20,000 lb. of magnesium was put into use. This furnace has operated for about two years and during that time six more similar furnaces have been placed in service.

Below the metal line these furnaces are lined with a refractory that is relatively non-reactive with the fluxes and the magnesium. Linings with the longest service record are of Tercod, a carbon-bonded silicon carbide refractory having a carbon facing next to the metal bath. The walls and roof are of high-grade firebrick.

In operation the solid charge is fed mechanically into one end of the furnace onto a preheating shelf, from which it is pushed into the bath by the introduction of the next charge. Metal is dipped or pumped out of a well at the opposite end of the furnace.

Consumption of flux for melting magnesium in these units has been the same as previously was required for standard open-pot operation. Similarly the melting loss closely parallels that obtained in the more conventional methods of melting. Fuel efficiency is much better and would amount to about two-thirds of that used in open-pot melting. The outstanding feature of the open hearth operation, Mr. Nelson pointed out, is the very high melting capacity. The units in operation are capable of melting continuously at the rate of 4000 lb. of metal an hour.

Safety of operation is another notable feature, since the charging and preheating is all automatic and spatterings cannot reach the operator. Further, the likelihood of a runout is remote because the refractory construction is cold on the outside.

The field of use of the reverberatory, he continued, is in large-scale continuous melting of magnesium or alloy ingot or heavy scrap. In such a process it operates as a premelter for alloying or foundry operations. It is not considered suitable for the melting of fine magnesium or light scrap because of the difficulty of applying adequate mechanical puddling and the development of the large amounts of sludge or dross that accompanies the processing of these materials.

Protection during melting and holding is provided by the open-pot type flux. Ultimate refining of the metal is accomplished in open-pot or crucible process that follows.

The die-casting process makes use of a flux, 57 KCl, 28 $CaCl_2$, 12.5 $BaCl_2$ and 2.5 CaF_2, that gives no surface protection but is used only for refining the metal. Surface protection in this method comes from the use of a sulphur dioxide atmosphere, which is maintained in a closed dome over the pot. Only a very little flux is used as protection during melting down and this is stirred through the metal for refining. After a few moments of quiet standing, this flux together with agglomerated oxides and dross, sinks to the bottom of the pot and is removed with the sludge.

The melting and refining of die-casting scrap presents a special problem since a certain proportion of

carbonaceous materials, lubricants and other impurities are present on the scrap. Using the flux described for the die-casting process is not satisfactory as a reddish scum or film of the carbonaceous material seems to stay suspended throughout the metal. This behavior is eliminated through the melting of such scrap in open pots or crucibles using the crucible-type flux. This flux has the necessary characteristics to agglomerate the carbonaceous film and refine this material.

The melting and refining of crystalline magnesium, the product of the ferrosilicon-dolomite reaction, is somewhat difficult, Mr. Nelson said. It is finely divided and hence oxidizes readily. Furthermore, a variable and sometimes appreciable amount of oxide, nitrides and other impurities are occluded with the crystals. Because of these more care must be exercised during the melting of the crystals to use a fluxing technique that will not permit oxidation. Normally this is done by charging the crystals into a "heel" of molten metal purposely left over from a previous batch, or into a bath of melted flux in the bottom of the pot. Liberal quantities of the same flux are dusted over the solid charge and as often as required to prevent the start of oxidation. The crystals are puddled into the metal or flux bath as rapidly as possible. After the charge has all melted down, more flux is added and stirred thoroughly through the bath, in order to separate the oxide and dross inclusions.

If the crystals are particularly clean and free from oxide and other undesirable materials, it may be sufficient to proceed with the normal alloying processes, followed by stirring of the fluxes through the bath and finally settling out of the dross and sludge and pouring of the refined alloy into ingots or castings.

If the crystals contain a large amount of oxide, or appreciable oxidation takes place during the melting, it is desirable to allow a few minutes of quiet settling and then dip from the bottom of the pot as much of the dross and oxide as possible before proceeding to the alloying and refining steps.

The magnesium crystals usually are relatively low in iron content but may contain sodium, potassium, calcium and sometimes silicon as impurities. For all practical purposes, all except the silicon are removed by reaction with the flux in the melting and refining process. The iron content, however, will tend to increase up to the saturation value if melted in steel pots. The iron may be precipitated after the principal alloying materials have been added, usually by the addition of manganese to a saturation value for a temperature above that at which the metal is to be poured. When manganese is present up to its solubility value, particularly in the presence of aluminum, iron is greatly reduced in solubility or tendency to stay in suspension, and is rapidly precipitated to the bottom of the pot.

Manganese is introduced as manganese chloride or either Dow's No. 250 or 320 manganese flux, the former if the process is carried out in an open-pot and the latter if in a crucible.

The grain structure of magnesium and its alloys can be markedly refined by a superheating treatment of 200 deg. to 400 deg. F. above the melting point. In this behavior, it is considered to be much like cast iron, and the theories and hypotheses used for the explanation of the behavior of cast iron may be applied to magnesium with the substitution only of the alloy and the type of impurities.

Superheating effects may be obtained as low as 1500 deg. F. but the time required at this temperature is rather long, being several hours. As the temperature of superheating is raised to about 1700 deg. to 1750 deg. F., the time required to get the effect gradually drops off to approach zero.

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Bureau of Mines "Baby"—Electrolytic Mn

ELECTROLYTIC manganese production capacity in this country is approximately 5 tons a day, R. S. Dean, assistant director of the Bureau of Mines, reported in "The Present Status of Electrolytic Manganese and Its Alloys." It has been used in magnesium alloy bomb casings, stainless steel tests, by the Mint for new nickels and has been sent to England under lend-lease principally for addition to aluminum alloys.

Present practice, as carried out at the Boulder City project, starts with a manganese dioxide ore containing about 20 per cent manganese which is reduced to MnO. The MnO is dissolved from the ore in spent electrolyte which contains about 38 to 47 grams per liter of free sulphuric acid, 135 grams per liter of ammonium sulphate and 10 to 12 grams per liter of Mn as sulphate. In the leaching step the manganese is built back up to 32 to 36 grams per liter of Mn as sulphate; the pH is adjusted to neutral by gaseous ammonia and passed through thickeners. The electrolyte is purified by adding H_2S which precipitates the heavy metals. After filtering, ferrous sulphate is added to the solution and oxidized with air and the solution is filtered and clarified on a pre-coat filter.

The purified catholyte is electrolyzed in a diaphragm cell using stainless steel cathodes and lead-silver anodes. Current density is about 45 amp. per sq. ft. Current efficiencies of 60 to 65 per cent are regularly obtained. The brittle manganese is stripped from the cathode by bending. The stripping efficiency, in good weeks, has reached 94 or 95 per cent. The average for a year has been 82.5 per cent. The reduction step has been carried on satisfactorily in either a Skinner muffled-hearth furnace or a Taylor multitube furnace. With either, direct addition of oil is a satisfactory reducing agent.

The managanese is substantially pure, except for 0.03 to 0.07 per cent sulphur.

An interesting use of electrolytic manganese is in an age-hardening alloy of approximately 60 per cent copper, 20 per cent manganese and 20 per cent nickel. This alloy is being rapidly commercialized. Its hardening range (from 80,000 soft to 180,000 hard) and fatigue strength (60,000 lb. per sq. in. for 108 cycles) are substantially greater than that of beryllium copper.

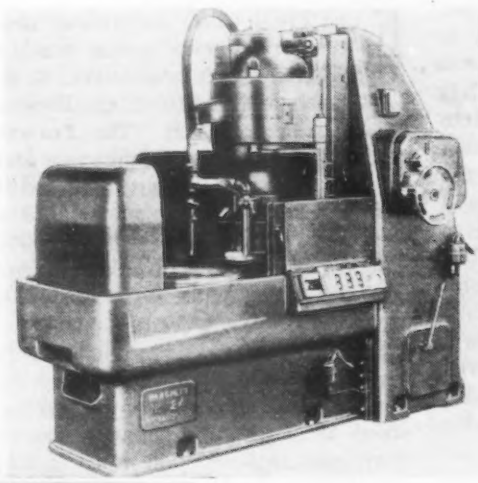
The price of electrolytic manganese has held back the demonstration and utilization on a substantial scale of its possible advantage in ferrous alloys. Experiments undertaken by the Bureau of Mines indicated a recovery of manganese in furnace additions to stainless steel of 87.8 per cent compared with 84 per cent for low carbon ferromanganese and for ladle additions 89.9 per cent, compared with 72.7 per cent for low carbon ferro. There was no measurable increase in the carbon or phosphorus content of the heat. Recovery of manganese was more consistent from heat to heat than when using ferromanganese and because of the convenience of handling, weighing and shoveling, electrolytic manganese and the smaller bulk and weight of the addition, the time required to prepare a heat for tapping is shortened.

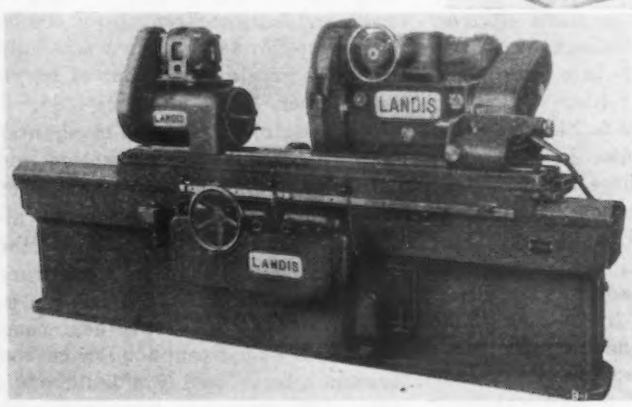
New Equipment . . .

Machine Tools

. . . Recent developments in production and tool grinders, boring mills, Swiss type automatics, gear shavers and other units are described and illustrated in the following pages. Other machine tool developments will be described next week.

THE wheel feed mechanism on the 10 and 14 in. Type CH plain hydraulic grinders put on the market by *Landis Tool Co.*, Waynesboro, Pa., has been redesigned. Accurate setting for the hand feed is provided by a large micrometer ring at the rear of the feed-up handwheel. Graduations on the ring are normally read in thousandths in terms of work diameter reduction, but a simple adjustment permits graduations to be read in "tenths." The wheel feed is automatically reset at the end of each grinding cycle without changing the position of the wheel feed handwheel. Hydraulic straight infeed, supplied only on order, retains the automatic wheel feed feature. Stroke of the infeed is adjustable from 1 to 3½ in. and slow feed from 0 to 0.120 in. on the work diameter. An automatic compensating device prevents changes in oil viscosity from influencing accuracy of feed. A hinged hood at the front of the wheel guard is adjusted inward as the wheel wears down. Smooth headstock face plate rotation is assured through anti-friction bearings and an all multiple V-belt drive. A wheel truing bar with micrometer adjustment is built into the footstock base.



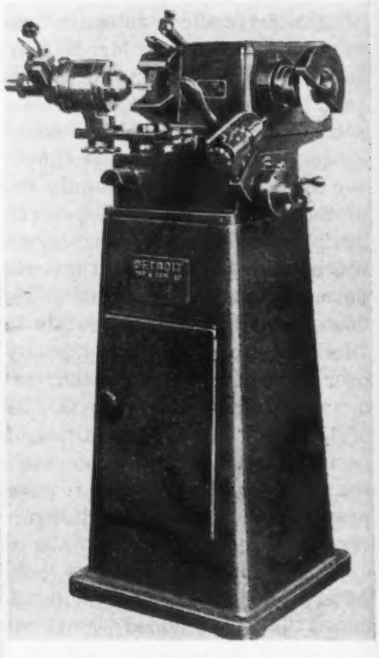


Surface Grinders

THE No. 24 vertical spindle rotary surface grinder has been brought out by *Hanchett Mfg. Co.*, Big Rapids, Mich. The structural proportions are said to be considerably heavier and stronger than conventional type machines of equal capacity. The 30-in. rotary magnetic chuck is equipped with a Neu-T-Rol demagnetizing switch and is traversed into grinding position by push-button control. The grinding wheel head has hand, power or automatic traverse with power being furnished by a 2-hp. 900 r.p.m. motor, while the coolant pump is driven by a ½-hp. motor. The grinder is equipped with an ammeter for determining the cutting action of the grinding wheel.

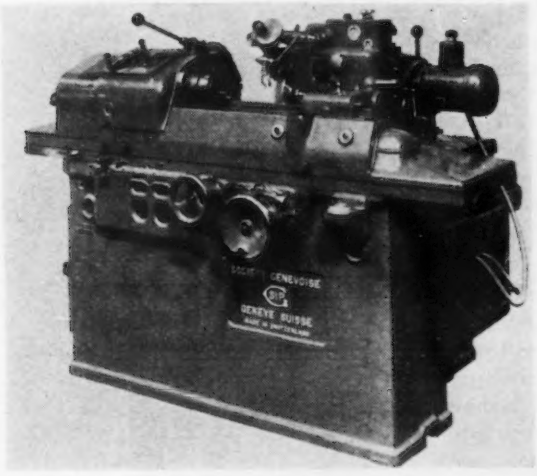
Tap Reconditioner

A NEW spindle head that accommodates interchangeably a wide range of motor types for various service voltages, phases and frequencies has been added to the tap reconditioner marketed by the *Detroit Tap & Tool Co.*, 8432 Butler, Detroit 11. Standard motors are 220 to 440 volt, 3 phase and 110 volt, single phase for either 25 or 60 cycle service. The spindle assembly is mounted on large dovetail ways in the pedestal base. The tap chamfering unit is of the precision collet type and will accommodate collets from the smallest machine screw size up to the 1¼ in. standard tap shank size, including long shank taper taps.



Precision Thread Grinder

THE RU-2 high precision thread grinder manufactured by *Societe Genevoise*, Geneva, Switzerland, grinds internal and external threads and is equipped with a micrometer stop which permits setting to 0.00005 in. Both wheel and work profiles may be inspected as to angle and radius by means of a microscope, which may be tilted out of the way. The wheel truing device is manually operated and has a dial gage reading to 0.0001 in. A temperature compensator permits variation of the pitch of the threads ground, to allow for the cooling effect of the coolant supply. The compensator works in conjunction with a device which automatically corrects for error in pitch of the lead screw. The external grinding wheel is 10 in.



in diameter, while internal grinding wheels are available from 1⅛ to 3½ in. in diameter. The grinder is being distributed by the *Cosa Corp.*, Chrysler Building, New York.

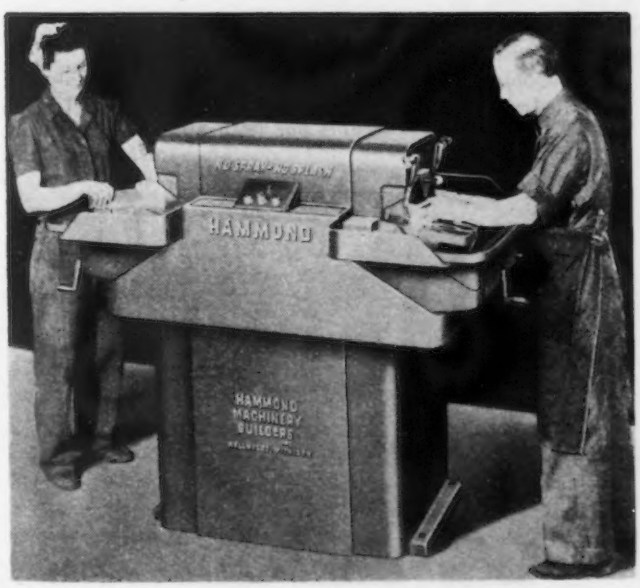
Carbide Tool Grinders

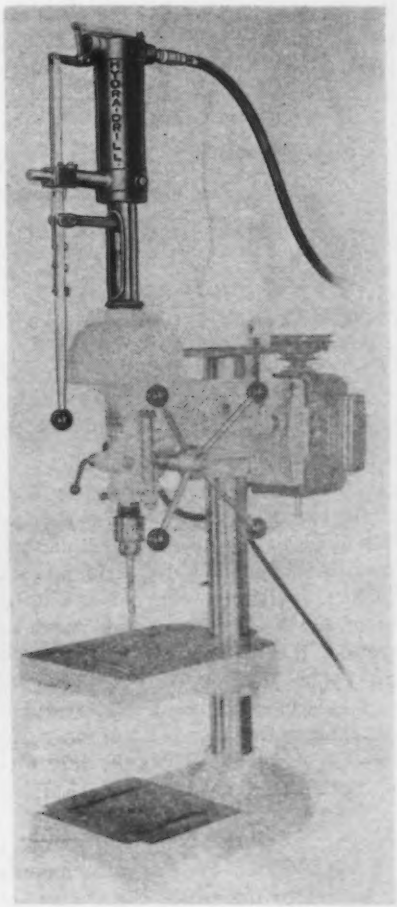
A NEW coolant control feature enhances the facilities for properly flooding the tool while wet grinding on the 10 and 14 in. carbide tool grinders built by *Hammond Machinery Builders, Inc.*, 1612 Douglas Avenue, Kalamazoo 54, Mich. Large splash pans around the table provide adequate protection to the operator and prevent coolant splashing onto the floor. A safety cup disk prevents the possibility of tools dropping into the well of the cup wheel. It moves in with the hood and table as the machine wears. A concealed, swivel no-splash guard on the wheel closes one side of the cup wheel while the other side is in use.

The company has also equipped its Series RW floor stand grinders for magnesium grinding with a multi-V-belt driven spindle, explosion proof electrical equipment, hinged wheel guards of plate steel with exhaust connections and spark deflectors, adjustable work rests, tool tray and removable water pot.

Vertical Turret Mills

A SPECIAL coolant system is available from the *Rogers Machine Works, Inc.*, 125 Arthur Street, Buffalo 7, for use on both the standard and high speed models of its 36 in. vertical turret mills. Two streams of coolant are delivered to the tool and the work through flexible tubing. The self-priming pump, driven by a direct connected fractional horsepower motor, is mounted on the base. The coolant is cleaned before being recirculated.





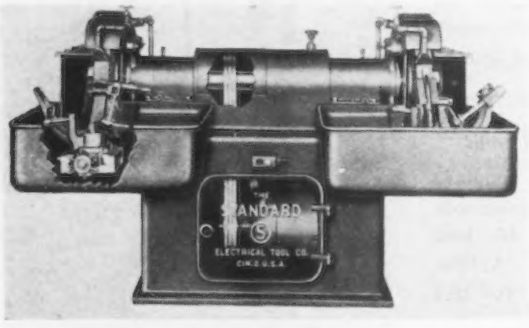
Drill Press Power Feed

A CONTROLLED automatic fully adjustable power feed for most makes and models of drill presses is being distributed by the *General Pacific Corp.*, 1800 South Hooper Avenue, Los Angeles 21. Powered by air, the Hydra-Drill is designed to automatically operate a drill press so that the customary hand feed is unnecessary for fast production work. Adjustable stops permit accurate adjustment for drilling, counterboring, spot facing, blind-drilling, reaming and other operations. The range of feed is infinite. Finger-tip control permits immediate release of the automatic feed. The rate of feed of the spindle can be adjusted so that the pressure of the drill on the work is right for any particular drilling operation regardless of the size of the drill used and the rate of speed at which the drill is operated.

Chisel Grinder

FOR grinding chisels uniformly, the *Standard Electrical Tool Co.*, 2490 River Road, Cincinnati 4, has introduced a heavy duty double end self-contained belted motor driven grinder. Twenty-inch diameter resinoid bonded wheels are mounted on a spindle operating at 1700 r.p.m. The wheels are

2½ in. face. The hoods or guards permit quick renewal of the grinding wheels. A tank fitted with motor driven pump with a capacity of 10 gal. per min. is mounted on the back of the machine. The chisel is secured in a quick acting holder which permits unskilled operators to accomplish a uniform finish on the chisel blanks. After the heel of the chisel has been ground, the attachment is swung 90 deg. to a position were the desired uniform cutting edge is acquired. The attachment is intended not only for grinding new chisel blanks but also for re-dressing used chisels.



Swiss Type Automatic

A NEW set of five attachments which increases the range of work that can be handled on the Wickman No. 2 Swiss type automatic is announced by the *Wickman Corp.*, 15533 Woodrow Wilson Avenue, Detroit 3. The three-spindle attachment, shown mounted on the machine, may be used for centering, drilling, reaming, threading or tapping. No. 1 spindle is non-rotating and is used for centering and drilling. No. 2 spindle may either rotate in the opposite direction from the machine spindle or be held stationary. It is used for drilling and reaming operations. No. 3 spindle over-runs the machine spindle for precision threading but it can also be held stationary and used for drilling or reaming.

The high speed drilling attachment, center, consists of a sliding head rotating in the opposite direction from the machine spindle. The threading attachment, at the left of the picture, employs a self-opening die head and consists of a hollow spindle with a sliding head that over-runs the machine spindle. The slotting attachment, to the right in the picture, is used to slot or mill the end of any part produced on the machine. An attachment is also provided for the making of long, accurate tapers by means of an accurately ground form bar.

Tapping Machine

A SERIES of light duty lead screw tapping machines has been announced by *Detroit Tap & Tool Co.*, 8432 Butler Avenue, Detroit 11. The LTM machines have a capacity up to ⅞ in. diameter and 14 pitch in mild steel. The tapping head and motor may be raised and lowered by a rack and pinion operated through worm gearing and may also be adjusted horizontally through an arc of approximately 90 deg. Multiple tapping heads can be applied. Interchangeable pulleys with V-belt drive are provided for changing spindle speeds through 64, 160 and 400 r.p.m. A multiple disk type clutch on the drive may be set by hand control to any degree of operating pressure.

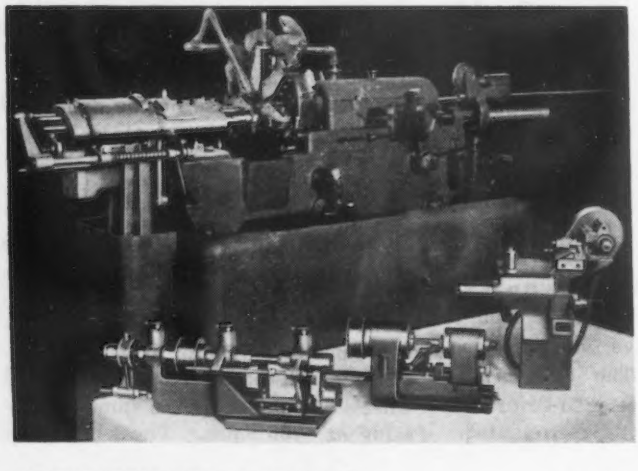
Band Filer

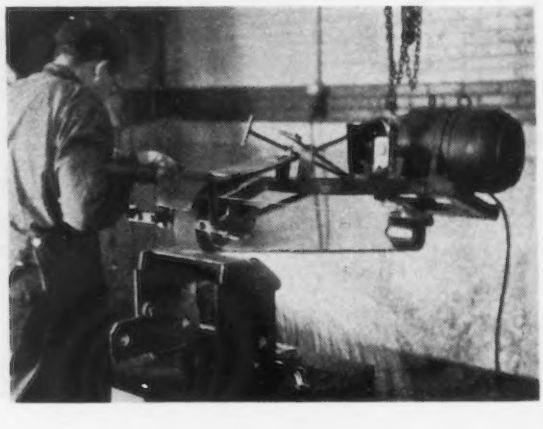
A CONTINUOUS band filing machine is offered by *Continental Machines, Inc.*, 1301 Washington Avenue, South, Minneapolis 4, for file broaching operations on metals, alloys, plastics, fibers and wood. It is claimed that smooth finishes with tolerances of 0.001 in. can be obtained by comparatively unskilled labor.

Twelve different types and sizes of file bands range from ¼ to ⅜ in. wide in ovals, half rounds or flats. Internal filing work is performed by unsnapping the file bands and threading through the work. The filer is equipped with Speedmaster infinitely variable speed pulleys to give any cutting speed from 50 to 250 ft. per min. All controls are conveniently located. A blower for removing chips is provided at the point of work.

Abrasive Belt Grinder

HEAVY duty Metalite cloth belts with smooth running Uniflow joints have been developed by the Behr-Manning Corp., Troy, N. Y., for use on swing frame grinders in place of solid wheels. It is claimed that with the abrasive belt, the grinder cuts faster and cooler, production is increased and grinding costs reduced. The belt is shown applied to the new Fox swing frame abrasive grinder. The unit has been applied to grinding welds and smoothing up armor plate.





Telechron Electric Timekeeper, Warren Telechron Co., Ashland, Mass.

The inside story of a clock

In the manufacture of this pre-war Timekeeper, many individual parts are made from brass. For example, the rotor units are produced from Free Cutting Brass Rod in an interesting high speed automatic operation which, using a five-turret lathe, counterbores, spots, drills, reams, forms and cuts off an endless stream of finished caps.

Revere Brass is used widely in the manufacture of watch and clock parts and in a wide variety of chronological and recording instruments such as fire alarm systems, telegraph mechanisms, ship chronometers, watchman call boxes, and the like.

In this particular manufacturing field, Revere offers a variety of tested materials such as Sheet, Strip and Roll Brass. Also Free Cutting Brass Rod in all standard sizes and shapes. Brass Sheet Stock is offered in various widths, gauges, lengths and tempers, in an infinite variety of combinations depending upon the alloy and characteristics required. Special finishes are available for many alloys and products.

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While primarily engaged in supplying Sheet, Strip, Rod, Bar, Tube and other mill products, Revere is also prepared to furnish a considerable number of fabricated semi-finished materials and parts not only in copper and copper base alloys, but also in magnesium and aluminum. Its intricate die-pressed aluminum forgings, especially as utilized by the aviation industry, are a case in point. If you have unusual technical problems involving the use of any Revere products, we shall gladly give you the benefit of our knowledge. Address Executive Offices. No obligation, of course.

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Assembly Line . . . .

STANLEY H. BRAMS

• 1944 truck program assumes final form as Army parcels out its cutbacks . . . Prices are worrisome to producers . . . Chevrolet multiplies aluminum forgings output.

DETROIT — The truck production program for 1944 appears finally arranged. But its details remain unrevealed at the time of this writing.

The Army has completed its scheduling of the cutbacks sought by WPB as the only means by which facilities could be made available for essential commercial truck production. Now that these cutbacks have been made, WPB knows how many units can be shifted to civilian channels. Assignments to individual companies will be on an historical basis, and WPB is now compiling past production statistics required to figure the 1936-through-1940 production averages which will provide the basis for forthcoming company quotas.

A few cutbacks of military truck requirements have already developed. The half-trac vehicle program undertaken by White, Autocar and Diamond T, as reported earlier in THE IRON AGE, has been all but eliminated. White announced that the cutbacks at its Cleveland plants where all the motors and many basic parts for these jobs have been produced, will reduce employment about 10 per cent.

The Dodge program is reported to have been cut sharply in recent weeks. An estimated 30,000 vehicles are said in trade circles to have been shaved from the company's 1944 schedules, representing probably a third of its projected work for this year. Company officials, however, stated that the cutbacks were considerably smaller than this. There were an indefinite number of layoffs.

Production of quarter-ton trailers for jeeps at Willys has been modestly reduced, but inasmuch as these units are built mainly of wood, the cutback will have little effect on steel ordering. Jeep output continues heavy at Willys, primary producer in this classification and, in fact, has recently been somewhat enlarged.

Now that the Army has settled fairly definitely on its 1944 program, cutbacks can be expected to arrive thick and fast during March. Thereafter schedules should be fairly firm, changing not so much as a result of policy but as a result of unforeseen turns, good or bad, in the war.

An interesting short-cutting of customary paper work is being pondered by the WPB Automotive Branch, it appears, as a means of expediting forthcoming commercial vehicle production. First step in this plan, trade circles say, may be the issuance of CMP allotments for 1945 vehicle production, covering work which actually is planned for 1944.

This plan's advantages deriving from that move are not entirely clear from the strict CMP interpretive standpoint. The aim would apparently be something radically new in the framework of the plan—the moving ahead of allotment numbers from one period to an earlier period. And after this was done, the one advantage gained would be the time cycle required for completion of the paper work.

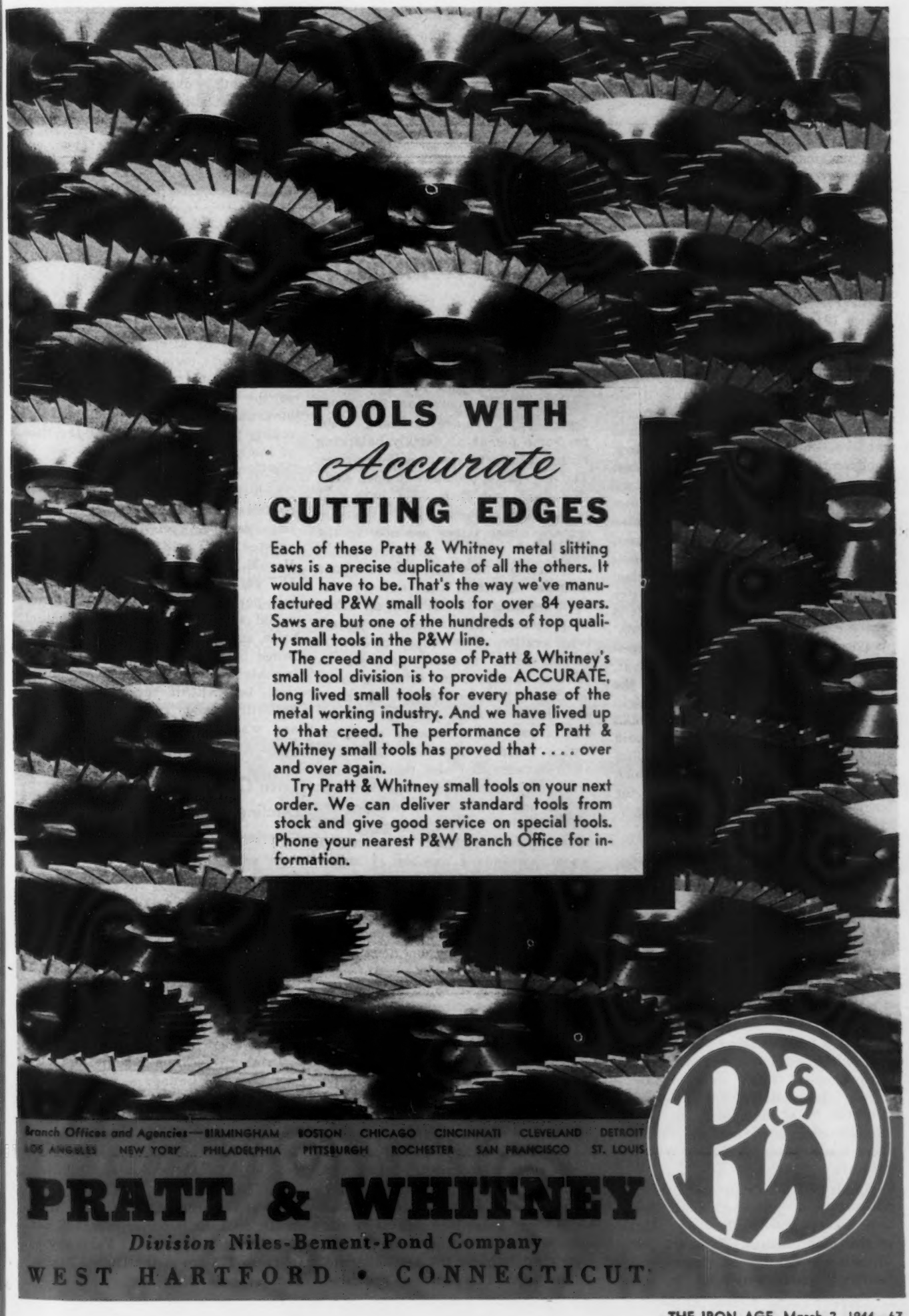
This equivalent advantage would derive even though the allotments could not be brought forward. In such an event, it would be conceivably possible for the claimant agency to duplicate, on new 1944 allotments, the information and details already developed for the 1945 allotments previously placed, reducing paper work time to a minimum.

AS room develops for commercial truck output, the attention of manufacturers is being concentrated more and more closely on the price problem. OPA has allowed Ford an increase of 11 per cent on the retail price of one truck model. Reo has been permitted price increases on five models, none of them notably different from the Ford advance.

Chevrolet has an application in for price increases straight through its line, but OPA as yet has made no decision. The rest of the industry, meanwhile, is awaiting the outcome of this application, figuring it will set a precedent for complete line price changes. Some competent sources within the truck industry believe that OPA's determination will be to permit price increases to the actual extent of labor and material cost advances—which would, of course, act to reduce the percentage of profit involved.

It appears probable that this uncertainty on prices is holding up distribution of 1944 commercial trucks to a vehicle-hungry trade. Approximately 3000 civilian models were completed during January, much more than were expected, primarily due to the cancellation of some rather minor Lend-Lease orders on jobs identical with ordinary civilian vehicles. The

PEACETIME STOVES: *In a Cleveland plant where armor plate for tanks was being turned out a year ago, gas stoves which meet pre-war laboratory requirements are now in production. They will reach the market sometime in March or early April. Grand Home Appliance Co. is making these units.*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Lend-Lease completions thereby became the largest part of the total of 3000 civilian completions. But these completions, like others, are rumored sitting idle awaiting determination of pricing policies.

Admittedly, OPA recognizes that manufacturing costs have increased notably, but the agency does not want to give ground too easily or too widely. This is proved by the size of the grants already made, all of them considerably smaller than the 25 per cent spread which manufacturers maintain really measures cost increases since 1941.

The truck companies are not so concerned over the immediate effect of prices as they are over the longer range aspects. With military truck production continuing, the producers might be able today to sell new trucks at levels very near the pre-war prices, and at the same time show a modest profit on them. But once the volume prop of war work is removed from the factories by cutbacks anticipated for later this year (not the current ones), then commercial truck manufacture could never be undertaken without substantially larger price tags. The manufacturers figure it is much easier to obtain those price concessions now, at the start of a program, rather than midway through it. The enlarged profits involved in the meantime would be quite definitely small. And the vehicle prices would mostly be right alongside prices paid in recent months for equivalent jobs built before the war began, on which $15 increments have been added for each of the 25 months since January, 1942.

PROGRESS reports tinged with significant post-war implications came out of the auto industry last week. Chevrolet Division of General Motors told that last year it turned out 76,000,000 lb. of aluminum aircraft forgings, making it the second largest producer in that field. In 1942, output was but 8,200,000 lb. Three plants put out most of this production, a fourth having gone into service only last November. Several hundred kinds of items were manufactured. In addition, Chevrolet cast 2,000,000 lb. of magnesium in its one foundry where eight different castings were made, all for Pratt & Whitney aircraft.

Amplex Division announced that its production of powdered metal products exceeds 250,000 lb. daily. Much of this manufacturing is in the form of self-lubricating, oil impregnated bearings, parts employed in more than 6000 different war applications. A small share of it is in a new product of interest—tool steel.

Where 3-lb. pieces represented a practical maximum size in pre-Pearl Harbor production, Amplex is now pressing big units weighing in excess of 100 lb. These are now handled on a Clearing hydraulic press, said to be the largest automatic briquetting machine in the world, put into service late last year.

o o o

Ore Price Increase Prior to Start of Shipping Deemed Vital

Cleveland

• • • **In order to start** promptly moving the 1944 merchant iron ore supply, which will constitute more than 25,000,000 tons of the season's projected ore quota of 93,000,000 tons, operators are pressing OPA for some means of quickly balancing rising cost factors with ceiling prices. The ore season promises to open early this year and it is held here that price relief is necessary to assist operators whose mines are now in the red.

Smarting under last season's poor financial showing, the industry has been working with OPA in an effort to present sufficient data to permit consideration of increased prices. A formal price increase proposal to OPA is imminent and promises to be on OPA's dockets between March 1 and March 10. This proposal will not only show that cumulative costs accruing since 1939 would warrant a price increase, but also that the final result of present labor wage demands may in addition require a further rise.

Cumulative costs, which have affected mine incomes in the past two seasons, include a number of intangible costs resulting from reduced efficiency, more extensive equipment repairs, higher operating supply costs, make-work policies imposed by the union, increased shipping costs, etc. Above and in addition to these costs the likely outcome of some 22 union demands, among which are increased wages and improved working conditions, promises to add as much as 50c. per ton to production costs of underground mines and probably no less than 15c. per ton to open pit mines.

Inasmuch as solution of the mine-union demands hinges on the outcome of the steel union case, it is expected that the ore industry will immediately propose a higher ceiling price under which its escalator clauses could operate. At the same time the industry will request the establishment of an adjustable pricing provision that would permit the sale of ore at an open quotation with the price to be confirmed after OPA has established a maximum ceiling price. This plan would permit retroactive billing of the differential between the new maximum ceiling price and whatever ceiling price was in effect at the time of the sale.

Best estimates of the ceiling price which the industry will request in consideration of present cost conditions vary between the formerly requested $4.75 and $5.00 per ton for Mesabi, non-Bessemer ore assaying 51.5 per cent iron, delivered at lower lake ports. While such a ceiling price would still not constitute the actual price, as ore often sells below the published price, it would provide a ceiling high enough to permit competition beneath it even with only presently known costs considered. If and when higher wages enter into costs, a further advance is indicated.

•

Lake Ore Consumption Declined During January

Cleveland

• • • **Lake Superior** iron ore consumption during January in the United States and Canada fell slightly below the total for December. In the United States, consumption was 7,291,607 gross tons in January as compared with 7,313,034 gross tons in December. Total consumption of Lake Superior ores for January was 7,481,653 as compared with 7,509,096 tons in December.

Total ore stocks on hand in the United States and Canada as of February 1 were 36,059,302 gross tons, with 30,746,228 gross tons on hand at furnaces, and 5,313,074 gross tons remaining at Lake Erie docks. Stocks a year ago were slightly better, totaling 39,742,766 gross tons.

Of blast furnaces depending principally on Lake Superior ores, 182 out of 196 were in blast as of February 1. Of these 175 are in the United States and seven in Canada.

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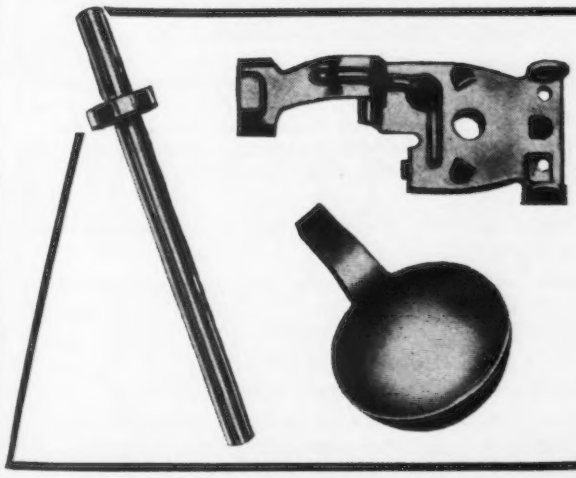
Or could you make use of personal assistance in the shop? If so, get in touch with your nearby Carpenter representative. You may be able to use his experience to lick a tough design problem, or simplify production methods to increase plant output. You'll certainly find it worthwhile to have a chat with him to discuss your Stainless Steel requirements.



It takes a wide range of Stainless properties *for the economical production of ladles for non-ferrous metals, switch parts and valve stems. The ladle must resist high temperatures, while the switch part is made from ductile Stainless Strip that makes possible intricate shapes and sharp bends. And still another Stainless is used for the long-wearing valve stem.*

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Washington

L. W. MOFFETT

• Socialized business battle not started yet ... Europe believed going economically left ... Agricultural agreement sets pattern for program ... Anti-trust laws can be by-passed.

WASHINGTON—The real battle between the conflicting concepts of socialized and private business has not even begun.

Preliminary skirmishes in the form of speeches and articles by private enterprise proponents have not yet touched the real issues that involve the fact that the machinery for socializing business is in existence, and that America will indeed have a hard time escaping socialism.

In this country there will be a great deal of resistance to more bureaucracy, more regimentation, and more planned economy. The Justice Department is relying upon the traditional American hatred of monopoly and pioneer principles of government and economics in its fight on cartels.

But the proponents of socialized business say that the last depression is proof that private enterprise has failed, that America has reached the crossroads where it must choose between international economic cooperation or economic isolationism.

Socialized "businessers" say that if the United States chooses the road of economic isolationism, socialization of industry will come quicker because of the demands of those who insist upon "full" employment which cannot be satisfied without setting up an internally planned economy. Furthermore, this philosophy says that international commodity or cartel agreements will stave off the degree of business control which will be necessary to gain "full" employment domestically, but that business must look for socialization either way.

WHO are these men? They are prominent individuals throughout the government. In the State Department, the Foreign Economic Administration, Congress, WPB, and the Commerce Department the thought is that even if private enterprise is not through in this country on account of its failure, and they are sure it has failed, the pressure of all foreign socialized economies after the war will prevent its continuance.

Competent business observers say that Europe is going to the left economically after the war because of the mighty influence of Soviet Russia. To Europeans, they say, victorious Red armies are proof that the Russian system cannot be so bad, and this will be a cogent argument to Europeans who may look to Russia for postwar help. It is considered inevitable that the ideas of socialized industry which already had a good hold on the continent will be spread further.

The British have told the United States flatly that unless this country enters into international commodity agreements with them, cartelize our foreign and domestic trade, and repeal our anti-trust laws, they will be forced to join with continental governments in a World Trade Alliance excluding the United States.

While the threat of economic sanctions is more irritating than fear-producing, the idea of being on the outs commercially with all the rest of the countries of the world has little attraction to cartel proponents. United States industry could compete with the rest of the world, but government would have to subsidize exports to maintain export volume, they say, and this would bring on socialization of business anyway.

The machinery for doing this is in existence. There is even a precedent for doing it in the wheat and sugar agreements entered into by the Department of Agriculture.

THESE agreements are pure cartels formed under the umbrella of close governmental supervision. Export quotas are set and penalties are provided for exceeding quotas, for importing from sources not sanctioned by the agreement, and for exceeding prices fixed by the agreement.

Congress approved the treaty permitting the formation of the agricultural cartels and consequently the Department of Justice is powerless to proceed under the Anti-trust laws. Moreover, if similar agreements were entered into with respect to steel, bearings, consumer electrical goods, or other commodities, the Clayton and the Sherman Acts would be by-passed.

The United States government proponents of cartelization point out that WPB with all of its regulations would have to be made a permanent part of the government. The Combined Raw Materials and the Production and Resources Boards would also be made permanent, and merged.

Industry advisory committees would be strengthened even as the Baruch report recommends, with representation granted to even the small producers. These committees would become trade associations, under the

DRAMATIC BREAK: *In bitter protest against the President's veto of the tax bill, Senator Alben Barkley (D.-Ky.) resigned Feb. 23 and is shown walking alone from the Senate Office Building. He was re-elected majority leader later last week.*

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Gunmix Gun, Model No. 1, designed to apply Gunmix to hot basic brick sidewalls in electric steel furnaces.

GUNMIX ...a unique refractory and a pneumatic gun for emplacement by air stream and water

● In Gunmix and the Gunmix Gun, Basic Refractories, Inc. offers another contribution to the art of refractories.

The Gunmixes—a series of basic, acid and neutral refractories designed for emplacement by air stream and water—represent just as great a departure from conventional refractory practice as was introduced 5 years ago with Ramix, the cold-ramming basic hearth refractory.

Gunmix refractories have these distinctive, outstanding properties:

1. High refractoriness.
2. Rapid coalescence with hot surfaces.
3. Ready adherence to vertical walls.

Gunmix Guns are specially designed for particular uses, with these features: simple design for ease of operation, low cost and maintenance.

The first Gunmix refractory, now in successful use, is a basic refractory intended primarily for maintenance of basic sidewalls of electric steel furnaces. Gunmix Gun Model No. 1, illustrated above, has been designed for this particular application. Other models will follow.

Many months in development, these new Gunmix refractories give promise of wide application in furnaces of many types. Your interest and your suggestions as to other possible uses for Gunmix will be welcomed.

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plan, and would provide the industrial know-how in making international agreements.

The Combined Production and Resources Board and the Combined Raw Materials Board would be thrown open to membership of all foreign countries, to form an international agency with powers to approve and amend such commodity agreements as might be entered into. The Boards would probably have strong State Department, WPB, and Commerce Department supervision.

Thus, the Department of Justice objections to cartels that they are private international agreements, affecting the entire public interest and mostly adversely during the war, would be overcome. The commodity agreements would be constantly under the government's eye.

THE Anti-trust laws would become a dead-letter. The combinations which have been formed during the war under exceptions to the Anti-trust laws would be permissible for all time after the war wherever advantageous.

It is generally conceded that at no other time in history has there been so wide-spread a concentration of industry, as has been fostered by the government during this war.

This concentration was thought necessary to obtain maximum war production. With conversion, the automobile, aircraft, electrical manufacturing, small arms ammunition, and a host of other industries, exchanged material, dies, tools, jigs, patents, methods, and even shared management skills. Everything short of actual merging of corporate identity has been done.

The formation of WPB brought together in the various industry divisions executives of all the competing parts of the different industries. And while these dropped their industry connections for the duration to serve the government's interest, the effect of their association might well further the cause of postwar concentration and combination of companies.

The industry advisory committees, together with the trade associations, have worked together in mobilizing America for war. Mr. Baruch has recommended that they assist in demobilizing America for peace. In this, WPB chairman Donald M. Nelson has publicly agreed.

Yet, both Mr. Baruch and Mr. Nelson are said to be opposed to the formation of cartels for transacting postwar businesss.

Which way are the dice going to fall?

"Bury Them Deeply"

• • • **"There is quite an extensive habit here (in Congress) of celebrating birthdays of the alphabetical set-ups. This is one place where there should be more funerals."—Rep. William P. Lambertson, Republican of Kansas.**

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Contract Termination Clause Amended

Washington

• • • **The Office of War** Mobilization uniform contract-termination clause for fixed-price war contracts, issued Jan. 8, was amended Feb. 24 to specify instances in which the contracting agency may elect not to use the article. The original directive conceded that there were instances where the uniform termination could not be applied and asked government officials to report any such instances. Study of such reports submitted prompted the inclusion of eight types of commitments on which exceptions will be permitted. These are:

1—Contracts for amounts less than $50,000 regardless of delivery date.

2—Contracts for amounts less than $500,000 providing for delivery within six months.

3—Letter of intent and other preliminary contractual arrangements that contemplate subsequent execution of form contracts.

4—Contracts of government departments, agencies, and instrumentalities of the government with states or subdivisions of instrumentalities thereof.

5—Contracts for purchase of material manufactured as a by-product or a co-product in an integrated operation from common raw material source in such manner that the cost of its manufacture is not susceptible of separate determination.

6—Contracts made in the name or on behalf of the government by contractors under a cost or cost-plus contract with the government for materials, supplies, or equipment required in construction of government-owned plants or facilities.

7—Contracts including pool orders and commitment contracts for production that provides that complete items produced under the contract and furnished to the government shall be paid for at a price intended to exclude profit.

8—Requirement or open contracts.

The uniform contract-termination clause allows full payment at contract price for all articles completed by the contractor on termination date and limits to 6 per cent the profit on articles begun but not completed. The articles of the clause will be used by governmental agencies and departments in all contracts executed more than 30 days after the publication of the article and accompanying article by the particular department or agency. The publication of these is to be as soon as practicable.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

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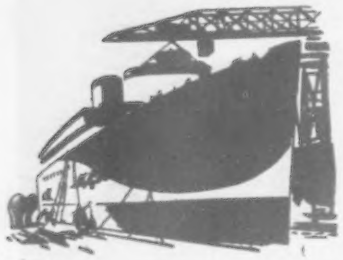
WEST COAST . . . OSGOOD MURDOCK

• Over 500,000 tons of steel a month now rail-hauled transcontinental . . . Geneva supplies plentiful foundry pig, but no plates before April . . . 43% of aircraft workers now women.



LOS ANGELES—Seven inches of tropical cloudburst drenched southern California, washing out bridges and highways and causing the ten-hour Daylight train to reach San Francisco 18½ hours late one day last week.

Col. Rufus W. Putnam for the Army Engineers took over management of the local municipal Department of Water and Power by order of President Roosevelt after a 10-day strike of 2500 AFL linemen, dispatchers, and service electrical workers, climaxed by flood damage and utility disruption, was shutting down air craft and warplants and demoralizing this metropolitan area.

On the tip of a patriotic independent service station operator in San Francisco, OPA investigators uncovered 640,000 counterfeit C-2 gasoline coupons, each good for five gallons, at a single private address. The long overdue sleuthing and investigation which is in progress uncovered black market and counterfeit operations on a grand scale, and fumbling, incompetence and lack of system or vigilance on the part of OPA rationing officials.

Such were the types of incidental distractions which last week impeded the well-known war effort and piled new complications on the overtaxed and harried transportation, housing, food and willing worker supply of West Coast industrial areas.

Pointing up again the staggering heavy materials load that the war has placed on western rail carriers is a tabulation from Interstate Commerce Commission records which show the iron and steel movement by seven principal rail lines serving the West Coast. Total figures are included for Southern Pacific's Lines, Union Pacific, Western Pacific, Santa Fe, Northern Pacific, Great Northern and the Spokane, Portland and Seattle, a joint operation of G. N. and N. P. between Spokane and Portland, and Portland and Seattle. These seven systems moved a total of 1,642,965 net tons of iron and steel classification products in 1940. Of this total 36 per cent was over the Southern Pacific, 22 per cent Santa Fe, 18 per cent Union Pacific and the remaining 24 per cent over the four other lines. The revenue for hauling this total tonnage was $9,715,608, or an average of $5.92 per ton hauled.

In 1942, two years later, the aggregate tons of iron and steel class products hauled had increased to 8,109,972 tons, a five-fold multiplication. In two years these rail lines were not only hauling five times the iron and steel tonnage but they were hauling each shipment two-thirds as far again on an average, as evidenced by the increased revenue per ton.

Of the individual carriers, Southern Pacific, Santa Fe and Northern Pacific quadrupled their gross tonnage. Union Pacific and Western Pacific handled six times their former tonnages and Spokane, Portland and Seattle hauled 12 times its earlier traffic. Great Northern's burden was five times increased.

When the figures for 1943 are finally tabulated and available, they will show additional staggering volume and still rising crescendo.

There are duplications in these tables, when freight was hauled by one of these seven carriers part way and turned over to another for the remainder of its routing. Traffic experts therefore figure that the carriers transported approximately 5,000,000 tons of iron and steel to Pacific Coast ports in 1942. Shipments averaged 42 tons to the car, to aggregate 1700 trains of 70 cars each, or nearly five trains per day, all in one direction.

During 1936 and 1937 iron and steel tonnage transported through the Panama Canal averaged 1,250,000 tons to Pacific Coast ports. The rails have therefore taken up all this "normal" tonnage and are carrying also the raw materials for new production on the West Coast as well as finished products for shipment trans-Pacific for Army, Navy, and general military and commercial supply.

FOLLOWING release of pig iron from allocation restrictions since February 1, West Coast foundries have been supplied with excellent quality foundry pig at ceiling prices from the Fontana and Geneva furnaces. Geneva No. 1 furnace has produced a steady 600 tons per day since Jan. 3 and No. 2 is now producing 400 to 500 tons per day. Nearly all first run is being sold for foundry use throughout the Intermountain and Pacific Coast area, the first provident domestic supply of pig ever available in this area.

It now looks like plates some time in April to those familiar with erection and installation progress at Geneva. Motors and cranes, which were holding up installations six months ago, are on hand as scheduled, but Mesta mill equipment is now the limiting factor.

THE aircraft atmosphere in southern California these days is clear and tonic. February production of the West Coast aviation industry is going to be up, way up, according to unofficial though authoritative predictions by those in a position to know.

Women continue to carry an increasingly important burden in maintaining and accelerating production. By the close of 1943 women constituted 43 per cent of the total production personnel of Pacific Coast aircraft plants. Average monthly employment of women in 1942 was 45,714, but by the first of the current year a total of 113,870 women workers were enrolled.

Even when 53.3 per cent of Douglas employees at Santa Monica voted for no union and 46.7 per cent voted for the CIO United Auto & Aircraft Workers in the recent run-off election, the issue apparently was not finally decided. This is Douglas' biggest plant, the original home plant, with well over 40,000 employees, the largest single aircraft operation on the West Coast. It is reported that 90.3 per cent of the eligible production employees voted. Comparison of the

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PROGRESSIVE *Kearney & Trecker Corp.*, Milwaukee, Wisc., reports the following savings by TOCCO hardening the above saddle clamp eccentric of their Milwaukee Milling Machine:

	FORMER METHOD	TOCCO
Heat treating	$ 0.721	$ 0.099
Straightening	0.752	0.000
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Total Cost	$ 1.573	$ 0.099

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In addition to this saving of $1.47 per piece, TOCCO made possible a switch from alloy steel to S.A.E. 1045 steel, saving $0.110 in material cost per piece.

Total saving on each run of 1375 pieces for this one part is $2,172.50.

Kearney & Trecker hardens a total of 138 different parts on one "TOCCO JR." machine. Output of some parts has been increased as much as 500%.

Output of the saddle clamp eccentric was boosted 144%—from 41 to 100 pieces per hour!

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vote in the final run-off with the election a week earlier indicates that a little over half of the 26 per cent who originally voted for AFL were for no union in the finals and only 47.7 per cent of the original AFLers were willing to be represented by CIO. Demand for a new election and charges of unfair conduct of the run-off have been filed with the NLRB by CIO.

CIO United Auto & Aircraft Workers point with pride to the new contract signed at the Douglas Vernon plant which they state is the best in the industry, guaranteeing merit wage increases, reviewing wages automatically every 16 weeks, providing an eight cent per hour shift differential and providing against discrimination.

At Consolidated - Vultee in San Diego, 74 per cent of the 7000 eligible white collar salaried employees voted as to whether the AFL Machinists would represent them, and 50.3 per cent were for the union, so that it became the bargaining agent by as narrow a squeak as is conceivable.

The first all-welded steel car barges ever built in the Puget Sound area have been launched at Olympia, for the Puget Sound Navigation Co. The barges were 100 per cent completed before launching. They are 264 ft. long by 42 ft. abeam. Each barge has three tracks and will haul 15 railroad freight cars at a time.

Now that 1943 aircraft production figures are all in and carefully computed, Aircraft Production Board has officially congratulated Consolidated Vultee Aircraft Corp. for having delivered more airplanes by number and weight than any other manufacturer. Convair's deliveries totaled more than 126,000,000 lb., including spares, compared with 115,000,000 lb. delivered by the second largest and 73,000,000 lb. by the third largest producer. The Consolidated contribution to total production was 12 per cent by number and over 16 per cent by weight. It further developed that the San Diego division of the company has the nation's highest output per man per day in the production of heavy bombers with an average of 8.2 lb. per man day. The national average was only 4.6 lb. and the second most efficient producer was 5.8 lb.

Steel Tight Through 2nd Quarter, Says WPB

Washington

• • • **While steel** is much easier and in adequate supply to fill all essential requirements, it will continue tight for the second quarter, according to WPB. This is the information now being given architects and engineers. They are being advised, however, that in designing new projects it would be more economical to use steel than to require the use of lumber.

Due to specific programs, it does not appear that there will be any easing of the steel situation generally until the third quarter.

With the demand centered on ship construction, plain structural materials deliveries have lengthened slightly to other buyers, including warehouses, although some tonnage is available in late March. This is due to pressure for steel for landing craft and may ease slightly next quarter. This is a possibility that first quarter shipments may be advanced somewhat, although this is dependent largely on the ship program, inasmuch as it is now impossible to validate any substantial construction project on which steel could be shipped before April.

Structural steel framing (except plate girders) may be permitted for buildings in which it would be the logical material to use. In general this is the case when the roof span is in excess of 40 ft. and the floor span is in excess of 25 ft. The structural steel designer is expected to develop designs requiring the least amount of material consistent with safe practice. When obtainable, used steel or steel available in idle or excess inventories must be used. Such steel is not a controlled material.

Nelson Report Shows Air And Land Craft Increases

• • • **Combat aircraft** and landing barges output showed a substantial increase for January along with other war equipment, according to a report by Donald M. Nelson, WPB chairman, on Feb. 23. The over-all production index, however, showed a 2 per cent slump from December to January.

The number of landing craft accepted for service rose 20 per cent in January. The number of planes accepted, however, fell from 8802 in December to 8789. Deliveries of merchant vessels fell off 40 per cent; guns and fire-control equipment were down 8 per cent; ammunition was down 6 per cent, and combat and motor vehicles were down 17 per cent in comparison with December. This program has been designed to slow down, but output of heavy trucks, which fell sharply below December levels, was disappointing. Completed war and navy-built vessels totaled 298,000 displacement tons, compared with 343,000 tons in December.

Industry Advisory Committees

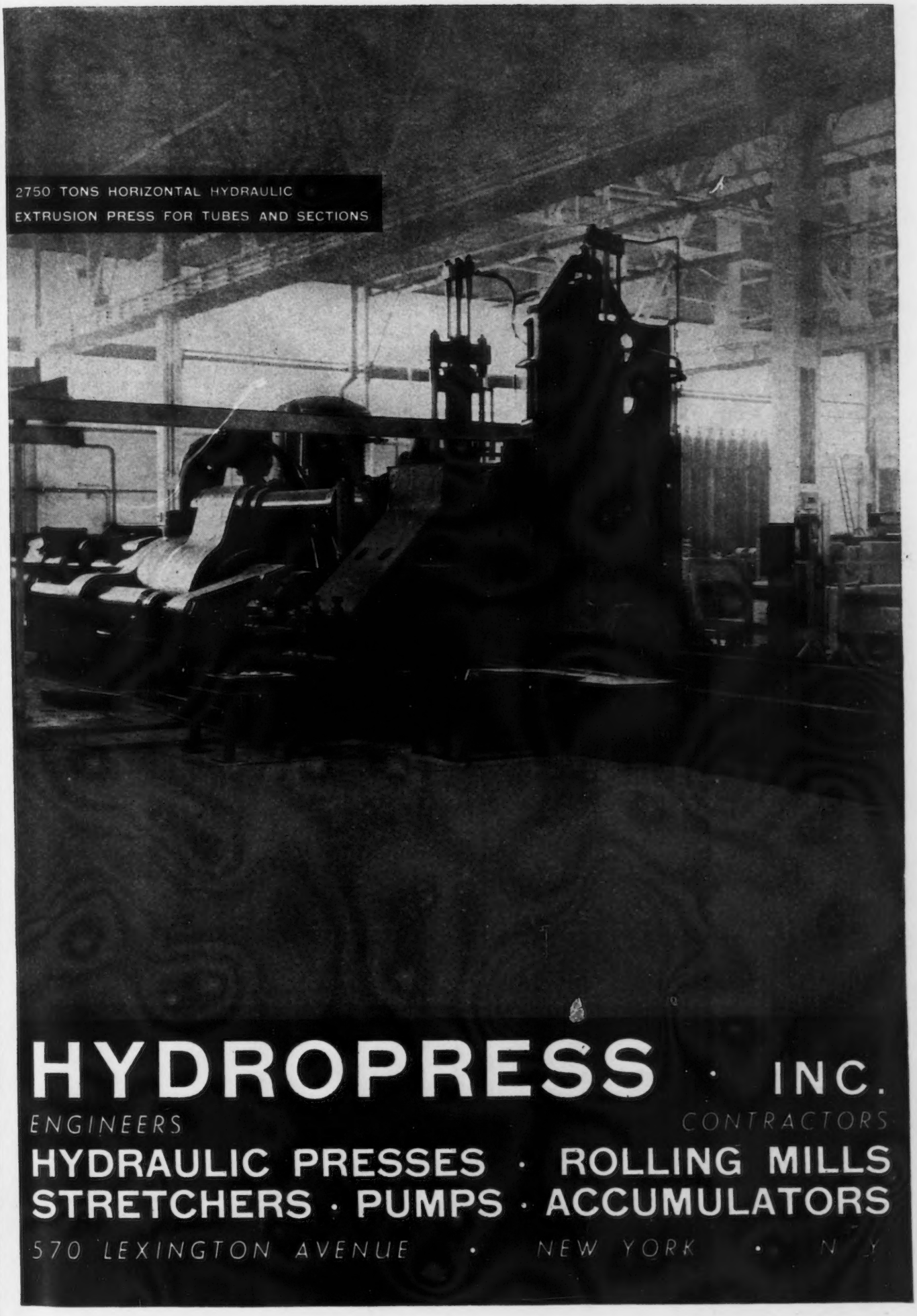
• • • **WPB on** Feb. 21 announced the formation of the Rolls Royce Merlin Aluminum Casting Industry Advisory Committee. Stanton W. Ballard, WPB Aluminum Division, has been appointed the government presiding officer. The membership is as follows:

D. W. Bay, Aluminum Alloys Corp., Detroit; Bruce Burroughs, National Bronze and Aluminum Foundry Co., Cleveland; N. Harold Boardman, Elmira Foundry Co., Elmira, N. Y.; B. A. Dollens, Delco-Remy Corp., Anderson, Ind.; L. D. Harkrider, General Malleable Corp., Waukesha, Wis.; Frank C. Howard, Howard Foundry Co., Chicago; Ed P. Haas, Metal Parts Corp., Racine, Wis.; Fred Maytag, II, Maytag Co., Newton, Iowa; Harry L. Smith, Aluminum Co. of America, Cleveland; Arthur B. Schnell, Aluminum Industries, Inc., Cincinnati; R. J. Roshirt, Bohn Aluminum and Brass Corp., Detroit; M. E. Van Riper, National Foundry and Machine Co., St. Louis; and Karl A. Stein, Acme Pattern and Tool Co., Dayton, Ohio.

. . . Cited for Awards . . .

• • • **The following** companies have been awarded the Army-Navy E award for outstanding war production:

Admiral Corp., Chicago.
American Red Cross, Blood Donor Center, Columbus, Ohio.
Brewer-Titchener Corp., Cortland Forging Division, Cortland, N. Y.
Bristol Brass Corp., Bristol, Conn.
Bryant Electric Co., Hemco Plastics Division, Bridgeport, Conn.
Cleveland Welding Co., Cleveland.
Detroit Gasket & Mfg. Co., Marine City Plant, Marine City, Mich.
Douglas & Lomason Co., Detroit.
Hercules Powder Co., Pluto Plant, Ishpeming, Mich.
International Silver Co., Factory "X," Meriden, Conn.
A. Johnson Machine Works, Brooklyn.
Maico Co., Inc., Minneapolis.
Metals, Inc., Berkeley, Cal.
North Carolina Finishing Co., Salisbury, N. C.
Roanoke Welding & Equipment Co., Inc., Oren Fire Apparatus Division, Roanoke, Va.
Ross Packing Co., Selah Plant, Selah, Wash.
Texas Long Leaf Lumber Co., Trinity Plant, Trinity, Tex.
Weirton Steel Co., Weirton, W. Va.
Charles D. Briddell, Inc., Crisfield, Md.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EXTRUSION PRESS FOR TUBES AND SECTIONS
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CONTRACTORS
HYDRAULIC PRESSES · ROLLING MILLS
STRETCHERS · PUMPS · ACCUMULATORS
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PERSONALS

• **D. M. Sheaffer,** Philadelphia, and **William A. Alfs,** Detroit, have been elected the new directors of International Detrola Corp., Detroit.

• **Harvey T. Hill,** has recently been appointed executive director of the Diesel Engine Manufacturers Association with headquarters in Chicago.

• **E. B. Scott** has been appointed to the position of sales manager of the engine division of the Enterprise Engine & Foundry Co. Prior to his promotion, Mr. Scott was manager of the repair and maintenance division.

• **Gordon K. Tollaksen** has been appointed purchasing agent of the Dumore Co. of Racine, Wis., to succeed **J. M. Hamilton.** Since June 1942, Mr. Tollaksen has been assistant purchasing agent.

• **C. G. Wollaeger,** who has been connected with war production for Milcor Steel Co., Milwaukee, has been made vice-president in charge of sales. He joined Milcor in 1926.

• **Fred T. Goes** has been elected president of the Vilter Mfg. Co., Milwaukee, succeeding the late William O. Vilter. **William B. Vilter,** has been made vice-president to succeed Mr. Goes and will continue as director of personnel. Other officers elected were **E. B. Tilton,** executive vice-president and treasurer; **E. F. Vilter,** secretary and **W. H. Wenzel,** assistant secretary.

• **W. H. Grinold** has been elected vice-president in charge of operations and **G. J. Griffin** vice-president in charge of sales of the Wallingford Steel Co., Wallingford, Conn.

• **A. H. Kean** has been made general manager of the Edward A. Lynch Machinery Co., Ardmore, Pa. He was previously with the Bridgeport Safety Emery Wheel Co.

• **J. B. Ribakoff** has been elected president of Reliance Steel Corp., succeeding **Sol Friedman,** who resigned as president and treasurer and disposed of his interests in the company. **Philip P. Brown** has been elected executive vice-president, and **I. R. Zwick,** treasurer.

• **Carryl A. Asher,** eastern sales manager and a vice-president, has been elected a director of Electro Refractories & Alloys Corp., Buffalo. He will continue to have headquarters at New Haven, Conn.

• **Philip H. Clapp** has been appointed abrasive division district manager for the Pacific coast by Norton Co. He will make his headquarters in Los Angeles. Mr. Clapp has been with Norton for 30 years and since 1935 has been district manager in Detroit.

• **E. M. Whalley** has been promoted to works manager of Pesco Products Co., Cleveland, a division of Borg-Warner; **Louis Matthews** to general superintendent; **Jay M. Roth** to director of engineering of pump and automotive departments and **John A. Lauck** to chief engineer of the pump department.

• **Vincent A. Sheals** has been appointed designing engineer of the cable engineering division of General Electric's Schenectady works, N. Y. **W. C. Hayman,** Mr. Sheals' predecessor, will be available as a general consultant.

• **Ray J. Cowden** has been appointed sales manager of Lycoming division of the Aviation Corp., in Williamsport, Pa. Mr. Cowden for the past two years has been contract and service engineer at the American Propeller Corp., Toledo, a subsidiary company.

• **C. B. Allen** has been transferred from Washington to the Detroit district of the Reliance Electric & Engineering Co., Cleveland, as an application engineer.

• **N. I. Mekell, Jr.,** formerly assistant manager, has been appointed manager of the grating department of Blaw-Knox division, Blaw-Knox Co., Pittsburgh. He succeeds **Elmer E. Brodhead,** former manager. Mr. Mekell in the past was a manufacturer's agent for steel products in the eastern zone.

• **Lyman D. Warner** has been appointed sales manager of the Crocker-Wheeler division, Joshua Hendy Iron Works, Ampere, N. J.

• **A. H. Freeman** has joined R. L. Orth in representing the American Foundry Equipment Co., Mishawaka, Ind., in the Detroit territory, filling the post vacated by the death of M. T. Mortensen.

• **L. A. Ver Bryck** has been made New York district sales manager for Pittsburgh Steel Co. Mr. Ver Bryck has been the company's Washington, D. C. sales representative since 1942. **W. F. Boore** has been made assistant manager of sales, Steel & Wire Products, at the company's general office in Pittsburgh. **J. G. Smith** has been made district sales manager at the Pittsburgh district sales office and **W. J. Meyer** will assist Mr. Ver Bryck.

• **R. C. Edgar** has been appointed personnel director of Allegheny Ludlum Steel Corp. He will have general supervision of all industrial labor relations, employment, safety and welfare departments.

W. J. FISHER, president and general manager of A. B. Farquhar Co., formerly A. B. Farquhar Co., Ltd.

R. C. EDGAR, personnel director, Allegheny Ludlum Steel Corp., Pittsburgh.

• **P. L. Dafoe,** who has been on leave of absence from his position as manager of the central division of Acme Steel Co., Chicago, has resumed his post after spending 15 months in the tank, automotive center office of the Chief of Ordnance, Detroit.

• **H. S. RuDesill,** for many years sales representative in the Detroit office of Rustless Iron & Steel Corp., Baltimore, has been appointed district manager.

• **E. C. Hetherwick** has been named vice-president and general manager of Haye Industries, Inc., Jackson, Mich. and will continue as treasurer. **William J. Donahue** was elected secretary and assistant treasurer.

• **J. J. Donovan** has been named regional manager of the Chrysler Airtemp New York office. Mr. Donovan will direct Airtemp sales and service activities in the greater New York area and New England. Since 1941 he has been associated with the WPB.

• **A. D. Robertson** has been appointed assistant manager of the motor division of Allis-Chalmers Mfg. Co. at its Norwood works, Norwood, Ohio.

• **F. G. Gepfert** has been elected chairman of the board of Black Industries, Cleveland, which is comprised of Black Drill Co., Black Boring Machine Co. and Mec-Rad Co. Consolidation of all executive offices has been made in the company's new building located at 1400 E. 222nd St., Cleveland.

• **T. C. Knudsen** has been named manager and chief engineer of the new Texrope department established by Allis-Chalmers Mfg. Co., Milwaukee.

• **Bert Conway** has been named vice-president in charge of manufacturing of the Aviation Corp. Mr. Conway's headquarters will be in Detroit.

• **W. F. Vosmer,** until recently an executive in the steel section of WPB in Washington, has rejoined Republic Steel Corp. as manager of railroad sales. In this post Mr. Vosmer succeeds the late **Emmett Conneely.**

• **T. B. Hale,** former domestic sales manager of International Harvester Co., Chicago, has been elected vice-president of general line sales, and in that capacity will supervise the operations of a newly designated general line sales department. **F. W. Jenks,** former manager of the company's credit and collection department, has been elected vice-president of merchandising services. Four new divisional heads under the new company setup are **R. C. Archer,** general manager, farm tractor division; **R. P. Messenger,** general manager, farm implement division; **H. T. Reishus,** general manager, industrial power division and **Neil Loynachan,** general manager, fibre and twine division.

Harvester also has promoted **M. J. Graham** from manager of manufacturing to assistant to the vice-president in charge of manufacturing; **A. J. Peterson,** formerly assistant manager domestic sales, to manager of the general line sales department and **F. B. Mattingly,** to manager of the credit and collection department.

• **Charles W. Olsen,** for 33 years district manager for the Carpenter Steel Co. at Hartford, Conn., will retire shortly. Mr. Olsen has completed 49 years of active service with the company. He is succeeded by **Wynn F. Rossiter,** who for 20 years has been associated with him on the New England staff of the Carpenter Steel Co.

• **James E. Sweeney** has been elected vice-president and director, and **Howard Hall,** a director, of Kropp Forge Co., Chicago. **Raymond T. O'Keefe, Jr.** has been elected vice-president of Kropp Forge Aviation Co.

F. G. GEPFERT, chairman of the board of Black Industries, Cleveland.

WYNN F. ROSSITER, district manager at Hartford, Conn., for the Carpenter Steel Co.

OBITUARY...

• **John F. Mitchell,** one of the organizers of the Mitchell Mfg. Co., Milwaukee, died Feb. 12 at his home there after a year's illness at the age of 67.

• **George E. Phillips,** general superintendent of production planning and control for Chevrolet Motor Division, Buffalo, died Feb. 12 at his home in Kenmore, N. Y. He was 51.

• **A. Edmond Park,** president of Flint & Walling Mfg. Co., Inc., died on Jan. 24.

• **George W. Thornburg,** founder of the Crescent Park Brass Foundry, Waltham, Mass., died recently. He was 64 years old.

• **Raymond M. Hughes,** assistant chief engineer of Great Lakes Steel Corp., Detroit, died recently. Before coming to Great Lakes Steel in 1929, Mr. Hughes worked for Youngstown Sheet & Tube Co., Republic Iron & Steel Co., and Trumbull Steel Co. of Warren, O.

• **Jesse J. Ricks,** chairman of the board of Union Carbide & Carbon Corp., died at his home in Plandome, N. Y., on Feb. 20, after a brief illness. He was 64 years of age. Mr. Ricks became chairman in 1941. He had been president from 1925 to 1941.

• **Samuel J. Reeves** president of the Phoenix Iron Co., Phoenixville, Pa., was killed in an automobile accident Feb. 18. He was 64 years old and a graduate of Yale University.

• **John J. Flanagan,** 50, vice-president and treasurer of National Mfg. Corp., Tonawanda, N. Y., died Feb. 18 in Chicago. His home was in Buffalo.

Fatigue Cracks . . . .

BY A. H. DIX

Draft Fodder

• • • "Why," we asked a manufacturer sitting opposite us in the diner the other night, "do so many defense plants seem to have so many more men than they need for the work?"

"Draft fodder," he said. "You hire a lot of extras so that in complying with your replacement schedule your basic working force won't be touched."

Retreat to the Farm

• • • With that out of the way we jumped to our other favorite topic of conversation. "What do you think would be the least painful way of scaling down the probable 300 billion dollar postwar debt bunion so that we can get our postwar feet into our postwar shoes?"

"I'm buying a little place upstate," he said.

Stopper

• • • "We make the Damnedest Looking Things! — *American Spring of Holly, Inc., Holly, Mich.*

If this company's telephone operator gets a cold in her head we hope it comes in December, as it would add to the Christmas spirit if she said, "This is Abericad Sprig of Holly."

Mine Host's Megalomania

Speaking of the craze for plurals, when I was in the Washington Statler hotel the other day the top item on the "Today's Events" bulletin board read, "War Manpower Commission—Continental Room."

—*E. O. Schott*

Audience Agog

• • • As a loving reader you will share our joy in learning that even though the number of publications fighting for a share of your reading time is greater today than ever before, our anemometer indicates that reader interest in your favorite family journal is right now at full gale proportions.

We suppose we will have to credit much of this to the brains department's cleverness and industry. But at least an honorable mention should be given to the fact that changes are so frequent that you can't keep your eyes off the scoreboard for even a week without running the danger of missing a play that completely reverses a given situation.

It would be untruthful to say that we do not still find people who are too busy to read and who will spend two hours proving it to you. But on the whole the big, more or less happy family is watching with record-high raptness the bulletins teletyped in from strategic points by the brains department's pulse-feelers.

Left Hand Drill

• • • Latest chapter in what is now a *cause celebre* — the left hand "drill" in the "Bull of the Woods" cartoon of Dec. 9 — is written by Richard F. Cleary, general manager of Strait & Richards, Inc., Newark 8, N. J.:

Those who say it is a helical taper pin reamer may have your technical editor, Frank Oliver, out on a limb, but the cartoonist, J. R. Williams is still stuck with a left hand drill, for the caption reads, "Here's a ***drill*** and here's a piece of iron—you just ***drill*** a hole in it. There's a million of 'em and a war on."

Or else he proposes to "drill" a million of 'em with a helical taper pin reamer and with a war on.

J. R. Williams started it and we will let him finish it. A clipping of this page is being sent him with a request to let us know why he drew the flutes running counterclockwise.

No Torch Carrier

• • • Mr. Williams is a machine shop veteran and his reason will doubtless be completely satisfying. But not all cartoonists are technically well-heeled. Take, for example, the cartoonist who illustrated the Grape Nuts Flakes advertisement on page 58 of the Feb. 26 *Saturday Evening Post*. "A pert little welder named Susie" has a hammer in one hand and a wrench in the other.

Torpedoed

• • • The Feb. 3 editorial ended up, "It will have been, as the saying goes, 'spurlos versank.'" Our friend Ingo Maddaus wrote that it should be *spurlos versenkt*. We said our German grammar held its hand over the head of *versank*. He says:

You looked up the wrong verb in **sinken**. In German the verb "to sink" has three equivalents, each with a different shade of meaning: **versenken, versinken, sinken.**

In English the last three words of the editorial would have been "sunk without trace," the German equivalent of which is **spurlos versenkt.** My authority is "Duden, Rechtschreibung der deutschen Sprache," a grammatical textbook in all German schools."

We say "Kamerad!"

Air Castle Bomber

• • • Thanks to a system devised by Oliver L. Johnson, the scholarly, fact-worshipping head of your favorite family journal's Department of Research, our editors know almost as much about you as the editor of a country newspaper in a 1000 pop. town knows about his readers.

He does it with punched cards — one for every subscriber. There's a hole for class of product, another for financial rating, others for kinds of operations, and so on.

This passion for exactness, while probably all right in its way, has robbed us of the fuel that warmed many a pleasant half hour's argument. If an editor ran across something hot on say pickling, we could spend at least thirty minutes discussing the extent of the audience. Now we have no excuse. It's exactly 18.3 per cent.

And two out of five do heat treating, better than half do production welding, 97 per cent have machine shops, two out of eleven do electroplating. In talking to a lacquer manufacturer an advertising ambassador of ours could paint a seven-color picture of the number of metal products makers who paint or lacquer their products. Now he is hogtied to a black and white 47 per cent.

We suppose that Johnson has pushed industrial journalism another square closer to the king row, but at the cost of a lowered wing flap on the flight of fancy.

Puzzle

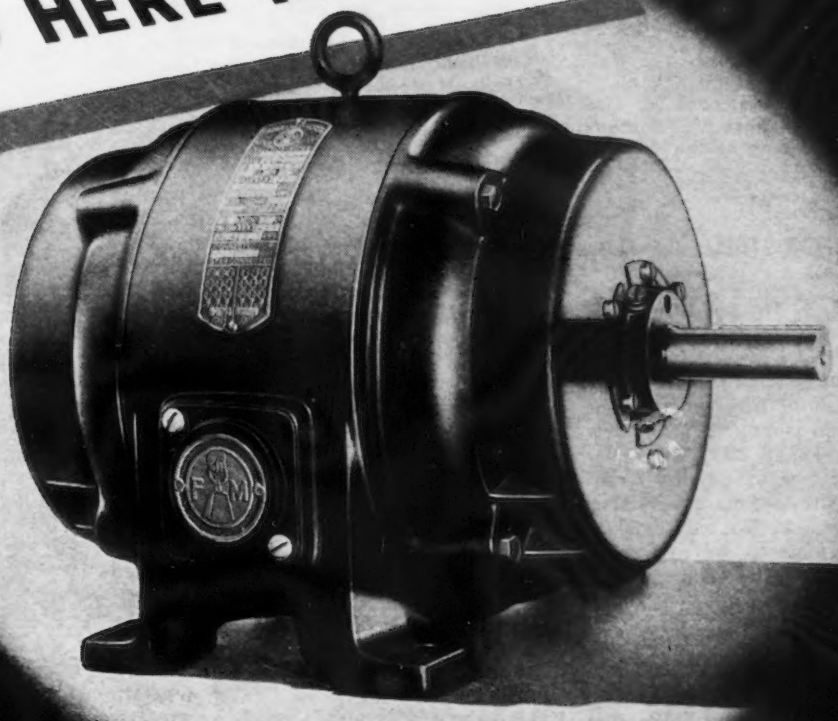
You can arrange last week's 3 nines to equal 20 this way: $\frac{9 - 9}{.9}$

Guy H. Colony complains about the answer of 18 days to the problem about the 21-ft. well with a frog that climbed 3 ft. each day and slipped back 2 ft. each night. On the 18th day he climbed 3 ft., bringing him up to 21 ft. He wrapped his front legs around the lip of the well so he couldn't backslide, and that was that.

Two minutes should do for this:

Stations A and B are 120 miles apart on a single-track railroad. At the same instant that a train leaves A for B at 25 m.p.h., a train leaves B for A at 15 m.p.h. Just as the first train leaves A, a fly flies from the front of the engine straight toward the other train at 100 miles an hour. On meeting the second train it immediately turns back and flies straight for the first train. So it continues to fly back and forth with undiminished speed until the collision. How far did it fly?

TOMORROW'S MOTOR IS HERE TODAY!



WITH *Copperspun* ROTOR

YOU can buy this new postwar designed Fairbanks-Morse motor now—*knowing* that it will be just as modern—just as efficient—just as up to the minute in years to come as it is today.

It is indeed a challenge to the future—in efficient motor design.

- It is a 40°C. motor.
- It is a protected motor!
- It has the most adaptable, convenient, and handiest conduit box you ever laid your eyes on!
- It has the famous Fairbanks-Morse COPPER-SPUN Rotor!

Important!

Never before has there been more stamina—more protection—more versatility built into a motor housing. A demonstration is necessary to fully appreciate how much this motor can really offer you. See it and judge for yourself.

Write Fairbanks, Morse & Co.,
Fairbanks-Morse Bldg., Chicago 5, Ill.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Motors

Dear Editor:

HIGH SPEED MILLING

Sir:

In what issue did your article "High Speed Milling" appear?

A. M. HARRINGTON,
Treasurer
Harrington Co.,
17th & Callowhill Sts.,
Philadelphia 30

● Oct. 14, 1943, issue, page 74. See the Dec. 9, 1943, issue, page 75, for the report of the ASME meeting on this subject.—Ed.

NO GLUE FOR STEEL

Sir:

Your Jan. 27 Dear Editor page reported that the United States Plywood Corp., New Rochelle, is a source of a glue for gluing steel to steel.

As a result of this remark and an earlier similar comment in the Oct. 21, 1943, issue (page 33), we have received a flood of inquiries from all over the country. This is very flattering to IRON AGE, but extremely embarrassing to us as we are not prepared to furnish any such glue or adhesive. . . .

CHARLES B. HEMMING,
Chief Chemist
United States Plywood Corp.,
Beechwood Ave., Second St.,
New Rochelle, N. Y.

● Our apologies to United States Plywood Corp. for placing it among those manufacturing metal-to-metal glue. Two correct sources are U. S. Stoneware Co., Akron, Ohio, and B. B. Chemical Co., Cambridge, Mass.—Ed.

MACHINE HYDRAULICS

Sir:

In your Feb. 17 Dear Editor page, Knox A. Powell, of Minneapolis-Moline Power Implement Co., inquired for a textbook on the operation, maintenance and repair of hydraulic systems as applied to machine tools.

The Henry Ford Trade School, Dearborn, Mich., has compiled and published a very complete book entitled, "Hydraulics As Applied to Machine Tools." The cost is 75c. Orders, accompanied by payments, should be sent to the School.

To my knowledge this is one of the most complete books on the fundamentals, maintenance and repair of hydraulic pumps, accumulators, intensifiers and special control valves that has ever been compiled for shop use.

H. C. SPROULE,
Hydraulic Sales Engineer
Lake Erie Engineering Corp.,
727 Nicholas Bldg.,
Toledo 4, Ohio

BERYLLIUM COPPER

Sir:

Please send us three reprints of H. G. Williams' article, "Predicting Spring Performance of Beryllium Copper Wire and Strip." This appeared in your July 8 issue.

O. O. BROPHY,
Engineer
American Mining & Research Co.,
Eagle and Lawrence Rds.,
Upper Darby, Pa.

● Reprints can be obtained from H. G. Williams, Instrument Specialties Co., Little Falls, N. J.—Ed.

BORON ELECTRODES

Sir:

Your Feb. 3 issue has a very interesting article, "Boron Treated Electrode Coatings Aid Cast Iron Welding," by Dr. J. A. Neumann, Director of Research, American Agile Corp. Will you please give us the address of this company?

FRANK P. JACOBS,
Chief Engineer
National Radiator Co.,
Johnstown, Pa.

● American Agile Corp. is at 5806 Hough Ave., Cleveland.—Ed.

CENTRIFUGAL CASTING

Sir:

Some of our people here have heard that you have a report on the centrifugal casting process as used by Ford of Canada. Can you tell me in what issue this appeared?

L. J. WISE,
Ass't to Exec. Vice-Pres.
Chicago Malleable Castings Co.,
1225 West 120th St.,
Morgan Park Station,
Chicago

● Dec. 2, 1943, issue, page 54.—Ed.

CONTINUOUS CASTING

Sir:

Kindly send us a reprint of T. W. Lippert's articles in your April 4 and April 11, 1940, issues on the subject of "Continuous Casting."

FRANK R. KEMMER,
Asst. to President
Reynolds Metals Co.,
2827 Hale Ave.,
Louisville 1, Ky.

● See also the comprehensive study of this subject in last week's issue, page 48.—Ed.

ISOTHERMAL QUENCH

Sir:

We would like to obtain one copy of "Isothermal Quench Baths Applied to Commercial Practice" by Harold J. Babcock, as published in THE IRON Age on Feb. 3 and 10.

A. S. JAMESON,
Works Metallurgist
International Harvester Co.,
West Pullman Works,
1015 West 120th St.,
Roseland Station,
Chicago

● Reprints can be obtained from Ajax Electric Co., Inc., Frankford Ave. and Delaware Ave., Philadelphia 23, Pa.—Ed.

"BIG INCH" BREAKS

Sir:

In one of your issues within the last two or three months, we recollect seeing an article which referred to a break in the "Big Inch" pipe line. Could you tell us in which issue this was?

W. E. BANNERMAN,
Asst. General Manager
Page-Hersey Tubes, Ltd.,
100 Church St.,
Toronto

● See page 97, Sept. 9, 1943, issue for the item "'Big Inch' Breaks Are Not Excessive."—Ed.

ARC WELDING DATA

Sir:

About one or two years ago you had a series on "Standard Data for Arc Welding Operations." I understand this was developed by Westinghouse. I am desirous of obtaining three reprints.

W. T. DuRELL,
Time Study Engineer
Ceco Steel Products Corp.,
Cicero, Ill.

● The series, "41 Lessons in Arc Welding," by Westinghouse, appeared in our issues of Feb. 20, Feb. 27, Mar. 6, Mar. 13, Mar. 27, Apr. 3, Apr. 10 and Apr. 17, all in 1941. Reprints are being sent you.—Ed.

ENEMY PATENTS

Sir:

We are very much interested in your weekly publication of enemy patents available from the Alien Property Custodian and as a result obtained from the APC a complete list.

We were rather surprised to find that the description in the APC list does not give anywhere near as much detail as yours.

Would you be kind enough to advise us where you secured the extra information? We presume that you did not go to the trouble and expense of searching the records of this number of patents in the patent office.

C. H. McL. BURNS,
Postwar Planning
Otis-Fensom Elevator Co., Ltd.,
Hamilton, Ont.

● We examined each of the seized patents on file at the Office of Alien Property Custodian, New York City, and prepared a thumb-nail description of each. For the current list see page 102.—Ed.

SIMULTANEOUS PLATING

A method of electroplating three metals simultaneously is mentioned on page 47 of your Feb. 3 issue. It was developed by Westinghouse engineers. We would appreciate receiving information as to which division of Westinghouse was responsible.

H. L. HOVIS,
Works Chemist
Hamilton Watch Co.,
Lancaster, Pa.

● Write to H. B. Blackmon, Public Relations Bureau, Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.—Ed.

5 REASONS WHY INDUSTRY LOOKS TO MUEHLHAUSEN FOR LARGE, HOT-COILED SPRINGS!

Controlled atmosphere conveyor type furnace

Complete magnafluxing and magnaglow facilities

Conveyorized enameling and baking speeds output

Specialized facilities enable Muehlhausen to produce springs:

— of any design
— to close tolerances
— in large quantities
— for quick delivery
— of lasting efficiency

One entire plant devoted to hot-coiling—conveyorized for volume manufacture—with control laboratory an active part of production—quenching tanks of swimming pool size—skyscraper-like shot blasters for clean, lustrous finish and added life to springs. A letter will place Muehlhausen engineers at your service—to save you time, cost and effort in obtaining the *right* spring. New, illustrated booklet on hot-coiling springs now available. Muehlhausen Spring Corporation, *Division of Standard Steel Spring Company,* 817 Michigan Avenue, Logansport, Indiana.

To improve product performance, use

MUEHLHAUSEN Designed SPRINGS

Hydraulic Load Tester

Precision hot-coiling springs on automatic equipment

This Industrial Week . . .

- ***Facing Record Needs, Steel Industry Drives to Lift Output***
- ***Clayton Pitches into Intricate Surplus Property Problem***
- ***Two Strikes Cause Loss of at Least 33,000 Tons of Steel***

STRIVING to push production a notch or two above recent high pressure levels, the steel industry is making a good start against March goals which include record requirements that will tax every plate mill in the nation.

Production executives have their fingers crossed concerning unforeseen hurdles such as labor disputes and equipment breakdowns. Fortunately two serious strikes were ended a few days before March began but not before 23,000 tons of steel, 14,000 tons of pig iron, and 14,000 tons of coke had been lost due to the strike at the Carnegie-Illinois Clairton by-product works while at least 10,000 tons of steel were lost in the strike at Great Lakes Steel Corp., Ecorse, Mich. These disputes were the big factors in forcing last week's ingot rate down to 93 per cent. The national rate this week is estimated at 96 per cent.

Meanwhile, the volume of orders reaching steel companies shows little slackening. Plates, sheets, and shapes this week are tighter, while heavy bars, small size lapweld pipe, and other items are in brisk demand. Requirements reflect the fast tempo of the invasion program with its careful planning for every eventuality.

REQUIREMENTS for the Navy's 1945 pontoon program, for which bids on steel are imminent, may be as high as 180,000 tons, including sheets, plates, floor plates, bars, and structurals. Two Army Ordnance packaging programs are under consideration which potentially involve requirements of hot rolled sheets, as previously reported, and black plate, respectively. The fact that new programs are being discussed which would further burden the already over-extended flat rolled production facilities (hot rolled sheets are now into September) has led to speculation that perhaps the War Production Board silently expects that military events will allow cancellations of heavy tonnages now on the books.

Testifying to the awesome proportions of the excess war property disposal problem was the quick action by the administration in appointing William L. Clayton last week as head of the new Surplus War Property Administration (a job which the Baruch report says will affect the well-being of this nation and also that of the civilized world). Clayton is making no hasty statements but has already held many organizational meetings with agency heads and has called a meeting of his policy board this week. The Baruch report will be followed in spirit, he says.

Not only the amount of surplus goods held but market conditions and industrial capacities must be studied. Clayton has indicated that the counsel of Industrial Advisory Committees will be sought.

HOW to get the best brains in the surplus materials field together in one spot will be a puzzler for Clayton. The individuals now are widely dispersed. Army, Navy, Maritime, WPB, and other agencies have been attempting to dispose of surplus materials, each pretty much in its own way, with either no general policy or conflicting policies between the departments and with most agencies having only small specialized staffs. As in the early days of priorities, there has been a confused mass of orders, directives, and red tape, all exerting a drag on the prompt movement of the materials. New problems have been posed by contract cancellations and the accompanying legal angles. Certain officials naturally have been cautious in handling some of the residual material.

The power to declare what is surplus still rests with the procurement agencies and will remain there unless Congress steps in. The War Department particularly has been anxious to retain this power.

On the subject of surplus steel, T. S. Fitch of the WPB Steel Division, in a Baltimore speech recently cited some interesting figures as he urged industries to take the initiative in disposing of surplus material. The government already has sold 4,000,000 tons of excess steel and now has nearly 2,000,000 tons to sell, he said. Should the war end suddenly and immediately, there would be 15,000,000 to 20,000,000 tons of unfabricated steel available.

CONSOLIDATIONS and other shifts which will place the steel industry in a more realistic position in the light of current and postwar actualities gradually are appearing, and more moves can be expected over the near future. Sheffield Steel Corp. is closing its St. Louis works. RFC has ordered work stopped on a DPC-built blast furnace at the Monessen, Pa., plant of Pittsburgh Steel Co. The stack was 95 per cent complete. A move which will concentrate production at a midwestern plant is expected to be revealed soon and it is known that several other producers are contemplating similar steps.

Problems may arise if the heavy volume of steel plate orders wanes later this year. If WPB is not in a position to allocate additional sheet business to wide continuous mills or if reconversion plans have not pro-

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gressed to the point where additional sheet business is in sight, there may be sizable idle space on wide strip mills. Total production of all types of sheets last year was almost the same as in 1939, but hot rolled sheets accounted for a much larger percentage of the total, while galvanized, cold rolled and other types were down. The WPB Steel Division is aware of the problems which it may face.

WPB is reported to be preparing to authorize allocations of controlled materials for production of essential war products during the first quarter of 1945. Subcontractors producing essential components also would be aided. WPB is planning to withdraw from the position it has taken in connection with the design of a number of civilian items, thus permitting the use of materials formerly used that are once again in fair supply. Some 65 limitation orders have been redrafted in accordance with this new policy but their actual clearance awaits final approval of the Army.

The controversy over amortization of new freight cars was clarified during the past week. There will be no argument over cars built from now on. The railroads will get WPB certification under which the cost can be amortized over a five-year period. Prior to October, 1943, the railroads obtained certificates from the War Department. With respect to cars ordered between October, 1943, and January, 1944, discussions are still under way and a satisfactory solution of the problem is expected soon. Not many cars were ordered during that period.

WITH the 1944 freight car production goal having been raised from about 40,000 to 60,000 domestic units, the third and fourth quarters of this year should see a record in freight car construction—that is, a record considering the times. It is reported that some car builders are accepting freight car orders on the basis of the ceiling price plus any revisions in prices which OPA may make as a result of the builders' appeal for relief.

In the passenger car field, proposals from the railroads have opened up spirited competition between makers of aluminum, stainless steel, and other materials. This competitive spirit has been keen in other fields recently when prospective business appeared.

Chicago has been placed in the War Manpower Commission's class one labor shortage group. The labor shortage there is estimated officially at 47,000 and the principal employment need is said to be in the radio-radar industry, of which Chicago is the focal point. One aircraft engine plant is not yet fully manned but other similar plants have been thinning out their forces. The steel industry in the area requires common labor but has been weeding out the skilled classifications. Railroads need help badly.

St. Louis Steel Plant Closed

Sheffield Steel Corp. is closing its St. Louis works, because of cutbacks and inability to obtain sufficient orders at the advanced prices granted by OPA last December to warrant further operation.

Raw steel production at the plant ceased last week (about Washington's birthday) and rolling of finished products will be concluded by March 10. The St. Louis works, leased by Sheffield from Scullin Steel Co., includes six stationary basic open hearth furnaces.

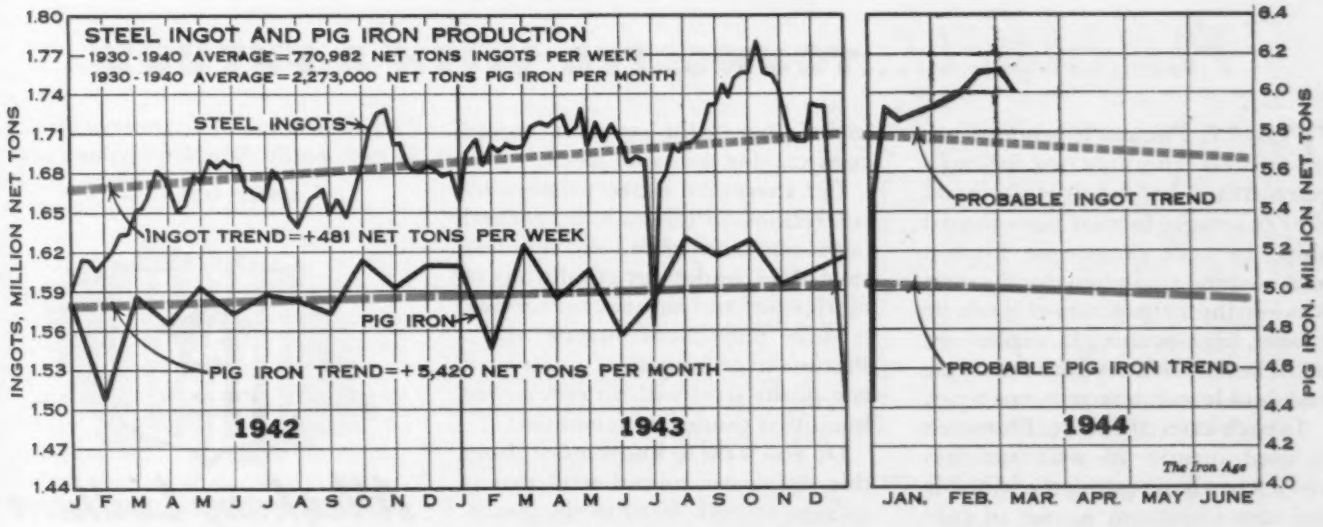
High cost of war time operation necessitated Sheffield's making application last fall for price relief. This was granted effective Dec. 20 to allow a charge of 2.55c. per lb., f.o.b. St. Louis on structural shapes, 2.75c. per lb. on merchant bars and 2.60c. per lb. on the tie plates.

The shutdown in no way affects the operations of the company at its main plant at Sheffield Station, Kansas City, Mo.

•

• • • Acting on a WPB recommendation, the RFC has ordered stoppage of work on a DPC-built blast furnace at the Monessen, Pa., plant of the Pittsburgh Steel Co. The WPB recommendation was made because, it said, there is already an adequate supply of pig iron.

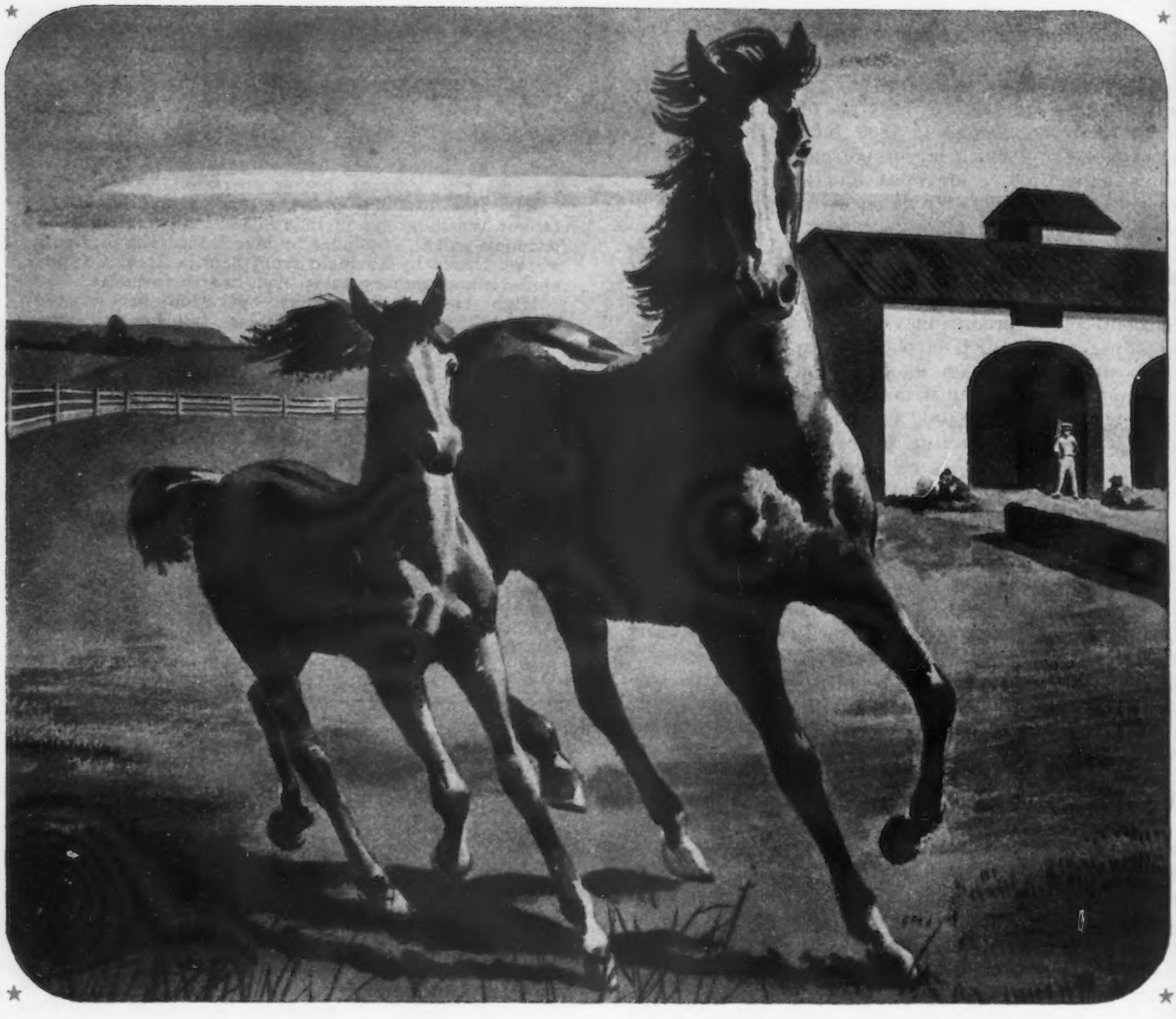
The Monessen furnace is 95 per cent complete and if completed would have an annual capacity of 432,000 tons. The cost of the furnace was placed at $6,400,000.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 24	91.0*	102.0	95.5*	96.5	91.0	104.5	96.5	92.0*	99.0	94.0	95.0	101.5	80.0	93.0*†
March 2	94.0	102.0	98.0	93.0	91.0	104.5	98.0	83.0	99.0	94.0	95.0	90.0	91.0	96.0†

* Revised
† Based on revised capacity



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Take Initiative in Disposing of Excess Steel, Industry Advised

Baltimore

• • • T. S. Fitch, WPB Steel Division Special Assistant in charge of the Surplus Inventory Branch, on Feb. 21 urged that all industry adopt an aggressive policy with respect to redistribution of its own surpluses rather than putting too much dependence on government efforts. Mr. Fitch's proposal was made in a speech before the Baltimore Priorities Discussion Group at the Longfellow Club.

Mr. Fitch emphasized that consumers should take the initiative in disposing of excess steel, particularly small lots. He said: "I think Uncle Sam wants us to do it if we can."

Stating that the government already has sold approximately 4,000,000 tons of excess steel, and now has nearly 2,000,000 tons to sell, Mr. Fitch said that present stocks are made up of small and large lots in controlled material form, and other quantities of partly and fully fabricated steel.

Should the war end suddenly and immediately, there would be 15,000,000 to 20,000,000 tons of unfabricated steel to be sold, he said.

Pointing out that as of Jan. 15, 358,000 tons of idle and excess steel were reported to WPB but that this figure contains a small percentage of government owned excesses, Mr. Fitch said that the Army and Navy and others hold but have not reported substantial tonnages of excess steel. On Oct. 1, Steel Division records showed that there were 1,800,000 tons of surplus steel. "In other words, it would appear that the Services might hold in the neighborhood of 1,500,000 tons at the present time," he remarked.

Analyzing the 15,000,000 to 20,000,000-ton figure which might be surplus on sudden war ending, Mr. Fitch declared that the number of appeals under the CMP inventory regulation show that industry is functioning on a 60-day inventory or less.

He reasoned: "Based on an annual product tonnage of 65,000,000 tons, it would appear that we would have no more than 11,000,000 tons of unfabricated steel. To this would have to be added that steel in production which could not be diverted; it has been estimated that this might be in the neighborhood of 4,000,000 tons. There would also be an additional tonnage made available if the government-owned facilities, such as Navy Yards and Ordnance plants ceased construction immediately after the termination of hostilities. It is our opinion that a top figure of 5,000,000 tons could be ascribed to these facilities. Therefore, we would appear to have a total of something between 15,000,000 and 20,000,000 tons if the war ceased immediately."

◈—— NEWS OF INDUSTRY ——◈

However, the assumption is that the war with Germany will end before the war with Japan and in this case steel excesses will be channeled into essential civilian production.

Mr. Fitch said that there are practical limitations in the future allocating procedure and that it would not be feasible to redistribute less-than-carload lots in this fashion. The movement of smaller quantities could be speeded up by appropriate revision of "L" and "M" orders, now being considered by WPB.

FLAMING LANDMARKS: *The future blazes brighter for Bessemers, according to E. C. Wright of National Tube Co., discussing development of killed Bessemer steel at the AIMME meeting last week. Photo shows converters at McKeesport.*

Regarding small lots of material in primary form, Fitch said such sales cannot be planned centrally, nor is it feasible to establish inventory control.

"We have tried to make it easy to move such small lots by saying in Priorities Regulation 13, that any item of steel worth less than $25 can be sold freely except for the end use restrictions of the L and M orders. It is contemplated that this value will be increased in the near future to $50 per item.

"Perhaps the quickest and most effective method of getting surplus steel in small lots back into the stream of trade is to call in warehouses and/or dealers and solicit a bid on your entire accumulation of small lots."

Discussing for the first time the ultimate disposition of partly fabricated steel, Mr. Fitch indicated no one knows how much of this material will be available after the war, nor what final disposition will be made of it. He expressed the opinion though that the portion not salvagable probably would be scrapped and that the recoverable portion will be sold at advantageous prices.

The Surplus Inventory Branch chief said:

"If to maintain some employment, the government decides to complete any construction which has commenced, then there won't be a particularly severe problem on account of partly fabricated material.

"Instead there will be a problem in the redistribution of idle and excess ships, gun mounts, widgets and Gremlin chasers. It is conceivable that the government will stop such construction shortly after the termination of hostilities, in which case there will be a more serious problem.

"Essentially, this is a problem in salvage and the ratio of recovery will vary with the type of steel. In the case of plates and structural shapes it is conceivable that from 60 to 70 per cent of the weight of the partly fabricated structures could be salvaged.

"In the case of tubular goods, bar and sheet, 40 to 60 per cent might be salvaged. In the case of strip, tin plate, wire and forgings and castings, probably not more than 25 per cent could be salvaged for reuse. * * * *"

Clayton Holds Meeting This Week

Washington

• • • **Surplus War Property** Administrator William L. Clayton on Feb. 25 said that while he thought the Baruch report is a fine one, and that it will be followed in spirit, he could not give any categorical answers to questions until after the new Surplus Property Policy Board has had its first meeting. Mr. Clayton said that the board is to hold its first meeting on March 1 or 2.

One of the very important things Mr. Baruch recommended was that surplus properties be disposed of in the same channels business would employ.

In connection with this, Mr. Clayton said:

"Obviously studies will have to be made not only of the amount of surplus goods the government holds, but of market conditions and the industrial capacity for civilian production above war needs."

Stating that surplus property policy would be divided according to property categories, Mr. Clayton said that the counsel of industry advisory committees will be sought, but it has not been decided that WPB industry advisory committees will be employed.

Mr. Clayton is given absolute au-

Vast Problem of Surplus Materials and Equipment Enters

• • • **The Administration** lost no time in appointing a surplus property administrator, following recommendations made in the Baruch report Feb. 18. William L. Clayton, assistant secretary of commerce, was named head of the new Surplus War Property Administration, which will be known popularly as SWPA. This agency will be under the general supervision of James F. Byrnes, director of the Office of War Mobilization.

The SWPA will have wide powers over the handling and disposition of surplus war property, including the transfer of such property from one governmental agency to another. In general, surplus consumer goods will be assigned to the procurement division of the Treasury; capital and producers' goods to a subsidiary of the RFC; ships and maritime property to Maritime, and food to the food administration. Property to be disposed of outside the U. S. will be assigned the Foreign Economic Administration.

Representatives of 15 departments and agencies will constitute a board which will assist the new SWPA. No government agency can transfer or dispose of surplus property in contravention to its regulations.

Army, Navy, Maritime, WPB and other agencies have been attempting recently to dispose of surplus materials, each pretty much in its own manner. As in the early days of priorities, there has been a confused mass of orders, directives and red tape, all exerting a drag on the prompt movement of the materials.

The first agencies established were Steel Recovery Corp. and similar organizations which sought to put excess but usable materials back into the war production effort. Later the Redistribution Division of WPB took over the task of serving as an intermediary between holders of surplus materials and would-be buyers. An appeal procedure enabled use of some of the surplus materials for non-vital production in consumer goods fields if they don't interfere with the war effort.

New problems are posed by contract cancellations. Obviously, it is considerably easier to move materials which are in excess of war production needs than to dispose of residual material arising from the cancellation of contracts. In addition to numerous legal angles involving settlement of the cancelled contracts, the residual material frequently is in fabricated or semi-fabricated form or gotten up to special specifications.

Officials naturally have been cautious in handling some of the residual material created by contract cancellations through such fears as possible collusion charges or allegations that public money had been wantonly handled. Aiming to achieve a proper degree of prudence so they never could be criticized, the officials have moved most deliberately in some cases.

Haphazard, unregulated sales of surpluses could demoralize the peace-time economy by hampering reconversion, paralyzing new investments, curtailing employment, inflating prices and disrupting normal markets.

At present, Priority Regulation 13 controls most special sales of surplus industrial materials except transfers of surplus aircraft stocks and special sales in the petroleum industry. Under this regulation controlled materials may be sold to fill most authorized controlled material orders and ex-allotment orders. Basic rules for special sales of idle or surplus fabricated components and other products are provided by Priorities Regulation No. 1, although special WPB limitation or conservation orders may set up other restrictions.

War Department—Rules governing the sale and disposal of property owned or acquired by the War Department are generally found in Procurement Regulation 7, originally issued July 6, 1943.

In order to get non-military property back into pro-

Baruch-Hancock Views on

. . . Pointing out that surpluses are beginning to pile up and that still other huge quantities are going to come into the possession of the government, the Baruch report stated that existing machinery clearly is inadequate to handle with dispatch current problems, let alone the much heavier accumulation in the future.

The report recommended immediate creation of an agency capable of dealing with current problems and in so doing gain the experience necessary for handling the greater postwar surpluses. Closest cooperation with WPB was recommended.

Excerpts from the Baruch report on the surplus problem include:

"We recommend, in particular, that the WPB and Surplus Administrator, between them, work out a means by which small quantities of surplus materials can be promptly disposed of so as not to get involved in rehandling or storage problems or tight priority interpretations. Otherwise the clearance of private plants will be hindered and unemployment will result . . .

"There is now in existence an efficient field force of the various agencies . . . This personnel and machinery should be available for the carrying out of the disposal policies that

thority over every agency having surplus property to issue regulations and directions necessary to effectuate the purposes of the order, and no property can be disposed of in a manner not prescribed by him.

The recommendations of overall policy which were contained in the Baruch report and which Mr. Clayton has indicated he will follow are:

1. Sell property as soon as possible without disrupting normal trade.
2. Listen to pressure groups but act in national interest.
3. No sales, no rentals to speculators, none to promoters.
4. Get fair market prices for values with proceeds of sales deposited to the general fund of the Treasury.
5. So far as possible, use same regular channels of trade that private business would in selling.
6. Sell as in a goldfish bowl, with reports always open to public inspection.
7. No government operation of surplus war plants in competition with private industry.
8. No monopoly, equal access to surpluses for all businesses, preference to local ownership but no subsidizing one part of the country against another.
9. Scrap what must be, but no deliberate destruction of useful property.
10. Before selling surplus equipment abroad, assure America's own productive efficiency on which living standards rest.

NO JOB MORE VITAL: *Will Clayton, 64, former southern cotton king, is now Surplus Property Administrator, a post which the Baruch report says will not only affect the well being of the U. S. but of the entire world.*

New Era with Creation of SWPA

ductive use as rapidly as possible, the War Department often makes its availability known concurrently with internal circularization. Lists are usually submitted in five parts:

Part 1, power and motor equipment (power motors, internal combustion engines, turbines, etc.); Part 2, all construction equipment; Part 3, all other items not listed in Parts 1, 2 and 4 which are believed to "have a reasonably foreseeable use in industrial or military purposes or for civilian supply, and which cannot practicably and expeditiously be redistributed without wide circularization"; Part 4, controlled materials; Part 5, all items not included in Parts 1, 2, 3 and 4.

Surplus items listed in Parts 1 and 3 are reported to WPB Regional Redistribution Divisions. Controlled materials listed in Part 4 are reported to the WPB Regional Offices and may be purchased "ex-allotment" without charge against the buyer's CMP allotment. Items in Part 2 are reported to the appropriate Regional Office of the Treasury Procurement Division.

For a period of 20 days after listing with WPB or the Treasury Procurement Division, surplus property is available only to military agencies or other contractors. After the 20-day period, anyone may purchase, although war contractors generally receive first preference. Sales are negotiated by the local officer.

Army Air Forces—The Army Air Forces operate under the general redistribution policy of the War Department discussed above, but maintain separate disposal outlets.

Navy — For the Navy, the assistant chief of procurement and material for industrial readjustment is charged with the establishment, supervision and coordination of all property disposal policies. Lists of surpluses are circularized among the various activities of the Navy Bureau, with a final screening by the Navy Bureau of Supplies and Accounts to determine whether any section of the Navy can make use of the listed commodities. Surpluses are then made available to other government agencies and any items which are still available are placed on sale to the public through competitive bidding by the Navy Office of Procurement and Material. Each of the dozen or more branch offices acts as a clearing house for all surplus materials available in the district under its jurisdiction. Items are grouped into 20 broad categories.

Treasury—The Procurement Division of the Treasury Department disposes of federally-owned surplus stocks made available both by the "old line" government departments and agencies and the newly created government-owned corporations, most of which are controlled by the Reconstruction Finance Corp. The Federal Property Utilization Branch of the Procurement Division has catalogued more than 17,000 different items, ranging from small hand tools to entire operating units. Regional property officers have three methods of disposing of surpluses.

Maritime—Maritime Commission recently created a Surplus Property Section in its Procurement Division. It conducts nation-wide surveys to determine what surplus materials and equipment exist in every yard with which Maritime has a contract. What amounts to a preference rating system of sales is established. First preference is given to shipbuilding contractors.

Important Surplus Disposal Job

are developed. No new enormous field organizations are needed . . .

"The question was asked whether there could possibly be a more important post, affecting not only the well-being of America but also of the civilized world, than that of this Surplus Administrator? The answer was 'No.' It should be added that few government posts are more difficult . . .

"In general, outright sale will be preferable. The disposal agencies, however, should have authority to exchange properties and to lease as well as sell; also to sell on credit and not simply for cash . . .

"We would urge upon the Surplus Administrator a middle course between the two extremes of dumping or freezing—the middle course of wise and carefully-timed disposal. These surpluses, properly utilized, represent tremendous wealth to ourselves and to others . . .

"Timing will be of the essence in the disposal . . . The Surplus Administrator should sell all he can as early as he can, reducing proportionately the quantities of surpluses which will be left for the more difficult postwar period and saving handling and storage charges . . .

"A 'goldfish bowl' policy should be folllowed in all sales."

Whiting's Warning Stirs Industry; Anxious to Maintain Full Output

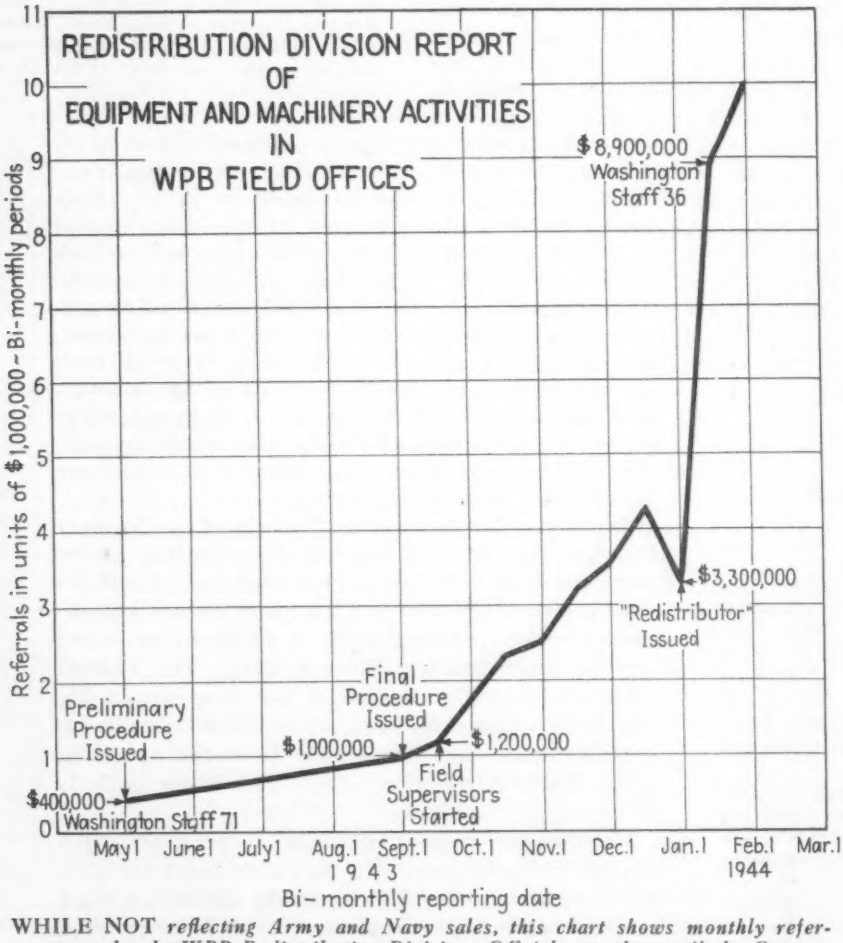
Pittsburgh

• • • **The implied warning** that steel producers should not "rest on their oars or relax their efforts," issued by John T. Whiting, Steel Division director of WPB, recently, was ill-advised, according to opinion in steel circles here. Steel observers recall that several months ago there was a definite trend downward in steel ingot production because of cutbacks in governmental contracts, as well as reduction in Lend-Lease requirements. At that time steel industry officials as well as steel labor leaders warned WPB that unless some expansion was made in essential civilian allotments, a decline in steel output would occur.

The steel industry, it is said, was anxious to maintain full output, and for this reason advocated increased directives by WPB, in order to keep operations at a peak level so that war needs and essential civilian requirements could be taken care of. The union, on the other hand, emphasized the need to keep labor at work and it, too, sought to have WPB keep close tab on any falling off in military or Lend-Lease requirements so that they could be quickly replaced by essential civilian needs.

At no time here, it is said, or in other steel circles, has there been any agitation for return to the production of normal civilian steel products as long as war needs were paramount. There was, however, considerable agitation to increase the allotments to the railroads, to the oil industry, to the farm implement groups, and to steel container manufacturers. Apparently this advice was followed by WPB, since recent trade reports have made it clear, that practically all of these groups which are actively engaged in essential civilian endeavor, have obtained more steel.

Aside from the increase in the flow of material to essential industries, there have also been increases in demand for flat rolled products, which, all taken together, indicate a continuation of present high levels in steel operation. It is pointed out here that the steel industry itself has no control over the production of its products, but makes them at the explicit direction of the WPB. These directives are placed upon the steel companies on a monthly basis; hence, according to opinion here, any "resting on the oars" could not possibly be attributed to the steel industry.



WHILE NOT *reflecting Army and Navy sales, this chart shows monthly references by the WPB Redistribution Division. Officials say that until the Government establishes realistic price policies on this equipment, sales are bound to be slow. It should be noted that after the issuance of the Redistribution Division publication the "Redistributor" sales went up.*

Republic Earns $12,011,057

• • • **Republic Steel Corp.** reported for 1943 a consolidated net income of $12,011,057, which compares with $17,154,578 earned in 1942. Charges against the 1943 net included Federal income and excess profits taxes of $39,300,000 and $4,750,000 provided for contingencies. Sales increased during 1943 to $552,329,000 from $521,110,000 the previous year.

•

Allegheny-Ludlum Earnings

• • • **Allegheny Ludlum Steel Corp.,** for 1943, reported a net profit of $3,865,315 after charges including $600,000 for contingency reserves; $2,000,000 for renegotiation of 1943 war business; and $16,145,000 for Federal taxes. Net income for 1942, after renegotiation, was $4,129,126.

•

Crucible Earns $4,949,696

• • • **Crucible Steel Co. of America** reported net income of $4,949,696 for 1943, as compared with $4,864.781 earned in 1942. Charges against net income were $5,200,000 provided for contingencies and $27,958,855 for taxes on income. No deductions were made for renegotiation of war contracts. Sales during the year aggregated $209,435,789, as compared with a total of $200,704,853 in 1942.

•

Alan Wood Earns $699,230

• • • **Alan Wood Steel Co.** reported a net income of $699,230 for 1943, as against $739,590 earned in 1942. The 1943 net income was reported after deductions for Federal and state taxes, credits for postwar refund, and carryback to 1941 of unused excess profits credit. Also an adjustment of $40,592 was made for over-accrual of Federal income taxes for 1941.

Statistics Bring Out Problems to Be Faced When Volume of Plate Orders Wanes

Pittsburgh

• • • **Under-surface** rumblings, over the possibility of rolling space, but no orders late this year, on the part of those steel companies whose sheet mills are now saturated with plate orders, seem to find some support in latest statistics covering flat rolled production. While total production of all types of sheets in 1943 was almost the same as that in 1939, it was not being produced on the same mills.

Reliable but unofficial indications are that the plate load may be diminished somewhat by July of this year, due, it is said, to the fact that the bulk of the 1944 Maritime requirements will have been produced. Meanwhile, large strip mills which are almost entirely on plates are in no position to accept forward sheet orders to any great extent, due to WPB directives on plates, while on the other hand strip mills and sheet units which are not loaded with plates are being flooded with sheet directives and sheet orders under the CMP.

According to observers here, if the WPB is not in position, when the plate recession sets in, to allocate additional sheet business to the wide continuous mills, or if reconversion plans have not progressed to the point where additional sheet business is in sight, there will be sizable idle space on wide strip mills. There are some sources, however, who predict that a packaging program, requiring the use of sheets, will materialize on an unprecedented scale; but some of the tonnage figures being booted around seem to be far beyond realistic realms.

It is not to be expected that mills predominantly producing sheets, today, would give up any bookings which they have, in case of an easing in the plate load, which would free some wide strip mills; hence, the latter, regardless of some of the name calling in WPB circles, will be definitely "up against it" later this year, unless provision is made or plans are formulated to offset such a situation.

Stated quite simply, a substantial drop in plate requirements would leave wide strip mills high and dry because close to half a million tons of plates a month are being produced on wide strip mills, while other sheet mills are heavily engaged in the production and acceptance of sheet orders. There are some flat rolled officials who believe that forward orders on sheets, for production on wide strip mills later this year, should be allowed to be accepted in order to preclude any substantial void in rolling schedules later.

Steelmakers whose normal pursuits involve sheet production, not only have serious pre-postwar problems, but, according to recent statistics, have a long way to go to regain some of the lost sheet production which has given way to other items because of the war. Total sheet output in 1939 was about 8½ million tons, and in 1943 was about 8,530,000 tons. However, in 1941, before the conversion of the automobile industry and before more drastic controls were placed upon civilian consumption, sheet production for sale reached the unprecedented total of 12,654,000 tons.

It is significant that while production in 1943, on a tonnage basis, was about equal to 1939, total flat rolled output including plates increased 65 per cent from 1939 to 1943. Still more important, while sheets remained static, was an increase of 78 per cent from 1939 to 1943, in the production for sale of all finished steel products. These figures indicate that sheet production has a long way to go to regain its pre-war position, if total steel production after the war, and after an anticipated short recession, should approximate the 1943 level.

Hot rolled sheet output, contrary to the trend in total sheet production, increased from 1939 to 1943, although there was a decrease from 1941 to 1943. On the participation basis, hot rolled sheet production in 1939 was 54.4 per cent of total sheet output, compared to 68 per cent in 1943.

The biggest drop in production among the various types of sheets occured in galvanized, which, in 1939, amounted to 1,395,000 tons, as against 824,000 tons in 1943; or a participation figure of 16.4 per cent of total sheet output and 9.7 per cent respectively. Galvanized sheets may fare better in 1944, owing to the relaxation of some restrictions. Likewise, hot rolled output may be much higher owing to relaxation in controls, as well as increased use of hot rolled sheets for export packages.

Cold rolled sheet output, which in 1939 amounted to 2,022,000 tons, and in 1941 reached 3,025,000 tons, slumped to 1,550,000 tons in 1943; or, in other words, from about 24 per cent of total sheet output to 18.2 per cent. This again was to be expected, in view of the conversion of the automobile industry.

The unprecedented records made and being made on wide strip mills and mechanized sheet mills as well, certainly indicate that flat rolled capacity on a practical basis is, and will be, far greater than that recorded for the same units before the war. A study of the figures shown in the table, when compared with the complete flat rolled compilations, covered in this magazine Feb. 24, page 106, clearly indicate the tremendous problem to be faced on the sheet picture when the volume of plate orders begins to drop off sharply, as is expected later this year. It represents, probably, one of the biggest potential headaches for the WPB later on—just as big, or bigger, than when sheet mills were converted to plate production.

SHEET PRODUCTION

By Types and in Per Cent of Total Sheet Output For Sale

Source: American Iron & Steel Institute Report No. 10
Compilation—The Iron Age
1939-1943
(000 Omitted)

Year	Hot Rolled		Galvanized		Cold Rolled		Other		Total
	Net Tons	% of Total	Net Tons	% of Total	Net Tons	% of Total	Net Tons	% of Total	Net Tons
1939	4634	54.4	1395	16.4	2022	23.8	454	5.3	8505
1940	5596	55.0	1551	15.2	2437	24.0	602	5.8	10186
1941	7265	57.5	1622	12.8	3025	23.8	742	5.9	12654
1942	5565	65.4	972	11.5	1518	17.8	448	5.3	8503
1943	5801	68.0	824	9.7	1550	18.2	355	4.1	8530

Non-Steel Producers Inclusion In Steel Wage Case Adds Confusion

Washington

• • • **The muddled "steel"** wage case, with its already ramifying aspects and conflicts, became more confused at a WLB "procedure" hearing on Feb. 23. With a scant attendance of members, the board summoned before it what a press statement had previously said would be 74 steel companies, on the question of extending contracts with the CIO-USW.

Actually many of the companies represented at the hearing, some 40 in number, are not even remotely connected with the steel business. There were slag producers, paving brick manufacturers, enameling concerns, and a miscellany of other lines whose representatives were befuddled over the whole thing. In vain they tried to find out why they were dragged into the proceeding.

Others sent answers to the board, and like those present, protested against their being drawn into the steel case, and objected that their wage scale is generally under the steel wage level. Some said that they could not possibly pay the steel wage scale. All, however, have had or now have USW contracts. Some have expired. Others have been extended, an indication of how widespread USW organization has been in other fields as well as in steel.

The explanation of the inclusion of non-steel companies in the case, however, was cleared up somewhat by WLB vice chairman George W. Taylor, a public member who presided. Dr. Taylor told the attorney for one company that the case covered all companies that have USW contracts. Broadening of the proceeding to this pattern aroused renewed charges that the CIO is seeking union-wide rather than merely industry-wide contracts and its AFL rival, already in a row with USW in the steel case, has become increasingly anxious over the penetration into its field of CIO organizations.

The board itself originally spoke of the case as involving only two groups, the "basic" steel companies and the "non-basic" steel companies. Whatever the board's definition of the terms "basic" steel and "non-basic" steel, its terms did confine the case to steelmakers and steel users. It also said that approximately 500 steel companies were included in the proceedings.

Non-steel companies, however, which have been dealing with USW find themselves mixed up in the case and were given 10 days in which to file answers to show cause why an interim order should not be issued extending USW contracts calling for retroactive pay in the event the board orders a readjustment of wages as set forth in the board's Carnegie-Illinois, et al order of Dec. 23, 1943. The move, of course, is to break the Little Steel formula wide open.

The companies represented at the hearing tried to get an interpretation of the order to learn the distinction between it and the national stabilization policy. Dr. Taylor told them that that was a question for the board to handle. Eugene Catton, USW attorney, offered the vague explanation that the only motive of the order was to "stabilize the relationship with industry till the issue could be resolved by the board."

AFL has clashed with USW in asking that the President modify the Little Steel formula while USW is asking that it be set aside. In view of USW's broadening the case to go beyond the formula, AFL is, so far without success, asking that it be represented on the six-man steel panel which will hear the steel case, still in its "procedural" stage and moving at a snail-like pace.

Meanwhile WLB has announced that the panel will hold its first meeting with USW and some 100 "basic" steel companies on March 8 to consider the issues to be heard and the procedure to be followed. Immediately after the hearing the panel will report to the board for further instructions. The panel will than hear the parties on the merits of the case. The board said that this hearing will begin March 14.

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Manpower Plan Takes Effect

Pittsburgh

• • • **The Pittsburgh Manpower Budget Plan** went into effect on March 1. Essential industries that come under classification No. 2 have had Feb. 1, 1943, set as their employment ceiling. The number of male employees in service at that time is the base from which allowable hirings are made.

Essential industries fall into group No. 2, until such time as the employer can qualify for group No. 1. This group includes companies with direct Army, Navy, or Maritime contracts. Employers in group No. 1 may hire for expansion and replacement, but individual ceilings are to be set after consultation with the Manpower Commission.

The essential group, No. 2, may hire on the basis of four per cent a month of its Feb. 1 male payroll, a figure that represents about the average employment turnover in this area. In case the company feels it needs more than a four per cent hiring rate in any given month because of unduly large armed force inductions, it may seek adjustments from WMC.

The plan also includes assignment of priorities to companies in groups

200 TON MOLD: *This corrugated one-piece ingot mold, weighing 400,000 lb., was cast at the Bethlehem plant of Bethlehem Steel Co. It is 111 x 199 x 165 in. (deep) on the outside. It was poured on Jan. 15 from two 150 ton and two 15 ton ladles, using about 500,000 lb. of metal.*

one and two when referrals are made by the United States Employment Service to companies needing additional workmen. Companies in groups one and two may also hire privately, as long as they abide by the WMC regulations.

Inauguration of the Pittsburgh Manpower Budget Plan was discussed in THE IRON AGE, *Feb. 17, page 109.*

A ceiling has been set at Feb. 1 for the non-essential group, No. 3. However, no additional male employees other than part-time young boys or veterans of this war may be hired now except through specific permission of the USES. It is through the control over this group that WMC expects more manpower to be available to groups one and two.

One of the chief features of this plan will be the requirement of every employer to report, semi-monthly, the names and addresses of all men hired within that period. The possession of such a list will enable the USES to keep a check on possible violations in transfer rules and regulations either on the part of employee or employer.

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Canadian Labor Code Provides Penalties for Labor and Management

Ottawa

• • • **The Canadian government** has enacted a national code, effective Feb. 17, in wartime labor relations affecting 2,500,000 of the estimated 3,500,000 industrial employees in the Dominion. The code, under the authority of the Wartime Measures Act, has been in the making since last summer's National War Labor Board inquiry into labor relations. Its regulations, providing for compulsory collective bargaining and outlining conditions of fair labor practices, apply only to war industries and those occupations which came under the Industrial Disputes Investigation Act, which they now supplant.

There is nothing in the code which prohibits the Provinces, through legislation, to bring all non-war industries, now exclusively under Provincial jurisdiction, within the application of the code in interest of the uniformity which was sought originally by the Dominion department. Administration of the code, as it would apply to non-war industries, would have to be by agreement, between the Dominion-Provincial governments, with possibly a joint administration.

While the code is effective immediately, the composition of the Wartime Labor Relations Board, the administration board, has not yet been announced. The board will consist of a chairman, a vice-chairman and not more than eight other members. Also, provided for is employer and employee representation on an equitable basis. Strikes or lockouts still are possible under certain conditions, but only after collective bargaining efforts have failed, and a conciliation board report has been before the Labor Minister for 14 days without completion of an employer-employee agreement. Uniform labor practices applying to employers prohibit attempts to dominate or interfere with trade unions and employees' organizations or to contribute financial support to them.

Neither side is obliged to accept the finding of a conciliation board and there compulsion ceases. Full provision is made for the renegotiation of agreements, and strikes are prohibited in a termination of an agreement. In other words, there must be a similar process as in the event of a new agreement. Terms are given that are designed to eliminate jurisdictional disputes and the raiding of one union by the members of a rival union. Behind them stands a list of penalties, applicable to both sides in a labor dispute, in the event of the regulations being broken.

The regulations are designed to place on both parties a joint responsibility for a settlement by their own action.

The new Wartime Labor Relations Board will be responsible for matters of policy and such regulations as are necessary to insure uniformity in application of the code. Unions are prohibited from coercion or intimidation of workers to force them to join an organization. Activities in plants during working hours in an effort to enlist union membership are banned and no support or encouragement may be given to slow-downs or other interference with production. All collective agreements must include a grievance procedure for settlement of disputes without stoppage of work. If no procedure is provided in existing agreements, the board may establish one. In cases where there is no agreement and a dispute arises, a 60-day delay is provided to enable the employees to elect bargaining representatives.

The main provisions of the labor code are:

1—Establishment of a Wartime Labor Relations Board comprising a chairman, vice-chairman and not more than eight members.

2—Certification by the board of bargaining agencies representing the majority of employees in affected industries.

3—Compulsory negotiation between employers and certified bargaining agencies.

4—Conciliation procedure if negotiations for an agreement fail.

5—Prohibition of strikes during the selection of a bargaining agency, negotiation of an agreement, conciliation proceedings if necessary, and the life of the agreement after it is adopted.

6—A definition of unfair practices by employers, employees and unions.

Penalty clauses include:

1—An employer who causes an illegal lockout: A fine of not more than $500 for each day of the lockout.

2—An employee who strikes illegally: A fine of not more than $20 for each day on strike.

3—A union or other organization authorizing an illegal strike: A fine of not more than $200 for each day of strike.

4—Persons or organizations contravening any sections of the code for which specific penalties are not provided: A fine of not more than $100, against an individual or a fine of not more than $200 against a corporation or organization.

5—Persons offering bribes to those charged with administration of the code or officials who accept a bribe: A fine of not less than $500 and not more than $5000, or imprisonment for not less than six months and not more than five years, or both fine and imprisonment.

CITATION WINNER: *Walter C. Wolfe, cupola tender at the manpower-short Chicago Hardware Foundry Co., Elkhart, Ind., was cited by the Gray Iron Founders' Society for staying on the job despite a fractured leg. The citation was accompanied by a $100 war bond.*

23,000 Tons of Steel Lost Through Outlaw Strike in Pittsburgh District

Pittsburgh

• • • **An outlaw strike** by less than 400 coke oven workers at the Carnegie-Illinois Clairton by-product plant reduced the flow of open hearth fuel to Corporation plants to such an extent at midnight, Feb. 25, that more than 90 open hearths were shut down, and in excess of 20 blast furnaces were forced to have their wind reduced. The strike, caused by alleged "promotional sequence" inequalities, ended Sunday, Feb. 27, but full operations at the affected plants was not resumed until Feb. 28. About 23,000 tons of urgently needed war steel was lost due to the wildcat strike. The pig iron loss was 14,000 tons and the coke loss was 14,000 tons.

The walkout in the by-product plant shut off the flow of gas necessary for open hearth furnace operations, and further affected some processing of finished material due to lack of fuel for heating furnaces. With the open hearths down, the management was forced to cut the wind on the stacks. A seamless mill at the National Tube works at McKeesport was also shut down for a day, and resumption of Carnegie's Irvin Works 80-in. hot mill, now working on plates, was delayed.

Armor plate production, for Navy landing barges came to a standstill on Feb. 25 at Great Lakes Steel Corp., Ecorse, Mich., when 6000 workers struck. Thomas Shane, district 29 director of the USWA-CIO claimed the major cause was that for "the past 18 months the men have been working in short-handed crews" and had not been compensated for the extra work, but the discharge of a union employee precipitated the strike. The company maintained that violation of management rules and procedures was involved in the discharge.

Union's Cost of Living Data Flayed

Washington

• • • **Exhaustive** in detail, A. F. Hinrichs, Acting Commissioner of Labor Statistics, last Saturday submitted a report of the Bureau of Labor Statistics to WLB Chairman William H. Davis in which the commissioner stoutly supports the Bureau's cost of living index which had been attacked by George Meany and R. J. Thomas, labor members of the President's Committee on the Cost of Living.

Clearly designed as a pattern from which to build CIO-USW's case for a 17c an hour increase in steel wages, the Meany-Thomas report was made public Jan. 25 by CIO President Philip Murray before the WLB had a chance to study it. The labor report contended that the cost of living had risen 43.5 per cent since January, 1941, the basis on which the Little Steel formula was fixed. The Bureau of Labor Statistics said the cost of living had risen 23.5 per cent since that period.

With a wealth of facts and textual discussion to back up the BLS report, Mr. Hinrichs said that the claim of the Meany-Thomas report that the cost of living has risen 43.5 per cent is not supported by their data.

"Rather," said Mr. Hinrichs, "there is conclusive evidence that they are absolutely wrong in asserting that the rise in the cost of living is nearly twice as great as the BLS shows it to be (23.4).

"The report contains many errors of fact, and makes use of unrepresentative data to support its general conclusions. It does not meet the high technical standards which usually have characterized trade union research."

Forgings Show Steep Rise Among Aluminum Products

Monthly Shipments of Fabricated Products—1942 and January through November, 1943. Source: WPB

(Millions of Pounds)

	Rod, Bar, Wire and Cable	Sheet, Strip, Plate and Foil	Rolled and Extruded Shapes	Castings	Forgings	Tubing	Rivets	Ingot Powder and Paste	Total (All Shapes)
1942—January	8.1	30.5	6.8	19.9	5.8	2.0	1.0	12.3	86.4
February	7.4	32.1	6.7	19.7	5.9	1.7	1.0	11.6	86.1
March	8.7	38.1	7.4	23.3	7.3	2.8	1.1	14.0	102.7
April	9.0	39.4	6.9	24.9	8.1	2.5	1.2	14.2	106.2
May	8.6	38.7	6.1	24.0	8.7	2.7	1.3	10.5	100.6
June	9.1	42.5	7.0	25.4	10.1	3.1	1.3	17.9	116.4
July	7.7	49.6	6.2	26.9	10.4	2.8	1.4	12.3	117.3
August	6.8	52.4	6.2	29.1	11.1	2.6	1.6	17.6	127.4
September	6.8	51.4	8.0	30.6	11.6	2.8	1.7	16.4	129.3
October	8.6	53.6	8.2	33.8	13.3	2.9	1.7	20.0	142.1
November	8.9	49.7	7.1	32.4	15.0	2.8	1.8	14.9	132.6
December	8.6	62.4	8.1	34.1	16.0	3.4	1.9	17.3	151.8
1942—Total	98.3	540.4	84.7	324.1	123.3	32.1	17.0	179.0	1,398.9
1943—January	10.1	68.4	7.6	33.1	17.8	3.6	1.9	18.0	160.5
February	10.1	59.8	7.4	33.4	15.6	3.4	1.9	15.2	146.8
March	12.6	78.3	8.0	38.7	19.7	4.1	2.4	19.2	183.0
April	12.8	65.2	8.2	37.1	19.5	3.1	2.4	17.8	166.1
May	14.4	63.4	9.8	37.7	19.6	3.6	2.4	17.3	168.2
June	11.8	61.9	9.5	36.3	19.6	3.5	2.6	20.4	165.6
July	12.4	69.2	11.9	37.2	22.1	3.5	2.4	26.3	185.0
August	11.5	73.8	10.6	38.2	23.0	3.5	2.4	21.3	184.3
September	11.5	77.2	13.9	41.3	23.4	3.6	2.6	23.6	197.1
October	13.5	81.3	14.9	43.0	25.4	3.9	2.5	28.1	212.6
November	12.9	75.6	15.8	43.2	28.8	4.5	2.5	28.0	211.3
1943—Jan.-Nov.	133.6	774.1	117.6	419.2	234.5	40.3	26.0	235.2	1,980.5

Primary Aluminum Output in '43 Up 75 Per Cent

Primary Production and Secondary Recovery 1942-1943. Source: WPB

(Millions of Pounds)

Month	Production			
	Primary		Secondary	
	1942	1943	1942	1943
Total Year	1,042.2	1,839.8	370.4	527.6
January	64.5	121.3	17.3	37.1
February	60.2	111.2	21.9	36.9
March	68.8	129.2	25.2	40.5
April	70.0	133.6	30.0	41.2
May	74.4	145.7	30.0	41.1
June	79.0	148.3	31.2	42.9
July	90.0	156.9	33.7	37.9
August	97.9	162.7	33.9	43.2
September	99.1	172.8	34.6	46.4
October	108.3	188.1	37.4	51.0
November	110.0	182.7	37.4	54.4
December	120.0	187.2	37.8	55.0*

* Preliminary

Legislative Proposals Outlined In Appendix to Baruch Report

• • • **An appendix** to the Baruch-Hancock report (now available in printed form from the Superintendent of Documents for 20c.) briefly outlines the legislative policy it proposes and is taken to be an answer to criticism that the report contemplated that the problem of postwar adjustment be done only by executive orders.

"Congress should lay down whatever policies it feels wise and desirable to guide the existing agencies in their handling of demobilization," it is pointed out.

The report proposes that the Work Director work with Congress on a combined program of legislation and operations for the entire human side of demobilization; legislation for the selling of terminated war contracts; the Surplus Administrator to report to Congress as soon as possible on legislation needed for surplus government property; extension of price control law, the priorities and allocations powers on which the functioning of WPB rests, and the requisitioning power of the President; extension of Smaller War Plant Corp.'s lending authority to permit changeover assistance; liberalization of Federal Reserve's authority to make industrial loans; postwar tax on the shelf; Congress consider funds for engineering public works shelf.

The appendix lists the more important aspects of the roles of WPB and the armed services as follows:

Armed Services: To decide what weapons and war supplies should be cut as the war changes, informing WPB as soon as such cuts are decided; to work with the WPB and other civilian agencies, including WMC on the choices of which contracts are to be cancelled; to negotiate settlements of what the government owes on terminated war contracts after cancellation; to assist the Surplus Property Administrator in promptly clearing government property from war plants; to work with him and the WPB on redistributing surplus property to stimulate war production; to be prepared to shift contracts to make use of plants and manpower freed by cancellations; to work with WPB in the preparation of a "X-Day" reconversion plan; to work with the "Work Director" on the demobilization of the armed forces when that becomes possible.

WPB: To keep the program of production for war and civilians in constant balance; to lay down the policies to guide the choices for cancelling contracts of war goods no longer needed; to work with the Armed Services and other procurement agencies and with WMC and other civilian agencies in making the actual choices of producers to be cancelled and those to be left in war production; to guide the shifting of contracts to make use of facilities or manpower freed from war production; to decide what civilian production and employment is to be resumed as war needs slacken; to work with the Surplus Administrator and Armed Services on the disposal of surplus government property so as to stimulate both war production and resumption of civilian employment; to keep all war controls under constant review so that they can be promptly modified; to review worthwhile local projects deferred during the war that may be cleared as war needs slacken.

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Report Procedure Mapped

Washington

• • • **WPB is** developing a procedure for the receipt and distribution of contract termination reports from the procurement agencies pursuant to recommendations contained in the Baruch report.

The WPB Statistics Division through form GA-1330 will seek information on contract cutbacks where the cut is more than 25 per cent and for more than $50,000. Procurement agencies will tell WPB the name and address of the contractor, end products terminated, monthly rate of production before and after termination, plans for future use of part or all of plant capacity released and the estimated date when production plans will begin and approximate percentage of released capacity that will be utilized.

Other information such as available equipment and labor will be secured by the WPB regional staffs.

Armco Plans River Terminal

Cincinnati

• • • **Plans for the** construction of a large river harbor terminal at Cincinnati for the American Rolling Mill Co. as a rush war project were revealed last week. The terminal would clear the entire coal requirements of Armco's plant at Middletown, and receive return loads of steel for Ohio River shipment. It is to be one of the most modern terminals in the vicinity and will be rushed to completion as quickly as possible to help facilitate steel output at Middletown, and delivery, by water, to war plants where feasible. According to plans revealed at the City Council meeting at Cincinnati, where the petition for legislation to permit construction was presented, the cost of the improvement was estimated at about $500,000. In addition, it was reported that Armco is purchasing about 27 to 30 acres of ground on which to make the improvement, should the legislation be passed.

JANUARY PIG IRON OUTPUT UP SLIGHTLY

Blast Furnace Capacity and Production—Net Tons

Source: American Iron and Steel Institute

	PRODUCTION						
	Pig Iron		Ferro Manganese and Spiegel		Total		
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	Percent of Capacity Current Month
DISTRIBUTION BY DISTRICTS:							
Eastern	975,730	.....	23,011	.....	998,741	.....	92.0
Pittsburgh-Youngstown	2,100,874	.....	19,053	.....	2,119,927	.....	93.2
Cleveland-Detroit	519,986	.....		.....	519,986	.....	92.7
Chicago	1,132,107	.....	8,780	.....	1,140,887	.....	99.2
Southern	340,200	.....	20,879	.....	361,079	.....	96.3
Western	135,232	.....		.....	135,232	.....	67.3
TOTAL	5,204,129	.....	71,723	.....	5,275,852	.....	93.4

During 1942 the companies included above represented 99.7 percent of the total blast furnace production.

100,000th Centrifugally Cast Gun Tube Made at Watertown Arsenal

Boston

• • • **The casting of the** 100,000th gun tube by the centrifugal casting process at the Watertown Arsenal was announced on Feb. 20. Actually, however, many more than this have been cast centrifugally at the Arsenal.

The process first was employed in 1938, with one casting machine operating eight hours per day, five days a week, with a crew of 15. By 1942, 14 machines were operating 24 hours a day, seven days a week requiring a crew of 288. In 1943, the crew had to be increased to 550.

During the two years immediately preceding the entry of the United States into the war, practically the entire modern gun tube program for the Army was carried on by this Arsenal alone. During 1940, some 1600 tubes were produced centrifugally by Watertown, the capacity of the equipment at that time. In the year and a half following Pearl Harbor, production jumped 26 fold. During 1942, until civilian industry had begun to produce its full share of gun tubes, the Arsenal carried a substantial portion of the 90, 105, and 40 mm. tube-making burden. By 1942 it had produced more than 40,000 tubes.

The centrifugal casting foundry at Watertown is more or less conventional, with casting machines at both ends. Directly behind the casting machines and about 15 ft. above them are the melting platform and control equipment. Electric melting furnaces are picked up and carried to the casting machines. After the cast, the tube number is stamped on it and it is carried to cinder pits for cooling.

The late Brig. Gen. Tracy C. Dickson is generally credited with being the father of centrifugally cast gun tubes. He was in command at Watertown Arsenal from 1918 to 1932.

Industry's Expansion Funds Tie U. S.

New York

• • • **The steel industry** has matched the government's funds dollar for dollar in financing the two billion dollars emergency wartime steel expansion program started in 1940, according to the American Iron and Steel Institute. From 1940 through 1944, steel companies have spent or will spend $1,151,000,000 in developing new ore mines, building new blast and steel furnaces, and installing other items of new equipment. Over the same period, government funds pro-provided for the same purpose total $1,063,000,000.

As a result of these expenditures, new ore mines with an expected annual capacity of 15,000,000 tons of ore have been developed or are nearing completion. Since January, 1940, nearly 14,000,000 tons of new blast furnace capacity, and over 12,000,000 tons of new steelmaking capacity have been built.

In 1941 the industry increased its new equipment expenditures 70 per cent over the previous year to a total of $295,000,000. The government-financed part of the program began late in 1941, reached a peak in 1943, and will taper off sharply in 1944.

In 1944, the steel industry will spend $181,000,000 of its own funds for new equipment and construction, about 25 per cent less than $239,000,000 spent in 1943 for these purposes. The $131,000,000 of government funds to be spent in 1944 for new equipment is 75 per cent below the total of $516,000,000 spent by the government during the year 1943.

"World's Largest Known Ore Mine" Opened in Brazil

• • • **Installation of power** and industrial equipment this year at Caue peak, Brazil, center of the world's largest iron ore deposit, will open up an important new source of ore for United Nations war plants, the International General Electric Co., has announced. Described as "the greatest known hard-ore mass, and easy to equip, develop, and mine," the area contains an estimated 15 billion tons of ore suitable for high-grade steel. Beginning this year and continuing for three years, annual production of one and a half million tons of ore will be divided between the United States and Great Britain.

The peak is located in the province of Minas Geraes about 4500 ft. above sea level. There is no overburden of earth, and open pit mining, with drilling and blasting, will begin near the top. Two large electric shovels, powered by GE drives, will load the ore into trucks which will carry it three-quarters of a mile to the processing plant.

The railroad from Itabira, the location of the mine, to the Atlantic ocean port of Victoria, 350 miles away, is being rerailed and rehabilitated.

WOMEN BUILD BOMBERS: *Playing an increasingly greater role in aircraft construction, women are becoming more essential daily to aircraft quotas. These women are a working team in the fuselage assembly department of Bell Aircraft Corp.'s Marietta, Ga., plant where newer types bombers are built.*

Gray Iron Casting Price Changes Effected to Stabilize Price Structure

• • • **Six changes in the** provisions governing maximum prices for gray iron castings were announced by OPA. The net effect of the changes, OPA said, should be to provide a more stable price structure in the gray iron castings field.

The changes are as follows:

1—Sellers of gray iron castings using the "base period" method of computing maximum prices, beginning March 1, 1944, are authorized to add overtime labor costs in calculating ceilings. This may result in an increase of two to three per cent in the level of maximum prices for gray iron castings. It will, however, tend to stabilize prices, for previously producers were authorized to add overtime labor costs in computing maximum prices under the "formula" and "pre-base" period pricing methods.

2—In computing ceiling prices for "short orders" (orders where the shipping weight of the casting multiplied by the quantity ordered does not exceed 200 lbs.), the maximum price must be determined by multiplying the shipping weight of the casting by twice the seller's average price per lb. for gray iron castings in 1942 and by adding a starting charge of $8 for non-cored or $12 for cored castings. This simplified pricing method was authorized by OPA after consultation with representatives of the industry. Previously "short orders" had to be priced in the same manner as any other orders for castings.

3—Sellers of castings under the "formula" method hereafter are permitted to recompute ceiling prices only once on any casting sold under that pricing method. Limitation to one recomputation is designed to stabilize ceiling prices, removing price uncertainties for both buyers and sellers.

4—In a revision of pricing provisions, any seller of gray iron castings who delivered a casting during the base pricing period Aug. 1, 1941, to Feb. 1, 1942, now must use the "base period" method of establishing his ceiling price for that casting, no matter whether the contract for the delivery of the casting was made before or after Aug. 1, 1941. Previously it was possible for the seller to use the "formula" method of pricing if the contract was entered into before Aug. 1, 1941.

5—Sellers of castings under the "pre-base" pricing method, once they have chosen to use this method to price castings 30 days after the effective date of the amendment, may not shift over to the "formula" method of pricing. This action is also being taken to stabilize ceiling prices for both sellers and buyers.

6—The scope of the "base period" method of computing maximum prices now is narrowed, with the result that more castings will be priced by the "formula" method. This is accomplished by providing that in order that a casting may be priced by the "base period" method, the *identical* casting must have been sold or offered for sale by the seller in the base period. If *substantially the same* casting was sold or offered for sale in the base period, a maximum price is thereby established only if it was sold or offered for sale to the purchaser to whom the casting is presently being priced.

The three methods for determining maximum prices for gray iron castings are: The first, or "base period" method, established maximum prices at the highest prices at which the seller sold the casting between Aug. 1, 1941, and Feb. 1, 1942.

The second, or "formula" method, establishes maximum prices for castings not sold or offered for sale during the base period, by use of the seller's pricing formula (including costs, overhead rates) which he employed on Feb. 1, 1942.

The third method for determining maximum prices is the "pre-base period" method, and the seller has the option of using this method in lieu of the formula method. Under the "pre-base period" method the seller uses as his maximum price for a casting not sold or offered for sale during the base period, the price at which he last delivered the casting prior to Aug. 1, 1941.

Senate Committee Delves Cost-Plus-Fixed-Fee Contracts

Washington

• • • **Exploratory hearings** on a Joint Resolution to prohibit further use of cost-plus-fixed-fee contracts will be opened this week, Sen. James E. Murray, Mont., chairman of the War Contracts Subcommittee of the Senate Military Affairs Committee, announced.

The committee is now investigating complaints that an unbelievable waste of manpower and money has resulted under the cost-plus system, Sen. Murray said.

The measure to be considered, Senate Joint Resolution 80, introduced by Sen. Homer Ferguson, Mich., lays down two basic policies:

1—No new cost-plus-fixed-fee war contracts may be awarded except where the head of the contracting agency personally certifies it is necessary to do so "because of lack of precedents or experience upon which to base fixed prices."

2—All outstanding cost-plus-fixed-fee contracts are to be shifted as rapidly as possible to a fixed-price basis.

A third provision requiring the mandatory use of "incentive fees" in all cost-plus-fixed-fee contracts awarded or continued in the future, will also be considered. Some of the war agencies claim to have made headway in developing cost-plus-fixed-fee contracts with incentives for lower costs, Sen. Murray said, by increasing the contractor's fee when his costs go down and his production rate goes up.

The schedule of witnesses for the preliminary hearings is as follows:

March 2—Donald M. Nelson, War Production Board; Paul V. McNutt, War Manpower Commission.

March 3—Various persons who have complained to the committee about waste under cost-plus-fixed-fee contracts.

March 6—Lindsay Warren, comptroller general; Admiral Emory S. Land, Maritime Commission.

March 7—Robert P. Patterson, under-secretary of War; James V. Forrestal, under-secretary of the Navy.

CMP Developments

• Dir. 2 to Reg. 9A rules that repairmen may use only up to $25 worth of material purchased under procedures contained in the regulation for installing any unit of cooking, plumbing, heating or used air-conditioning or refrigeration equipment. (Release No. WPB-5068)

•

• Reg. 5, as amended, makes it possible for persons desiring to purchase aluminum for MRO purposes to obtain it in the same manner that steel and copper in controlled materials forms and shapes are obtained. (Release No. WPB-5064)

•

• Dir. 47 to Reg. 1 permits a producer of steel in controlled material forms and shapes to accept orders for delivery of his products in excess of amounts that he is ordinarily permitted to accept under WPB regulations, if he is able to fill the orders from stocks that are available in his mill. (Release No. WPB-5039)

•

• Dir. 26 to Reg. 1 modifies rules governing returns of excess or unused allotments of controlled materials to bring them into conformity with WPB's decentralized operations. (Release No. WPB-5006)

Steel Order Acceptances

Washington

• • • **A producer of** steel in controlled material forms and shapes may accept orders for delivery of his products in excess of amounts that he is ordinarily permitted to accept under WPB regulations if he is able to fill the orders from stocks that are available in his mill, the WPB Controlled Materials Plan division announced on Feb. 24.

CMP regulations ordinarily prohibit producers of steel in controlled materials forms and shapes from accepting orders for their products in excess of 110 per cent of production directives that have been served on them by WPB or in excess of 105 per cent of anticipated monthly production in the event no production directives have been served.

The ruling, contained in direction 47 to CMP Regulation 1, indicates that orders which a producer is permitted to accept under the terms of CMP regulations may be accepted in excess of these limits if, but only if, the producer is able to fill them from items that he has in stock.

MRO Order Changed to Permit More Extensive Aluminum Use

Washington

• • • **Rules governing** maintenance, repair, and operating supplies (MRO) under CMP have been modified to make it possible for persons desiring to purchase aluminum for MRO purposes to obtain it in the same manner that steel and copper in controlled materials forms and shapes are obtained, the WPB announced on Feb. 26.

In addition, the limit of 100 lb. of aluminum for MRO purposes that formerly applied has been eliminated. Under the new rules the only limit on amounts of aluminum that may be bought by a person eligible to use the MRO symbol for the purchase of controlled materials is the purchaser's MRO quota.

The procedure that formerly applied required that a special form of certification had to be used by persons purchasing aluminum under the MRO regulation. This is no longer necessary. Under the new procedure, persons purchasing aluminum for MRO purposes need no longer certify that the use of other materials would be impracticable and that the total amounts of aluminum on order do not exceed 100 lb. for the calendar quarter in which delivery of the order is requested.

Elimination of the limit on purchases of aluminum for MRO purposes has made possible the elimination of an appeals procedure under which it was possible for users to make special application for permission to purchase in excess of 100 lb. of the metal.

The amended order also provides that if an appeal for an increased MRO quota has been granted by WPB, the increased quota may be used for operations during quarters subsequennt to the one which it was originally granted. This rule holds unless a substantial part of the increased quota was granted to take care of an abnormal situation.

The amended regulation points out that persons who use its provisions to obtain MRO materials must compute their MRO quotas and must maintain a record of them. In addition, it points out that records of expenditures against the quota must also be maintained. As a result, Direction 13 to CMP Regulation 5, which formerly required that quotas be computed, as now been revoked in view of the fact that the provisions are now spelled out in CMP Regulation 5 itself.

Price Briefs

• Amdt. 48 to RSR 1 exempts sales of brucite to producers of magnesium from price control. (Release No. OPA-T-1766)

•

• Amdt. 2 to MPR 1 allows sales of second-hand machine tools for the government to be certified instead of guaranteed.

•

• Amdt. 109 to MPR 136 permits substitution of certificates of operation in creditor sales by government.

•

• Amdt. 6 to RPS 69 establishes a new basing point for sales of primary lead at Bayfield, Wis. The maximum price for lead delivered at Bayfield in carload lots is 6.50c. per lb. (Release No. OPA-3938)

•

• Amdt. 108 to MPR 136 provides that the extra costs of silver-bearing solder and other emergency measures involved in the production of servicing machinery may be passed on to the consumer. (Release No. OPA-3935)

•

• Amdt. 8 to RPS 12 places a ceiling price of 5⅝c. per lb. f.o.b. point of shipment on briquetted cartridge brass turnings. (Release No. OPA-T-1751)

•

• Amdt. 89 to MPR 120 grants permission to producers in Bituminous Coal Producing District No. 8 to sell bituminous coal to two railroads for use as locomotive fuel at maximum prices established for commercial fuel. (Release No. NB-2154)

•

• Amdt. 95 to RSR 14 permits the War Department to reach agreements with warehousemen on storage charges where the warehouseman cannot set his ceilings by reference to identical services performed in March, 1942. (Release No. OPA-T-1765)

•

• Amdt. 87 to MPR 120 provides a means whereby distributors of a certain limited amount of bituminous coal normally marketed through distributors, may, under certain specified circumstances, obtain on their sales a price above that charged by the mine. (Release No. OPA-T-1740)

•

• Amdt. 27 to MPR 306 extends maximum prices established for the 1943 fruit and vegetable pack to fruits and vegetables packed up to the time that a 1944 pricing regulation is issued. (Release No. OPA-3969)

•

• Amdt. 7 to MPR 244 makes six changes in the provisions governing maximum prices for gray iron castings. (Release No. OPA-3956)

Deliveries Restricted on New And Used Container Machinery

Washington

• • • **All deliveries of** new and used container machinery, including that used for packaging and labeling, can closing, can making, glass jar and bottle making, and cleaning or reconditioning, will be restricted after March 1, WPB announced. In addition to requiring an AA-5 priority or better for delivery of this type of equipment, monthly operational reports must now be filed by manufacturers to assist the WPB in calculating trends on the demand for this type of equipment and the ability of producers to supply such demands without interfering with their war orders.

Formerly some types of container machinery came under the provisions of L-83, but because of the complex nature of this business the WPB decided to issue this separate order, L-332, to cover operations of their branch of industry.

Meyers, Creighton Latest To Leave Steel Division

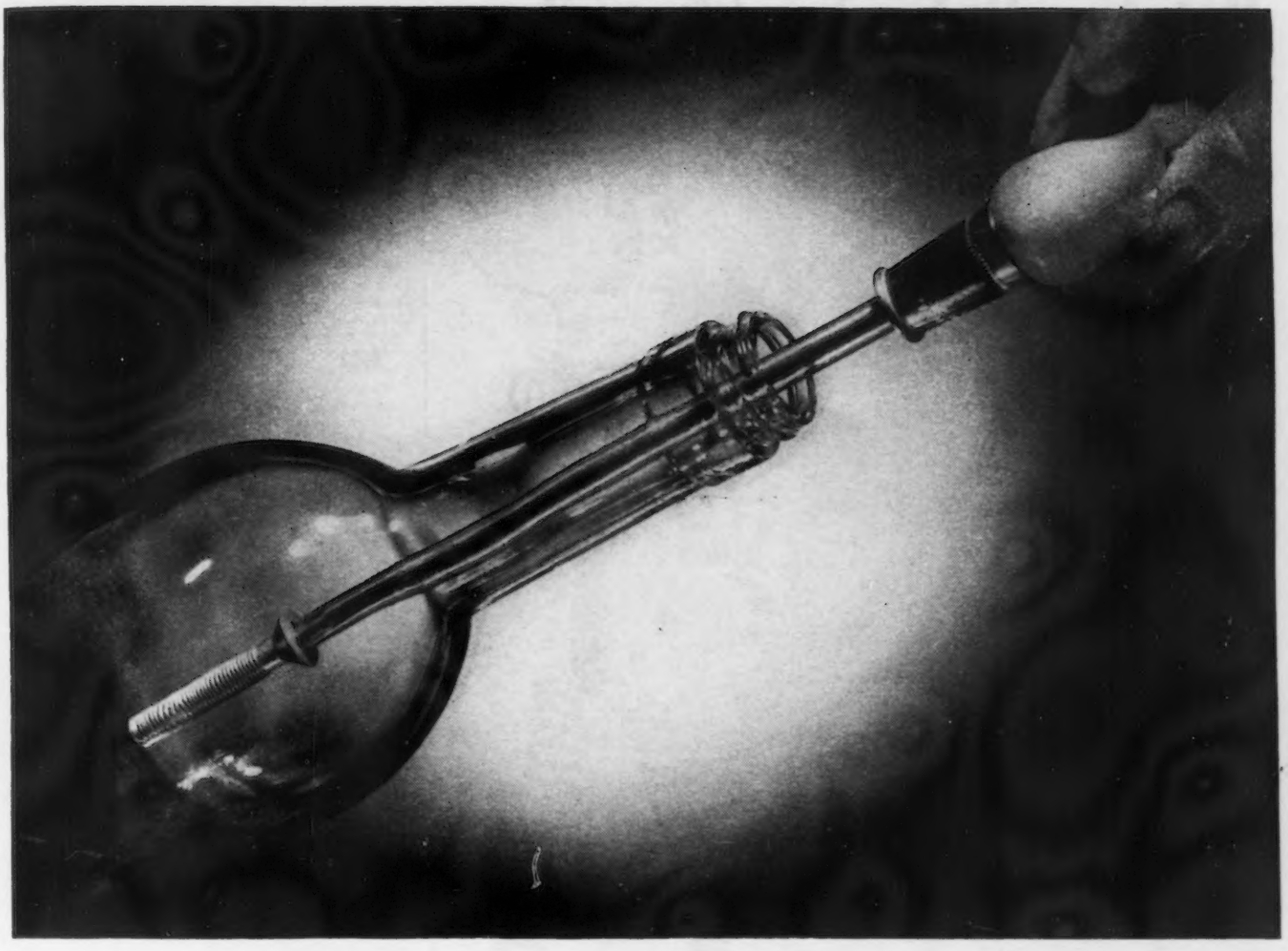
Washington

• • • **C. W. Meyers,** assistant director of the WPB Steel Division, has resigned, effective March 1. Mr. Meyers, who was manager of the Central Alloy District of the Republic Steel Corp. before coming to Washington to assume charge of the Steel Division's Raw Material and Facility Branch, will go back to Republic.

Louis E. Creighton, vice-president of the Rotary Electric Steel Co., who has been chief of the Steel Division's Alloy Steel Branch for the past year, resigned from WPB effective Feb. 29, to resume his former position.

COMING EVENTS

March 14, 15—National Association of Waste Materials, Inc., New York.
March 27, 28—American Society of Tool Engineers, Philadelphia.
March 30, 31—American Gas Association War Conference, Rochester, N. Y.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.
April 17, 18—American Zinc Institute, St. Louis.
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
May 1, 2—Westinghouse Machine Tool Forum, Pittsburgh.
May 25—American Iron and Steel Institute, New York.
Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.
Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.



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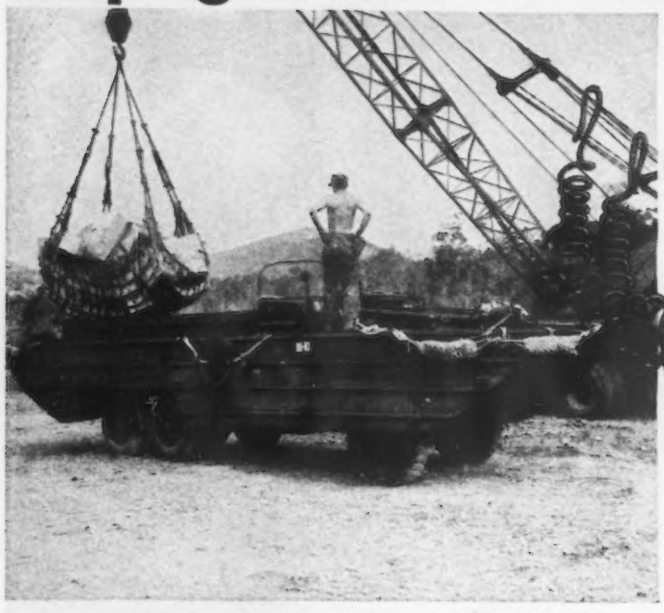

Unloading troop rations from an amphibious "Duck" on New Caledonia. Photo by U.S. Army Signal Corps.

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Priority Changes

L-30-b—Dir. 1 authorizes production of approximately 500,000 enameled cold pack canners. (2-19-44)

L-54-c—Amended order permits resumption of production of check, coin, envelope, currency, postal, and stamp machines to meet essential requirements. (2-26-44)

L-65-a—Order permits production of domestic electric flat irons for civilian use to be resumed on a limited basis in plants where labor is available and where there will be no interference with existing or potential war contracts. (2-24-44)

L-65—Amended order brings references in application forms, used by manufacturers in requesting permission to ship resistance wire and commercial cooking appliances, up to date through minor revision. (2-19-44)

L-145-a—Amended order places additional production controls on the output of large size ball bearings. (2-19-44)

L-154—Sched. II, as amended, lifts restrictions on the use of copper and copper base alloys that have limited the inclusion of these metals in the manufacture of tube and tube sheets of steam condensers. (2-21-44)

L-197—Dir. 1 relaxes the prohibition against the use of steel drums for shipping molasses. (2-23-44)

L-222—Amended order requires manufacturers and distributors of floor sanding and finishing machines to file a monthly report on production and shipments where production is scheduled. (2-19-44)

L-236—Sched. III, as amended, removes restrictions on the use of metals in the manufacture of marine fittings hardware. Action permits the use of alloy steel instead of carbon steel where necessary. (2-26-44)

L-237—Amended order raises the inventory limit of light power-driven tools to eight of each size and type for dealers in 17 Western states. (2-26-44)

L-298—Amended order rules that applications for the purchase of resistance welding equipment will continue to be accepted on Form WPB-2752 only until March 15. Thereafter applications must be submitted on Form WPB-1319. (2-25-44)

L-327—Order restricts the manufacture of lighting equipment for aircraft to equipment certified by the Aeronautical Board, Army Air Forces, Bureau of Aeronautics of the Navy, or the Civil Aeronautics Administration. Order effective April 10. (2-26-44)

M-9—Dir. 2 permits users of small amounts of copper raw materials to obtain in any calendar quarter materials containing up to 150 lb. of copper without obtaining WPB authorization. (2-22-44)

M-11—Amended order simplifies allocation procedures for slab zinc, but does not relax restriction on its use, however. (2-19-44)

M-225—Order dealing with overhead traveling cranes has been revoked. (2-19-44)

M-227—Amended order permits delivery to be made in any calendar quarter of 75 lb. or less of cuprous oxide to each laboratory or supplier principally engaged in supplying laboratories. (2-24-44)

P-19-h—Int. 1 points out that authorizations on CMPL-224 or GA-1456, the form in present use, is the equivalent of a P-19-h authorization as far as the delivery of restricted items for construction is concerned. (2-17-44)

P-68—Amended order clarifies the meaning of several provisions relating to MRO supplies for producers of iron and steel. (2-25-44)

P-98-b—Revised order extends to oil operators who provide maintenance and repair service to retail and consumer outlets the right to use an AA-3 rating. (2-24-44)

P-98-e—Revised order extends to oil operators who provide maintenance and repair service to retail and consumer outlets the right to use an AA-3 rating. (2-24-44)

Dir. 5 of Reg. 3, as amended, makes changes in phraseology for the purpose of clarification, and prohibits the extension of AA-1 and AA-2 blanket MRO ratings to secure production materials on the list attached to the direction. (2-18-44)

Reg. 18 has been amended to bring rules governing the freezing of production, delivery, and shipping schedules into conformity with Order M-293, as amended. (2-24-44)

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New Metallurgical Technique Shown in Enemy Patents

• • • This is the sixteenth list of seized enemy patents available on license from the Alien Property Custodian. These patents are grouped in classes. In the following lists, subclass numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationality, and the date the patent was issued.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time rules and procedures for obtaining the patents were described along with full information about their usage and possibilities. Seized patent applications were listed in THE IRON AGE on July 8.

Class 75—Metallurgy

1,728,909. Method of making tools from hard-metal alloys produced by sintering. K. Schroter, Germany. 9-17-29.

1,757,846. Manufacture of bodies for tools and the like from materials such as carbides, the alloys thereof, and the like. K. Schroter and Hans Wolff, Germany. 5-6-30.

1,773,793. Permanent magnets characterized by the fact that they are produced from steel alloys. C. Sattler, Germany. 8-26-30.

1,774,849. Hard alloy for tools and the process for their production. K. Schroter, Germany. 9-2-40.

1,812,811. Sintered hard metal alloys and articles made thereof, such as tools and implements, which alloys do not show pores in the fracture, in, for instance, a fifty-fold magnification. B. Strauss, Germany. 6-30-31.

1,895,959. Hard alloys for the manufacture of tools and implements. C. Agte and Kurt Moers, Germany. 1-31-33.

(.50) 2,179,810. Production of magnetic substances in finely divided form, the particles of which are characterized by a very small and uniform grain size. R. Brill and K. Schoenemann, Germany. 11-14-39.

(1) 1,721,416. Compositions comprising hard metal carbides. K. Schroter, Germany. 7-16-29.

(1) 1,729,697. Process of roasting iron carbonate ores. A. Apold and H. Fleissner, Austria. 10-1-29.

(1) 1,828,756. Process for the refining of chromium ores by treating the same at temperatures about 100 deg. C. with an alkali in the absence of oxygen. P. Weise and F. Specht, Germany. 10-27-31.

(1) 1,946,231. Process for the manufacture of alloys of precious metals which are amenable to heat treatment. L. Nowack, Germany. 2-6-34.

(1) 1,949,082. Method of obtaining heavy-metal beryllium alloys. E. Pokorny, Germany. 2-27-34.

(1) 1,973,441. Sintered hard metallic alloys for use in forming implements and tools. K. Moers, K. Schroeter and H. Wolff, Germany. 9-11-34.

(1) 1,991,912. Sintered hard metallic alloys for use in forming implements and tools. K. Schroter and H. Wolff, Germany. 2-19-35.

(1) 2,015,536. Sintered hard metal alloy suitable for the manufacture of working tools and implements. K. Schroter, K. Agte, K. Moers and H. Wolff, Germany. 9-24-35.

(3) 1,726,066. Process of converting tin ores into the form of pieces. P. Haedrich and O. Kippe, Germany. 8-27-29.

(3) 1,739,839. Process of agglomerating ore, mineral, or other matter and the product produced thereby. P. Jung, Germany. 12-17-29.

(6) 1,852,965. Process for obtaining metals from ores in a substantially pure state. C. Goetz, Germany. 4-5-32.

(7) 1,825,536. Process of reducing the quantity of sulphurous acid gas set free from copper glance on its roasting. M. Miyake, Japan. 9-29-31.

(7) 1,925,391. Process for the recovery of iron from iron and sulphur carrying metallurgical products especially ores. E. Kohlmeyer, Germany. 9-5-33.

(5) 2,075,210. Process for the agglomeration of fine iron ores. E. Kugener, Germany. 3-30-37.

(6) 2,045,226. Process for extracting metals

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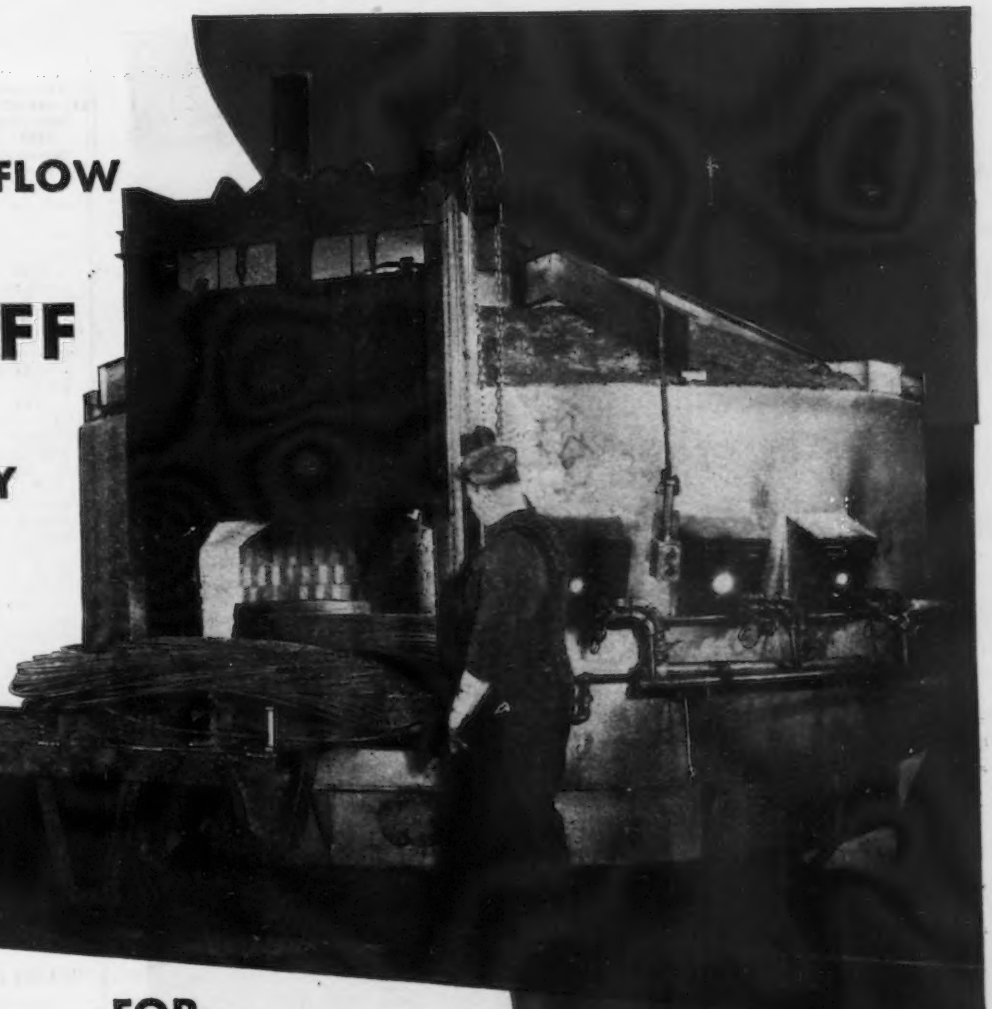

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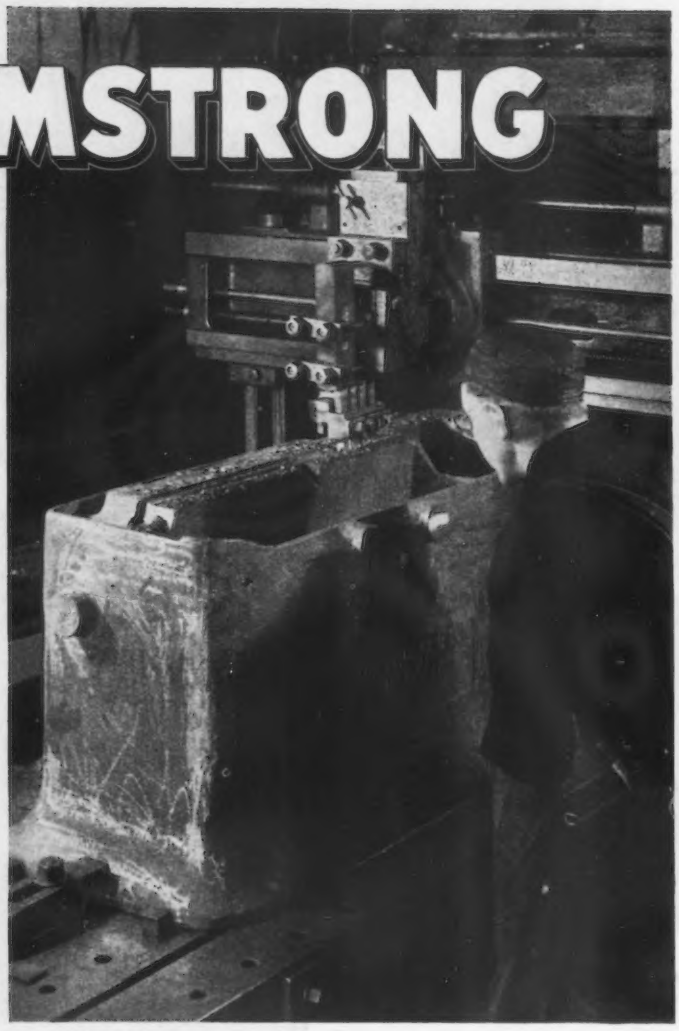

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There are ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers, and for many operations on turret lathes and screw machines. Each is a permanent multi-purpose tool that does the work of a complete set of forged tools. Each is a stronger, more efficient tool than can be forged and will stand up to the highest speeds and heaviest feeds. Each makes an ounce of high speed steel go as far as 10 ounces will go in a forged tool.

Use ARMSTRONG TOOL HOLDERS wherever possible. On all types of work, the heaviest as well as the lightest, they save man-hours, increase machine tool output and cut high speed steel requirements to a tenth.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. FRANCISCO AVE. CHICAGO 12, U. S. A.

Eastern Warehouses & Sales Office: 199 Lafayette St., N. Y.

Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

from ores. C. Goetz, Germany. 6-23-36.

(6) 2,082,284. Process for extracting metals from ores. C. Goetz, Germany. 6-1-37.

(10) 1,719,657. Method of treating antimonial ores by means of the wet reduction process. H. Goldmann, Germany. 7-2-29.

(10) 1,745,464. Process for the purification of metals. F. Wever, Germany. 2-4-30.

(10) 1,881,872. Method of producing aluminum and aluminum alloys. W. Neumann, Germany. 10-11-32.

(10) 1,884,993. Production of metallic magnesium by thermal reduction with carbonaceous material of magnesium containing material such as magnesium oxide or raw material containing or yielding magnesium oxide. F. Hansgirg, Austria. 10-25-32.

(10) 1,925,292. Method of sintering metallic bodies. R. Walter, Germany. 9-5-33.

(10) 2,012,777. Method of manufacturing alloys substantially free from associated deleterious impurities of carbon, silicon, oxygen, nitrogen, sulfur, phosphorus and the like. W. Rohn, Germany. 8-27-35.

(10) 2,097,344. Process for accelerating metallurgical slag reactions in inductively heated electric melting furnaces. W. Rohn, Germany. 10-26-37.

(10) 2,099,151. Production of magnesium from magnesium oxides. A. Vogt, Germany. 11-16-37.

(10) 2,177,070. Method for metallurgical treatment of ores by high frequency electric currents. Hideyuki Kikuchi, Japan. 10-24-39.

(11) 2,071,942. Method of manufacturing iron alloys. W. Rohn, Germany. 2-23-37.

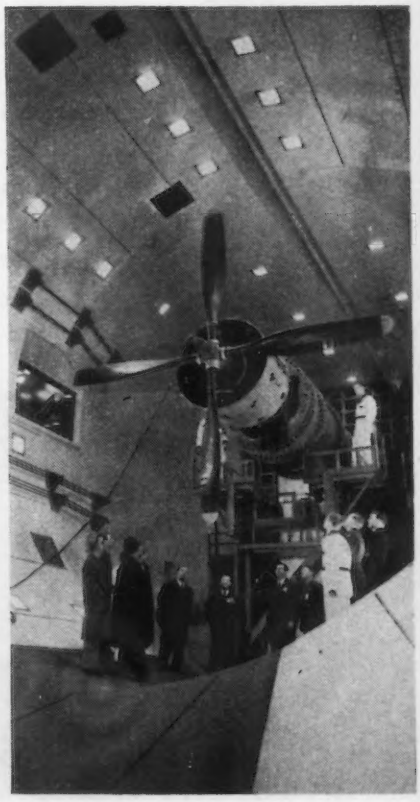
(11) 2,139,853. Method of making steel in inductively heated electric melting furnaces. W. Rohn, Germany. 12-13-38.

(11) 2,156,263. Method of manufacturing iron by direct reduction. K. Kusaka and H. Ashida, Manchukuo. 5-2-39.

(12) 1,608,270. Method for the decarbonizing of highly-carbonaceous ferro-chromium. L. Friderich and W. Rodenhauser, Germany. 11-23-26.

(12) 1,923,471. Manufacture of steel in an

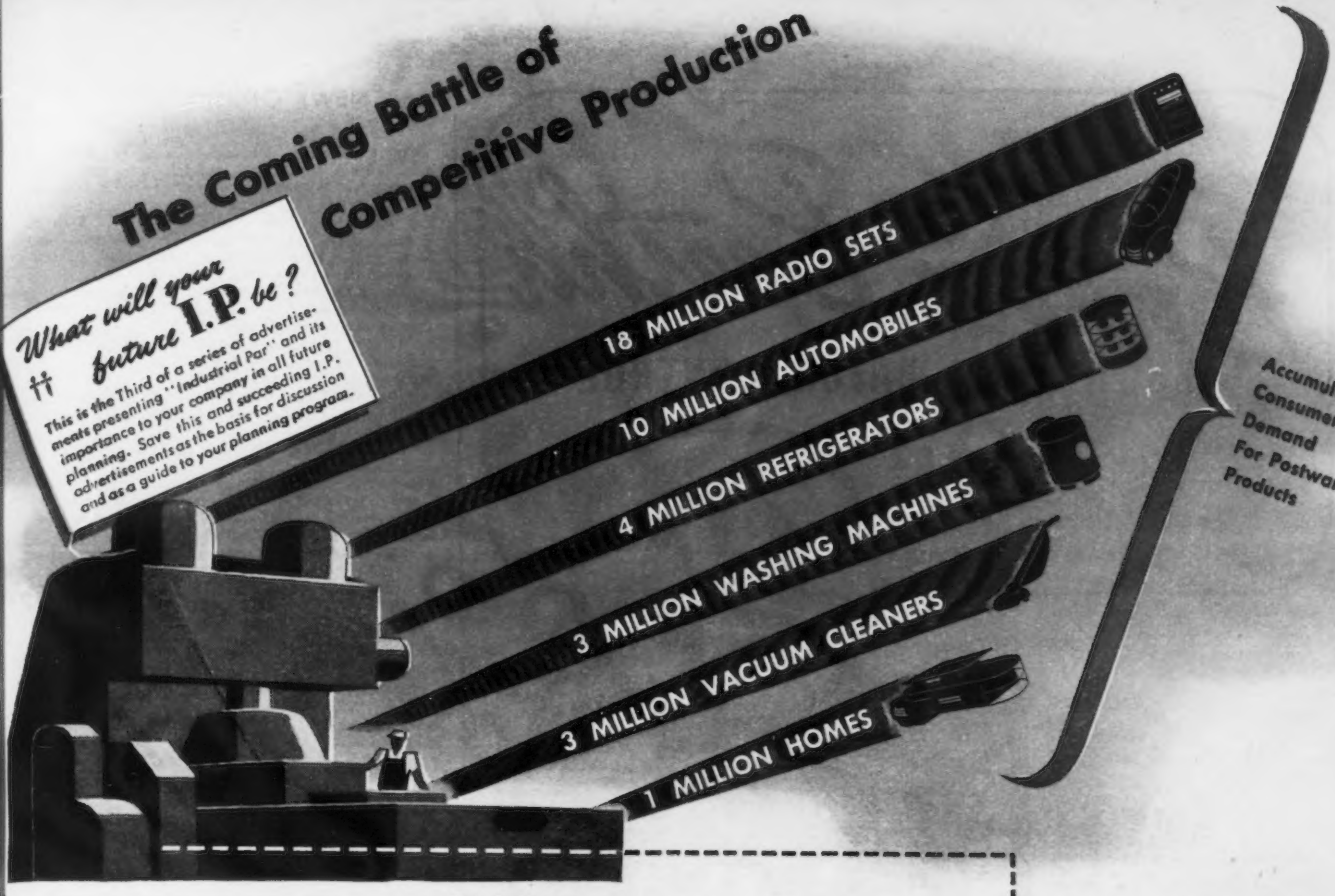
WORLD'S LARGEST: *This, the world's largest four-blade hollow steel electric propeller, 16 ft. 8 in. in diameter, will be tested at the Caldwell, N. J., plant of Curtiss-Wright. The propeller cell used can test blades for engines up to 5000 h.p.*



The Coming Battle of Competitive Production

What will your future **I.P.** *be?* ††

This is the Third of a series of advertisements presenting "Industrial Par" and its importance to your company in all future planning. Save this and succeeding I.P. advertisements as the basis for discussion and as a guide to your planning program.



will your company's I.P. qualify you to meet the Challenge

THERE'S a lot of "wants" waiting to be supplied by peacetime production. Millions of people are just marking time—with billions in money saved and ready to spend — to buy new radios, cars, refrigerators, washing machines, vacuum cleaners, homes and scores of other products as soon as they become available again.

When this flood of pent-up purchasing power breaks, American industry can expect a hard battle of competitive production. The old rule of three in manufacturing consumer goods—quality, quantity, low cost — will be in full sway again.

Manufacturing for peacetime markets will challenge managerial skill as much as manufacturing for war. Building a dominant position in these markets — finding profits — establishing the conditions for employment — will call for broad-visioned plans, able direction and execution.

To improve quality — reduce cost — and increase the output of goods, machine tools — the newest and finest — are indispensable. Machine tools are of key importance in determining your company's standing in terms of *industrial par* — the constantly increasing output per man-hour equal to approximately 50% every 10 years.

Other things being equal — quality of product, price, sales organization — the successes in the coming battle of competitive production will come to those companies best qualified to attain or excel industrial par — its vital significance as summarized in the panel headed "Spotlight Facts for Your Future I. P. Planning."

Your planning for postwar should include as a major project the matter of machine tools — provision for their continuing replacement to assure full productive capacity — to enable you to keep step with a high level of national prosperity — the volume production of more goods for more people at lowest cost and the resulting security of jobs and wages for the greatest number of workers.

Spotlight facts for your future I.P. *planning*

- ✻ Production methods — developed in wartime —increase man-hour output; pent-up buying power — released in peacetime — demands increased production.
- ✻ The rate of 2½% increase per year output per man-hour, established by a 12 year record of industrial production, can be expected to reach at least 4% per year — compounded.
- ✻ Manufacturers must set a goal of 50% increased output per man-hour every 10 years — to maintain a high level of national prosperity and achieve its benefits in terms of security of jobs and wages for the greatest number of workers and the volume production of more goods for more people at lowest cost.
- ✻ Machine tools — the most modern, most efficient — are recognized as the most effective implements of mass production and increased output at lowest cost — but only continual replacements with the newest and finest machine tools assures full productive capacity. *Such replacements yearly should be equal to 10% of the total machine tool investment — in keeping with increased output.*
- ✻ The cost of machine tools is insignificant in terms of their productive power . . . from 1927 to 1937, according to census reports, American manufacturers had only a total of about 2% invested yearly in machine tools in ratio to a total volume of 9 billion dollars' worth of production annually.

†† **Industrial Par** — *the constantly increasing output per man-hour equal to approximately 50% every 10 years.*

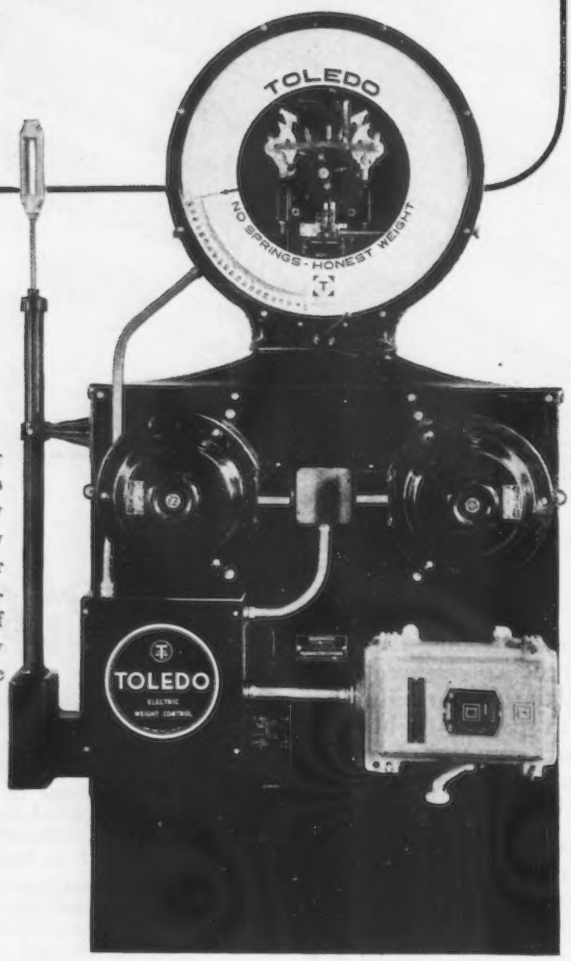
KEARNEY & TRECKER CORPORATION

MILWAUKEE 14 WISCONSIN

Let's All Back the Attack! **BUY MORE BONDS**

Milwaukee Machine Tools

Buxom Bertha
KNOWS HER BATCH CONTROL



Our Engineers dubbed her "Buxom Bertha." In glass plants where she works they know how deft her hand, how keen her eye, how efficient her control in the automatic high-speed low-cost batching of multiple ingredients. They love her for her superlative accomplishments.

A TOLEDO *CONTROL* INSTRUMENT

● Toledo Scales weigh-count-measure-*control* both fluids and solids. So doing, they monitor production and accumulate Control Facts which are vital to the maintenance of quality and the accurate determination of costs. They are the Silent Sentinels of Production.

Behind their quiet efficiency stands TOLEDO RESEARCH —the coordinated activity of the largest engineering-research group in the scale industry.

Toledo Research, prewar, had up its sleeve many developments in the fields of applied electronics and optics, which have helped to make War Things better, and faster.

Toledo Research, postwar, will help build a better world through the more accurate and rapid measurement and control of materials . . . Toledo Scale Company, Toledo, Ohio.

TOLEDO SCALES

TIP FOR TOMORROW *PRINTED Weight Records will become universal in Industry, postwar. Hundreds of war plants are using them. We are at liberty to send you complete information now.*

electric furnace containing one or more of the metals tungsten, molybdenum and vanadium. C. Arnold, Germany. 8-22-33.

(12) 2,040,566. Vacuum method of manufacturing steel. W. Rohn, Germany. 5-12-36.

(12) 2,040,604. Method of manufacturing low carbon iron and steel alloys. H. Gruber and W. Rohn, Germany. 5-12-36.

(12) 2,135,466. Treatment of titanium bearing iron ores or spongy iron obtained therefrom. K. Iwase, Japan. 11-1-38.

(12.60) 1,839,157. Titanium steel and the process of manufacturing the same. W. Mathesius, Germany. 12-29-31.

(17) 1,833,276. Recovery of copper from ammoniacal waste copper lyes. W. Busch, Germany. 11-24-31.

(17) 1,923,511. Process for eliminating arsenic and antimony from iron ores and manganese ores. E. Scheil, Germany. 8-22-33.

(17) 1,945,565. Process of producing heavy metal beryllium alloys. E. Pokorny and K. Schneider, Germany. 2-6-34.

(18) 1,639,610. Recovery of copper, zinc, and other metals from solutions containing chlorides and sulphates. K. Mattenklodt and H. Schramm, Germany. 8-16-27.

(18) 1,720,138. Method for working up solutions obtained by leaching ores having been subjected to a chlorination roasting process. H. Neumark, Germany. 7-9-29.

(21) 1,732,788. Process of reducing ores and the like which contain compounds, for instance, oxides, of easily fusible heavy metals, such as lead, tin, antimony and bismuth, by means of silicon or silicides. W. Buddeus, Germany. 10-22-29.

(21) 1,762,867. Process for working up complex ores and metallurgical products. F. Johannsen, Germany. 6-1-30.

(21) 1,889,482. Steel having a high yield point and a good notch toughness. A. Klinkenberg, Germany. 11-29-32.

(21) 1,941,506. Process for recovering nonferrous metals from melts containing metal oxides. W. Witter, Germany. 1-2-34.

(21) 2,105,657. Alloy for permanent magnets consisting mainly of nickel, titanium, cobalt and iron. K. Honda, Japan. 1-18-38.

(21) 2,105,658. Permanent magnet made of an alloy consisting of nickel, titanium, cobalt and iron. K. Honda, Japan. 1-18-38.

(21) 2,186,645. Process for reducing material containing zinc in shaft furnaces. H.

SAFETY LENSES TESTED: *Lillian Lapierre, American Optical Co. inspector, tests the toughness of safety goggle lenses by trying to break them. A 5/8-in. steel ball weighing about 1/2-oz. is dropped through the pipe at right a distance of 6 ft. on the lenses. The lenses must survive this test.*

IT'S CONTINENTAL WIRE *All the way*

Quality control at Continental carries through all steps of wire fabrication. From furnace to finish, Continental wire is under the supervision of Continental's own workmen. Continental's integrated, modern facilities make it possible to produce wire with superior qualities for many uses and methods of fabrication . . . wire in a wide variety of specifications to meet the exacting requirements of manufacturers.

CONTINENTAL STEEL CORPORATION, KOKOMO, INDIANA

CONTINENTAL STEEL CORPORATION ★ SUPERIOR STEEL WIRE

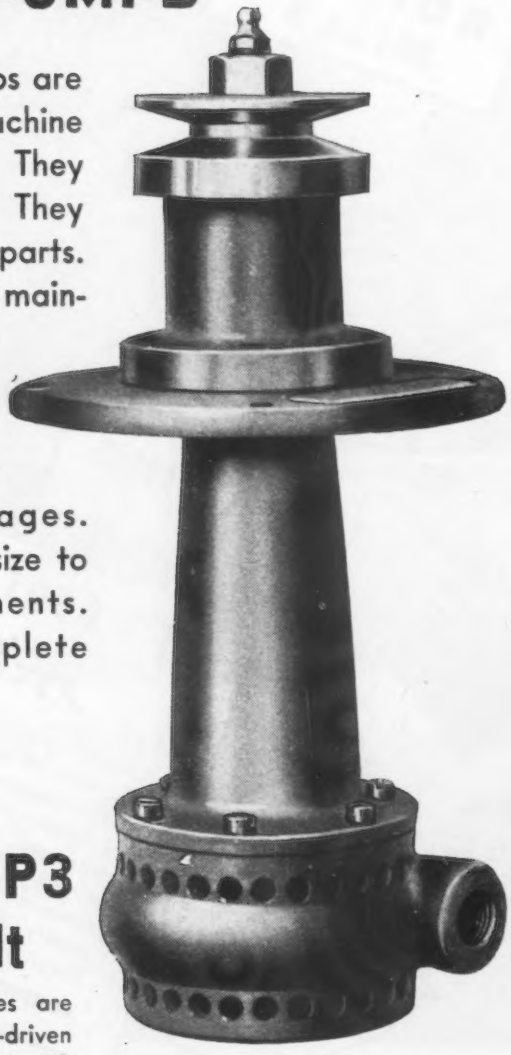
CONTINENTAL
STEEL CORPORATION

PRODUCERS OF— SHEETS: Black, Galvanized, Copperior, Hot and Cold Rolled, Special Coated, Long Terne, etc
WIRE: Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc

SPECIFY...

GUSHER
COOLANT PUMPS

Gusher Coolant Pumps are used by leading machine tool manufacturers. They are simple in design. They have few moving parts. They require minimum maintenance. Not injured by chips or grit. Capacity is from trickle to 200 g.p.m. Many exclusive advantages. There's a type and size to meet your requirements. Write for new complete catalogue.



●

Model 1-P3
"V"-Belt

The essential features are the same as motor-driven Gusher models, the only difference being the substitution of an automatically oiled gear-driven mechanism for the motor.

THE RUTHMAN MACHINERY CO.

1821 READING ROAD CINCINNATI 2, OHIO

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS

Klein, Germany. 1-9-40.

(22) 1,919,730. Production of porous metal and metal oxide. J. Koenig and F. Stoewener, Germany. 7-25-33.

(22) 2,030,229. Process of making compound structural material and shaped articles thereof. P. Schwarzkopf, Austria. 2-11-36.

(22) 2,082,126. Method of manufacturing porous metallic bodies of every kind. R. Schulz, Gremany. 6-1-37.

(22) 2,122,053. Process of manufacturing porous metallic bodies. H. Burkhardt, Germany. 6-28-38.

(22) 2,159,604. Process of producing nickel articles. L. Schlecht and W. Schubardt, Germany. 5-23-39.

(22) 2,172,548. Shaped bodies for electric purposes, particularly leading-in wires and bars for electric current. P. Schwarzkopf, Austria. 9-12-39.

(22) 2,179,960. Agglomerated material in particular for electrical purposes and shaped bodies made therefrom. P. Schwarzkopf, Austria. 11-14-39.

(22) 2,219,095. Method for the production of piston rings, especially of light metal pistons for internal combustion engines. P. Schuttler, Germany. 10-22-40.

(22) 2,227,176. Method of sintering hard substances in vacuum. B. Berghaus and W. Burkhardt, Germany. 12-31-40.

(22) 2,227,177. Method of manufacture of sintered bodies from metal powders or from powders of hard materials or their mixtures. B. Berghaus and W. Burkhardt. Germany. 12-31-40.

(22) 2,289,787. Method of producing metal bars from metal powder in a continuous process and machines for carrying out said method. K. Kaschke and H. Vogt, Germany. 7-14-42.

(25) 1,713,435. Method of working blast furnaces with the aid of furnace dust. P. Heskamp, Germany. 5-14-29.

(25) 2,002,932. Steel for railroad rails, wheel tires, plank piles, and other objects. H. Buchholtz, Germany. 5-28-35.

(26) 1,736,665. Process of extracting volatilizable metals from ores and metallurgical products. H. Paper, Germany. 11-19-29.

(27) 1,964,139. Process for the production

CASTING CORES: *These cores are used in production of cast magnesium aircraft engine parts. Here, they are ready for baking at the magnesium foundry of Chevrolet Motor Division of General Motors.*

BRAKE SHOE WARS ON WEAR

Announces research group to make vital parts last longer

For years, Brake Shoe in all of its divisions has been fighting to reduce losses caused by wear; heat, friction, impact, corrosion, abrasion and stress — wear from whatever cause.

Now such activities have been augmented and strengthened by centralization of experimental engineering under the direction of a Research Group at Mahwah, N. J.

While activities of this Research Group cover a wide range of industrial problems, their immediate responsibility is to carry on relentless war on wear.

In nearly every machine there is a "punished" part — a place where wear is greatest.

Often a manufacturer's success depends upon his ability to improve that particular "punished" part.

It is Brake Shoe's business to *know* the best material for each "punished" part and *how* to produce that material economically.

If existing materials are not good enough the Research Group endeavors to design better ones.

If design is faulty, Brake Shoe engineers can offer sound suggestions for changes.

Brake Shoe focuses *on one part* the effort that the manufacturer, for cost reasons, must spread over the *whole* machine.

The result? A better product . . . often at lower cost.

The resources of the Brake Shoe Research Group — unique we believe in this country — are available to manufacturers whose production calls for large runs of standardized parts.

Is Brake Shoe on Your Parts Source List?

Because many of the millions of parts produced by Brake Shoe for war have equally important peacetime uses, Brake Shoe will be ready for parts assignments in volume, the moment victory is won!

BRAKE SHOE'S RESEARCH GROUP

1. *Engineering Laboratory*
2. *Metallurgical Laboratory*
3. *Experimental Foundry*

AMERICAN Brake Shoe COMPANY

A parts source that may help you meet postwar competition

American Brake Shoe Company, 230 Park Ave., New York 17, N. Y.

8 DIVISIONS, 59 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakeblok Division	*Detroit, Mich.*	**Kellogg Division**	*Rochester, N. Y.*
Ramapo Ajax Division	*New York City*	**American Forge Division**	*Chicago, Ill.*
American Manganese Steel Division	*Chicago Heights, Ill.*	**Southern Wheel Division**	*New York City*
Brake Shoe and Castings Division	*New York City*	**National Bearing Metals Corp.**	*St. Louis, Mo.*

Annealing
in the STRONG *manner*

USERS OF STRONG STEEL CASTINGS *are keenly aware of how much they gain in the elimination of internal stresses by the Strong heat-treating and annealing processes. The car annealing furnace shown above is 12 feet wide by 14 feet long. It is oil fired and controlled by recording pyrometer.*

Wherever it is desirable, Strong double anneals its castings for extra protection. Strong also uses a pit type annealing furnace, oil fired with heat recorder control. Strong can tell a host of vital facts about heat-treating every steel casting buyer should know. Just ask for them.

STRONG IN NAME
STRONG IN FACT

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N.Y.

Strong

TENSILE STRENGTH · ELONGATION

of ferroboron. E. Pokorny and H. Seliger, Germany. 6-26-34.

(27) 1,970,467. Process for working up ferrovanadium containing products. E. Mayr, Germany. 8-14-34.

(28) 1,751,778. Method for making zinc from oxygen compounds of zinc or substances containing oxygen compounds of zinc. C. F. von Girsewald and H. Neumark, Germany. 3-25-30.

(30) 2,035,550. Process for producing pig iron or steel simultaneously with portland cement. E. Karwat, Germany. 3-31-36.

(32) 1,964,917. Process of directly producing wrought iron. F. Johannsen, Germany. 7-3-34.

(32) 2,047,562. Process of producing wrought iron from ferriferous minerals and metallurgical products. F. Johannsen, Germany. 7-14-36.

(32) 2,228,702. Production of lumped wrought iron in a metallurgical furnace from ferriferous minerals and metallurgical products, including crude ore, purple ores and slags. F. Johannsen, Germany. 1-14-41.

(34) 2,217,569. Process for the production of metallic iron powder. W. Stephan, Germany. 10-8-40.

(35) 2,107,549. Process for the reduction of fine iron ores. H. Schmalfeldt, Germany. 2-8-38.

(36) 2,026,683. Treating ferriferous ores. F. Johannsen, Germany. 1-7-36.

(36) 2,112,566. Process and apparatus for the production of metallic iron in the rotary tube kiln. A. Hasselbach, Germany. 3-29-38.

(37) 1,856,607. Process for producing sintered alloys. R. Walter, Germany. 5-3-32.

(38) 2,045,639. Process for the production of molten iron or steel by the direct method. F. Eulenstein and A. Krus, Germany. 6-30-36.

(39) 1,864,673. Production of pure metals by the removal from metal powders of the impurities which form volatile compounds with oxygen. L. Schlecht and F. Duftschmid, Germany. 6-28-32.

(39) 2,018,300. Method of producing industrial iron by means of iron sponge. H. Esser, Germany. 10-22-36.

(39) 2,127,299. Treating lumped iron. F. Johannsen and W. Volkel, Germany. 8-16-38.

(40) 1,815,946. Extracting of iron from its ores and process and apparatus therefor. A. Langer, Austria. 7-28-31.

(40) 1,868,666. Process for the direct extraction of iron from its ores and furnace for carrying out the said process. A. Langer, Austria. 7-26-32.

(40) 2,185,911. Direct batch process for the production of iron and steel. F. Eulenstein and A. Krus, Germany. 1-2-40.

(41) 1,773,491. Method of producing the blast required for blast-furnace or similar plants by means of calcium carbide. G. Malyoth, Germany. 8-19-30.

Copyright, 1944

(41) 2,057,919. Method of influencing the chemical and physical properties of blast furnace slags. J. Roll, Germany. 10-20-36.

(41) 2,120,740. Production of crude iron containing more than 0.6 per cent of titanium. E. Faust and E. Jung, Germany. 6-14-38.

(41) 2,205,896. Method of refining clayey iron ores. H. Yamagata, Japan. 6-25-40.

(42) 1,846,558. Process for making self improving aluminum alloys. S. Junghans, Germany. 2-23-32.

(43) 1,752,374. Process of producing steel in an open-hearth furnace. R. Durrer, F. Siemens and A. Sprenger, Germany. 4-1-30.

(43) 1,807,468. Process and device for the production of iron-alloys free from gases, especially oxygen. C. Brackelsberg, Germany. 5-26-31.

(43) 2,146,872. Method for operating cupola shaft furnaces. J. Wilberz, Germany. 2-14-39.

(43) 2,158,511. Method for the production of cast iron in cupola furnaces. K. Lauer, Germany. 5-16-39.

(44) 1,756,049. Method of utilizing bundled scrap metal. F. Wust, Germany. 4-29-30.

(45) 1,729,378. Method of manufacturing articles for which a resistibility against the noxious effect of the aged state is required. A. Fry, Germany. 9-24-29.

(45) 1,940,341. Process for treating iron baths in steel producing furnaces. H. Bansen and K. Lobbecke, Germany. 12-19-33.

(50) 1,705,972. Production of gray cast iron. H. Hanemann, Germany. 3-19-29.

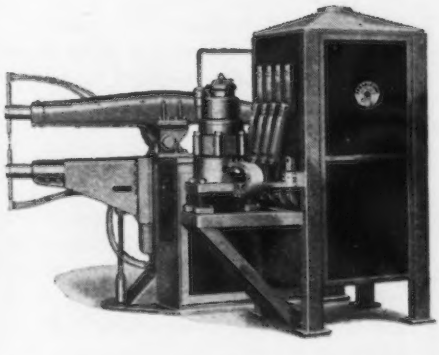
(50) 1,705,995. Process for the manufacture of a highly valuable cast iron. E. Piwowarsky, Germany. 3-19-29.

(50) 1,751,185. Method of smelting low carbon cast iron. F. Wust, Germany. 3-18-30.

To Be Continued

Announcing "STORAGE BATTERY" WELDERS

by PWC



The PWC STORAGE BATTERY Welder is already in use, welding aluminum for war materiel.

What a STORAGE BATTERY Welder is:

A modified PWC resistance welder (gun or machine type) with specially designed storage batteries instead of transformers or condensers . . . a simple non-arcing D-C controller-contactor (Patent applied for) . . . a continuous battery-charging low line-load instead of momentarily high power demand . . . Operated with a simple sequence weld-timer.

What a STORAGE BATTERY Welder does:

Eliminates reactance losses between power supply and electrodes . . . Eliminates inductive losses in the welding "loop" . . . Operates with virtually unity power factor . . . Eliminates high voltage "danger" . . . Provides maximum simplicity of maintenance.

What STORAGE BATTERY Welding means:

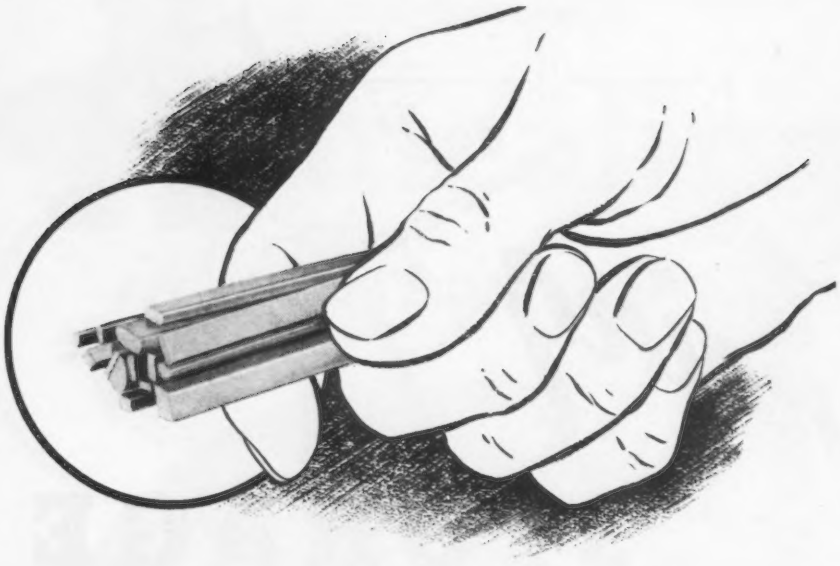
Lower cost stored energy welding equipment . . . Lower operating cost including vastly lower power cost . . . Ability to spot-weld aluminum even where power line capacity is relatively low . . . High efficiency even when welding at considerable distance from power supply . . . Less critical adjustments to get consistently good welds . . . Vastly simpler to operate.

Ask for Bulletin No. 901

PROGRESSIVE WELDER CO.

SEAM PRODUCTION & BUTT . . . *Electric Welding Equipment* . . . PORTABLE GUN & PEDESTAL

3050 E. OUTER DRIVE • DETROIT 12, U. S. A.



PAGE *Stainless Steel* WIRE

• If you are planning to use Stainless Steel Wire after re-conversion—**GET IN TOUCH WITH PAGE.**

Remember, wire has *always* been the business of **PAGE.** And, even in the earlier days of Stainless Steel, **PAGE** as a supplier of Stainless Wire learned much of its working qualities.

Then came the wide range of **PAGE** Shaped Wires—Hexagons, Octagons, Triangles, Keystones, Ovals, Half-rounds—in section areas to

.250 sq. inches, and Rectangles and Flats in widths up to 3/8 inch.

All this activity brought more knowledge of the workability of Stainless Steel.

Then came 1941—and war—with a tremendous increase in the use of Stainless Steel that has made this entire organization perfectly at home with this product.

So, again! If you are planning to use Stainless Steel Wire after re-conversion, **GET IN TOUCH WITH PAGE!**

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles, New York, Pittsburgh, Portland, San Francisco

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

Keep Eye on Ball, Says C. E. Wilson

• • • Charles E. Wilson, executive vice chairman of WPB, in a speech before the American Arbitration Association, on Feb. 17, said: ". . . altogether too many people, particularly in industry, are taking their eyes off the war production ball. Too many are looking ahead and casting about to find their place in the postwar parade. Postwar production is admittedly an exciting and fascinating prospect. It is natural and human that the interest of businessmen should center on it more and more — but it is also terribly dangerous and we must guard ourselves strictly against too much indulgence in postwar thinking."

Tool Engineers Plan Two-Day Session

• • • One of the most significant technical programs ever sponsored by the American Society of Tool Engineers has been announced for the annual meeting of the society scheduled for March 27 and 28 at the Bellevue-Stratford Hotel, Philadelphia. One of the innovations will be the presentation at one session of a series of papers discussing all the factors relating to the putting into production of a vital war product. Scheduled for Monday morning, the 27th, it will cover by papers presented by departmental heads of a major industrial producer, the engineering, planning for production, tooling, foundry and machining operations and inspection methods relating to this one product, thus providing an integrated picture of all the problems involved.

Monday afternoon's session will be devoted to new developments in surface finishing methods, with particular stress on honing through papers by Kirke W. Connor, president, Micromatic Hone Corp., Detroit, and A. F. Hasty of Sunnen Products Co., St. Louis.

Monday evening's meeting is devoted to the integrating of manufacturing, tooling and personnel to produce war products, with William Jack of Jack & Heintz in Cleveland revealing the principles on which this company based its production achievements as well as an analysis of the merits of the plan from a technical standpoint in terms of results achieved.

Tuesday morning's session is de-

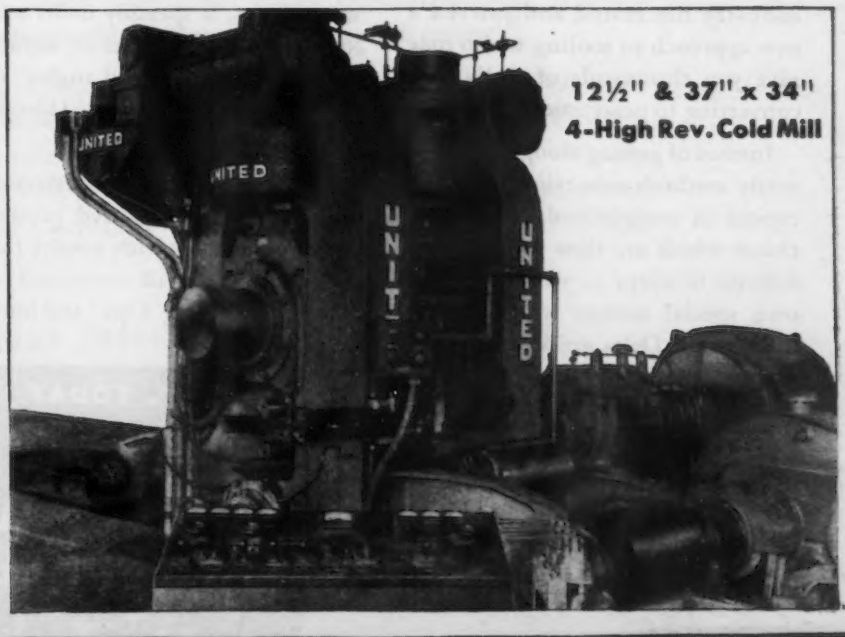
4-High Precision Cold Mills

For Rolling Ferrous and Non-Ferrous Metals

These UNITED MILLS are used chiefly for accurate finishing of thin gauge strip. Their simplicity of design permits flexible speed operations at a low maintenance and operating cost.

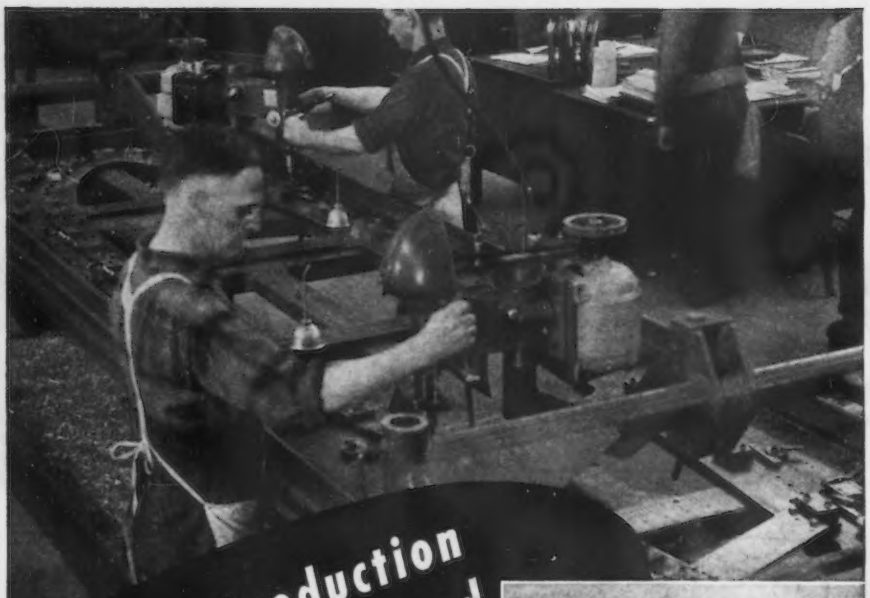
They are a product of UNITED'S more than 40 years experience in the design and construction of rolling mills and their auxiliary equipment.

9½" & 22" x 12"
4-High Rev. Cold Mill



12½" & 37" x 34"
4-High Rev. Cold Mill

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment



Aircraft Production Specialists Speed Up Output . . .

Official U. S. Navy Photograph

. . . by building standard low-cost DELTA DRILL PRESS units into this ingenious jig . . .

By hundreds of applications similar to this one at Curtiss-Wright, war industry has tested and proved a new approach to tooling which may save you thousands of dollars in converting to peacetime production:

Instead of getting along with slow, costly methods—or tying up heavy capital in complicated special machines which are slow to build and difficult to adapt — you build your own special set-ups with low-cost stock-model Delta units or batteries.

The trunnion jig in the picture is an excellent example. Equipped with two standard 14" Delta Drill Press heads attached to hinged arms on carriages, it speedily drills over 200 holes on both sides of duralumin shapes, in "matched angles" requiring extreme accuracy. (Details on request.)

For a simple, safe, satisfactory solution of widely varied production problems — with results that are creditable to all concerned — write for "Tooling Tips" and latest Delta catalog. MA-5

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Please send me "Tooling Tips" and latest catalog of your full line of low-cost machine tools.

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DELTA MILWAUKEE Machine Tools

voted to a symposium on electronics as applied to machining. One paper will be read by T. R. Lawson of the electronic control section of Westinghouse Electric & Mfg. Co., the other two by machine tool manufacturers. The first of these is by R. A. Cole, experimental engineer of the grinding machine division, Norton Co., while the second is by B. T. Anderson, of Sundstrand Machine Tool Co.

Two of the most recently spectacularly developed machining processes—fly-cut milling and broaching—form the nucleus of discussions at the Tuesday afternoon session, the former being presented by Ralph R. Weddell, president, Weddell Tools, Inc., Rochester.

The annual meeting will be brought to a close Tuesday night with a banquet at which John H. Van Deventer, editor of THE IRON AGE, is the principal speaker, discussing "The Tool Engineer and the Post War World." Ray H. Morris, A.S.T.E. president, will preside at the banquet, with past-president T. B. Carpenter as toastmaster. Installation of officers for 1944-45 will also take place at the banquet, together with presentation of the annual membership trophy award.

No show is scheduled coincident with the annual meeting, this year.

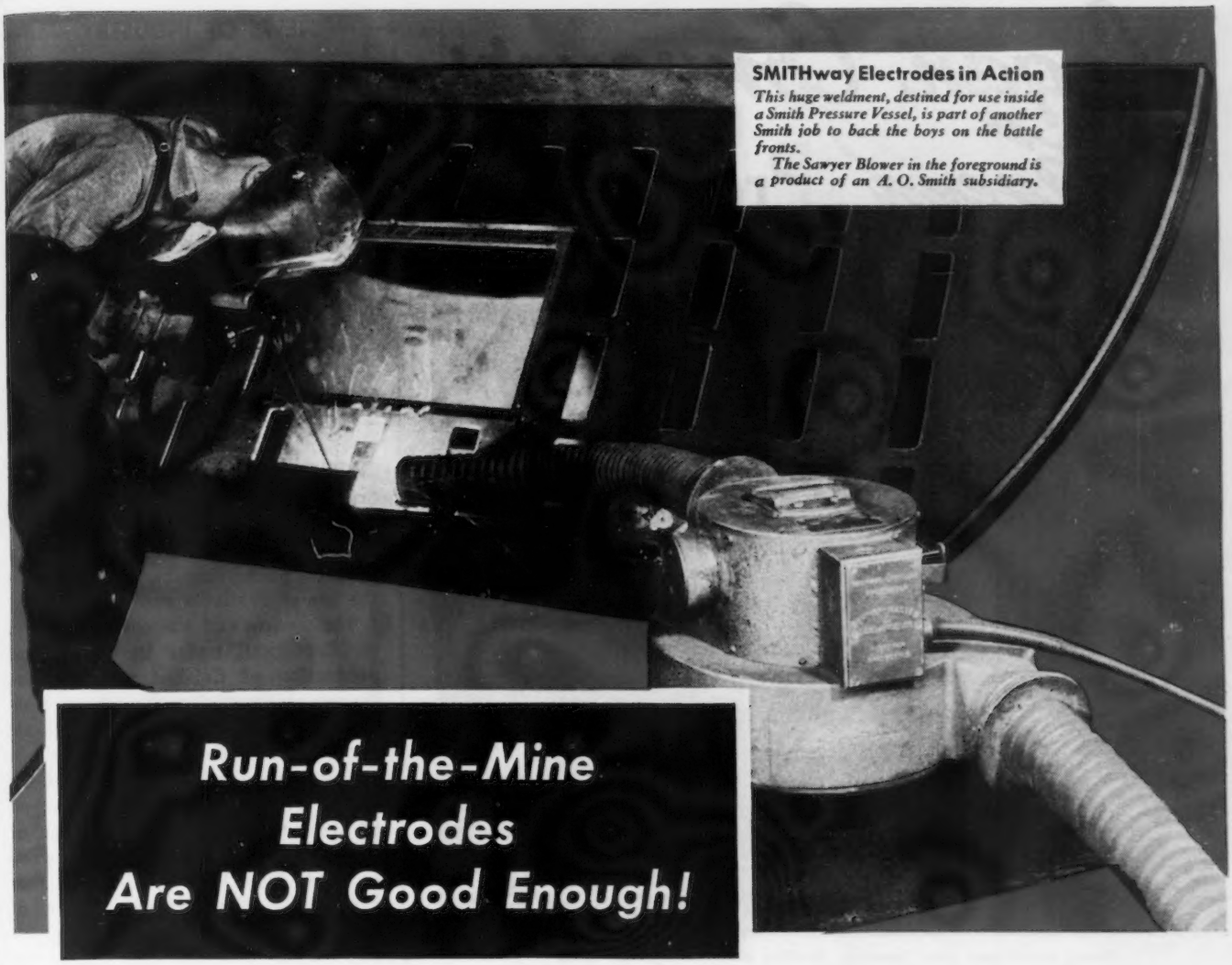
General Chairman for the annual meeting is Adolph E. Berdick, 1st vice-chairman of the Philadelphia Chapter of the A.S.T.E. and co-owner of the Engineering Tool Co., Philadelphia. A.S.T.E. 1st vice-president D. D. Burnside is in charge of the technical program, assisted by W. B. Rapp of W. B. Rapp Machining Co.

Unused Allotment Procedure

Washington

• • • **Rules governing** returns of excess or unused allotments of controlled materials have been modified to bring them into conformity with WPB's decentralized operations, the CMP division of WPB announced in Direction 26 to CMP Regulation 1.

The modified rules point out that excess or unused allotments that originate with WPB field offices should be returned to such field offices. The amended direction also points out that excess or unused allotments may be returned by letter if it is impractical for the person returning the allotment to obtain a copy of CMP-32, the form usually used to make such returns. The amendment also changes addresses of certain claimant agencies and WPB Industry Divisions, to which unused allotments are returned in order to bring them up to date.



SMITHway Electrodes in Action

This huge weldment, destined for use inside a Smith Pressure Vessel, is part of another Smith job to back the boys on the battle fronts.

The Sawyer Blower in the foreground is a product of an A. O. Smith subsidiary.

Run-of-the-Mine Electrodes Are NOT Good Enough!

SMITHway Certified Welding Electrodes were first made by us for our own use. WHY—?

Because in our plants, where practically every type of welding is done *every day* . . . run-of-the-mine electrodes were not good enough!

Many other concerns, who also demand the best in welding, now use SMITHway Certified Welding Electrodes—the same electrodes we use—the same electrodes we offer you. That's why we are confident we can prove that they will give you *better welding results* at lower time and material cost. We have already proved it—conclusively—in our own plants and in the plants of other welders.

Mild Steel...High Tensile...and Stainless Steel
WELDING ELECTRODES
made by welders . . . for welders

SMITHway AC Welding Machine *eliminates arc blow; reduces spatter losses; saves power.*

SMITHway Welding Monitor *cuts training time as much as 33⅓%;* trains *better welders.*

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Logan Conveyors Speed Production*

Logan double-lane roller conveyor handling aluminum cylinder heads through machining operations in the plant of the Wright Aeronautical Corporation at Cincinnati, Ohio. INSET: Assembled head-and-cylinder units, on individual pallets, flow by in a steady stream.

Smoother, swifter production flow plus important economies in time, space and man-hours — Logan conveyor systems are making these contributions to America's far-flung industrial war effort. From receiving through processing and assembly to shipping, Logan Conveyors provide a continuous supply of materials and parts to successive operations. You can benefit by Logan handling methods both during and after wartime. Write for details to Logan Co., Inc., 545 Cabel, Louisville 6, Ky.

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Roller Conveyors (gravity and power) • Belt, Wheel, Apron Conveyors • Roller Spirals • Slides • Spiral Chutes • Vertical and Pusher-Bar Lifts • Tilters • Transfer Cars • Ball Transfers • Turntables • Alligator Switches

Ask for "Key Book"

It's chock-full of pictures and actual Case Reports on Logan Conveyors in many large and small plants. Sent on request.

*in Vital War Industries

Director Points To CMP Successes

• • • **Industry in the** United States today is producing more finished products for war and essential civilian purposes in proportion to available raw materials than it was prior to the announcement of the Controlled Materials Plan in November, 1942, W. C. Skuce, director of the Controlled Materials Plan Division of the War Production Board announced today.

"CMP, which went into operation April 1, 1943, is now an acknowledged success after less than one year's operation," Mr. Skuce said. "Under its procedures, materials are being distributed to industry in an orderly manner, permitting high efficiency in the use of available resources."

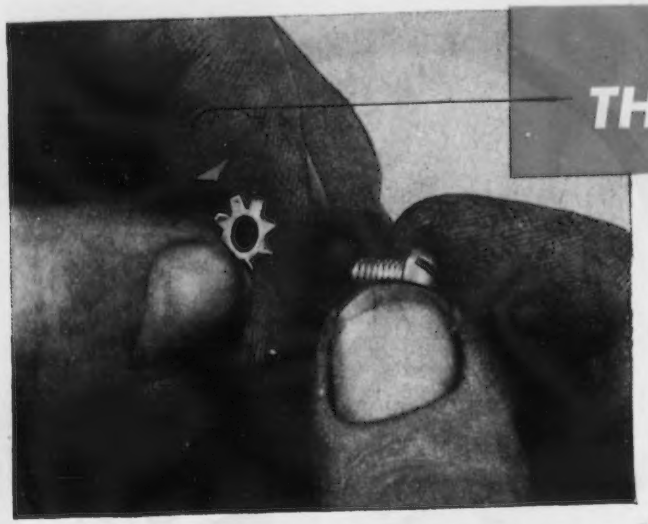
The measure of success is found in the fact that, under its procedures, production of finished products has shown substantially greater percentage increases than the supply of basic raw materials themselves.

For example, from the time CMP was originally announced to the end of 1943, the quarterly production of airplanes of all types increased 80 per cent, from 14,380 to 25,953 planes per quarter. The quarterly delivery of deadweight tonnage of merchant vessels increased 81 per cent during the same period, from 2,924,000 to 5,295,000 deadweight tons per quarter. The combat tank program has been consistently met since the inauguration of CMP, although it does not show the increases reflected in aircraft and merchant vessel production because of a reduction in the program itself. Combatant ship production increased 257 per cent in terms of displacement tons, from 156,506 to 559,220 tons per quarter, during this same period.

At the same time that airplane production was increasing 80 per cent and deliveries of merchant vessels 81 per cent per quarter, and deliveries of combatant ships 257 per cent, the available supply of the controlled materials had increased—but by much smaller percentage figures.

For example, aluminum supply during the fourth quarter of 1943 reflected an increase of 36 per cent over the fourth quarter of 1942, while available copper increased only 5 per cent during the same period. The quarterly supply of carbon steel increased 7 per cent from the fourth quarter of 1942 to the fourth quarter of 1943, while the supply of alloy steel decreased 21 per cent.

"Comparison of percentage in-



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Putting lock washers and screws together by hand wastes vital assembly time and increases costs!

Speed-Up Production with Pre-Assembled

SEMS FASTENER UNITS

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Lock washer can't come off but is free to rotate!

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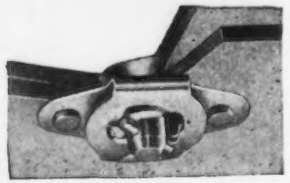
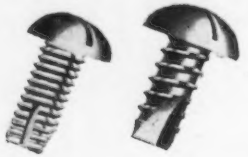
GOOD DESIGN DEMANDS MODERN FASTENINGS!

Shakeproof Lock Washers
In a variety of types and sizes.



Shakeproof Cowl Fasteners
"The Quick-opening Lock!"



Shakeproof Thread-cutting Screws
Type T for metals
Type 25 for plastics

ARMY NAVY

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creases in supply of controlled materials with the increased output of major military and essential civilian and items indicates that proper channeling of materials to production has helped accelerate war output," Mr. Skuce said.

"Major accomplishments of CMP which have permitted this increased production are:

"1. Provision of realistic end-product programs which are feasible within the available supply of basic raw materials.

"2. Provision of balanced flows of materials and parts to assembly lines for final fabrication into complete items.

"Experience has demonstrated that CMP provides the mechanism for both balancing and timing war production —and consequently has aided in increasing output of war products.

"One year ago last November, the War Production Board was faced with the gigantic task of installing a new system of material distribution. This involved formulation of rules, regulations, and procedures to implement the basic idea of controlling key production materials which in turn would tend to limit production programs to available raw material supply. The principles which were originally outlined for CMP have proved the basis of the successful material distribution system which is now in operation.

"In November, 1942, U. S. industry was faced with the gigantic problem of learning and installing, in each of its many plants, the mechanism necessary for successful operation under CMP. Today, U. S. industry has completed this job."

° ° °

LATEST STYLE: *Thelma Elkins, Seattle-Tacoma Shipbuilding Co., models a streamlined form-fitting leather outfit for feminine shipbuilders.*

° ° °

Speed up— AIRCRAFT RIVETING

Meet today's demands for *speed* and *accuracy* in aircraft riveting ...with the ruggedly built T-J Air Powered RIVITOR! Turns out flush riveting *fast*... with no manual rivet handling! Combines "air squeeze" action and automatic feed.

Furnished with adjustable setting tools and interchangeable lower horn to accommodate wide range of work. Throat depths up to 36". Also available in "Twin" types for setting two rivets at same time. Backed by long years of engineering and manufacturing know-how ...that makes T-J "tops" for Tough Jobs! Write for latest bulletin. The Tomkins-Johnson Company, Jackson, Michigan.

HIGH SPEED RIVETING

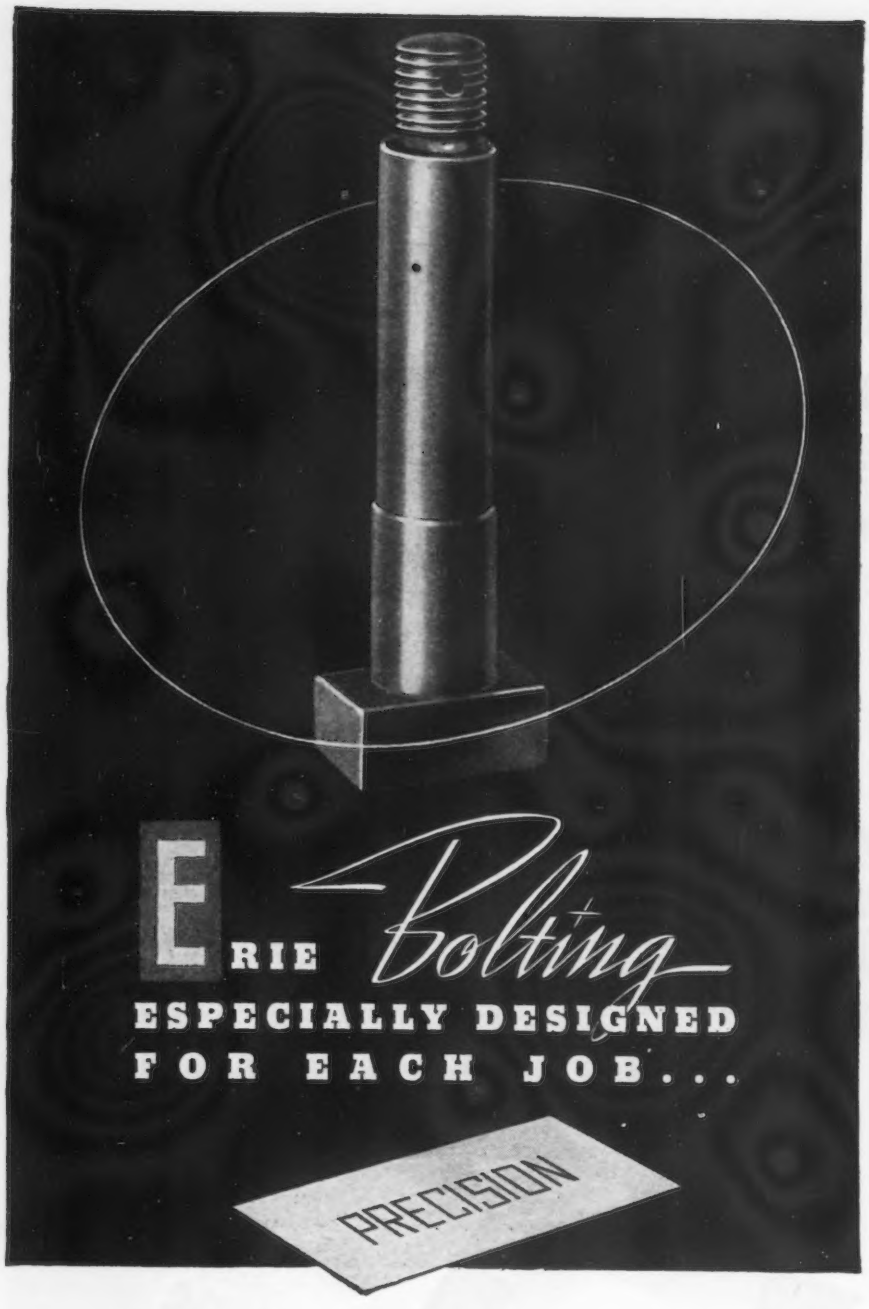
HANDLES FLUSH RIVETING

AUTOMATIC FEED

ADAPTABLE FOR MANY TYPES OF RIVETS

TOMKINS-JOHNSON

T-J **RIVITORS**



Our business has always been the making of bolts, studs and nuts to specifications with emphasis on the specials. Our customers are legion; 25 pieces here, a hundred there, and thousands for that special refinery-synthetic plant.

Today your Boss is our Boss and when we ask old customers to be patient, you know what we mean. We are working 100%, day and night, on vital war work, which as you know is scheduled by Uncle Sam with the one thought of winning the war, not of winning or holding good will. That part of business is reserved for peacetime.

SPEED THE DAY OF VICTORY—BUY BONDS

ERIE BOLT & NUT CO
ERIE, PA., U. S. A.

Among the Week's Trade Notes

Wyckoff Drawn Steel Co. has appointed Jack E. Allen district sales representative in Buffalo and surrounding territory, with offices at 525 Liberty Bank Building, Buffalo. W. A. Bolton will continue as Wyckoff's metallurgical consultant in their Syracuse office.

•

American Tool Works has purchased a five-story building containing 40,000 sq. ft. of floor space in Cincinnati. The building will be used as a warehouse for machine tools and supplies.

•

Bethlehem Steel Co. has changed the name of its Fore River Yard, Quincy, Mass., to Quincy Yard, Bethlehem Steel Co., effective immediately. The change is consistent with Bethlehem's policy of naming or renaming yards and plants to conform with the name of their location.

•

Sylvania Electric Products, Inc., announces that work on a $100,000 addition to its tungsten plant in Towanda, Pa., will begin immediately. The plant will be owned by the DPC, but operated by Sylvania.

•

Amercoat Division of American Pipe and Construction Co., Los Angeles, has moved its Chicago sales office to Suite 341, McJunkin Building, 4554 North Broadway.

•

Kelley-Koett Mfg. Co., Covington, Ky., is now occupying a new one-story addition to its plant, which will relieve congested conditions in the plant.

•

Meehanite Metal Corp., New Rochelle, N. Y., has granted manufacturing rights for Meehanite castings to the Indian Hume Pipe Co., Wadala, Bombay, India.

•

Ohio Crankshaft Co., Cleveland, has appointed the Moore Machinery Co., Los Angeles and San Francisco, as special distributors for TOCCO Process induction heating and hardening equipment in California, Nevada and Arizona territories.

•

Tomkins-Johnson Co., Jackson, Mich., has appointed the Industrial Equipment Co., Buffalo, sales representative for its products in the Buffalo territory.

•

Kennametal, Inc., Latrobe, Pa., manufacturer of cemented carbide cutting tools, blanks, and specialties, has opened a branch office at 378 Fifth Street, San Francisco 7, for the distribution and servicing of its products in northern and central California.

•

Wheelco Instruments Co., Chicago, has been purchased by F. A. Hansen and C. H. Stevenson, vice-presidents of the Lindberg Engineering Co., and several associates. The business of the industrial instruments firm will be continued under a new corporation.

•

Aviation Corp. has established its own publicity bureau in Toledo. The bureau will be under the supervision of Arthur W. Gratop.

•

Fitchburg Grinding Machine Corp. has appointed the Rudel Machinery Co., Inc., of New York, Hartford, and Boston as their exclusive representative in the New York and New England territories.

•

Chisholm-Ryder Co., Inc., Niagara Falls, N. Y., has bought the New Way Canning Machinery Co., Hanover, Pa. The purchase will add to the company's line of food processing equipment.

•

General Electric Co., Bridgeport, Conn., is reported to have entered into negotiation with the government to take over the Lowell Ordnance Co., Lowell, Mass., which until recently was operated by the Remington interests.

•

Crosley Corp., Cincinnati, has appointed Western Merchandise Distributors, Inc., Buffalo, as its distributor in the Buffalo territory. Dutton-Lainson Co., Hastings, Neb., has been appointed distributor for the company in central Nebraska and part of Kansas.

"Look fellow, you sorta' put me on the spot—I've been in the iron and steel business for twenty years and you're the first to ask me what ferro alloys★ are. I guess the best explanation is WHY we use them. Just as mother uses certain time tested ingredients to make her cakes perfect and tasty we use certain *ferro-alloys* in the heats to give the iron and steel we make proper characteristics so it appeals to the users. So you see we can't do any guessing on ferro-alloys—*we must have quality*. In fact the advertisement that prompts your question is by the company who supplies our needs — they really have *the* consistent quality."

★ *FERRO-ALLOY: An alloy of iron with a sufficient amount of some element or elements, such as manganese, chromium or silicon, for use as a means of introducing these elements into steel by admixture into molten steel.*

PHILO BRAND — DEPENDABILITY · QUALITY · SERVICE
RAINIER BRAND — DEPENDABILITY · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

FERRO SILICON 50%, 75%, 85%, 90%

FERRO CHROMIUM • FERRO MANGANESE

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O F A BRIQUETS

WLB Refuses to Reopen Lake Carriers Wage Negotiations

• • • **The National** War Labor Board on Feb. 20 refused to reopen a collective bargaining agreement for the purpose of wage negotiations when the contract prohibited such reopening. The board, with labor members dissenting, declined to take jurisdiction over the dispute between the Seafarers International Union, AFL, with 26 Great Lakes steamship companies. The union was demanding a service bonus. The board declined to take jurisdiction since, at the time of the certification of the case to the WLB, bona fide contracts with no provision for reopening on the issue of wages were in effect.

Buffalo Proposes 90-Day War Manpower Moratorium

Buffalo

• • • **A "conditional moratorium,"** freezing war workers to their jobs for 90 days, is the newest proposal before the Buffalo-Niagara Area War Manpower Committee for preventing the exodus of men and women from vital industry. It is estimated 1500 workers are leaving war jobs monthly —900 men and 600 women—some to enter the armed services, others to seek non-essential employment.

Suggestion for the "moratorium" came from Hugh Thompson, CIO regional director, who is a bitter opponent of national service legislation or any other scheme to "draft" labor.

"I think that perhaps a 90-day conditional moratorium for workers," said Thompson, "might be the answer to the problem of war workers quitting plants. Terms would be agreed upon by labor and management.

"Basically the worker would pledge to stay on his present job for the next 90 days and the employer would agree not to lay off or fire him during that period. Other provisions would be worked out between unions and companies."

Thompson warned there was no inference of "anything along the line of national service legislation in the suggestion." Definite action on the proposal has not been taken.

SHIPPING HEAD: *Almon E. Roth was elected president of the National Federation of American Shipping, a new organization designed to provide this country with a unified, adequate post-war merchant marine. Roth comes from San Francisco.*

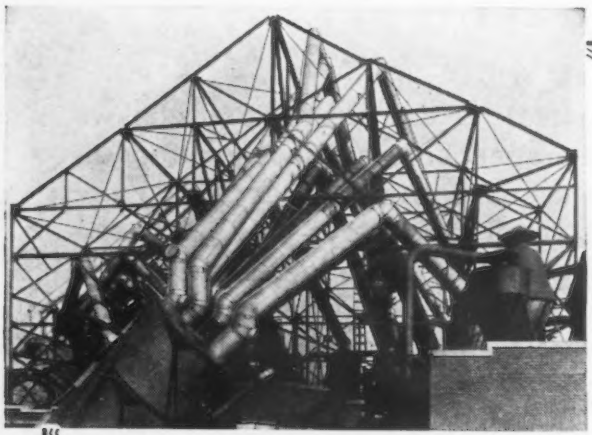
Appeal from WMC Decisions Provided in New Regulations

Washington

• • • **Unrestricted right** of appeal from decisions of the War Manpower Commission is provided in a revision of its regulation governing appeals. The changes were dictated by the Commission's experience in handling thousands of cases. The original regulation issued May 22, 1943, specifically indicated those persons entitled to appeal and spelled out under what conditions appeals could be made.

Other changes in the appeal regulation involve points which needed clarification or minor technical revision. There has been, for example, some confusion on the question of a worker's right to retain new employment obtained on the strength of a statement of availability, if the employer has appealed and it has been finally determined that the statement was erroneously issued.

The revised regulation holds that a statement of availability, once issued, stands. The employer may appeal as a matter of principle or precedent but he cannot demand that the statement of availability be withdrawn or that the worker be required to leave his new employment. In order to provide a means of reviewing the action of local employment offices before the services of a worker are lost to an employer, the revised regulation provides an optional procedure for temporary suspension of the issuance of statement of availability and making referrals in certain types of cases.



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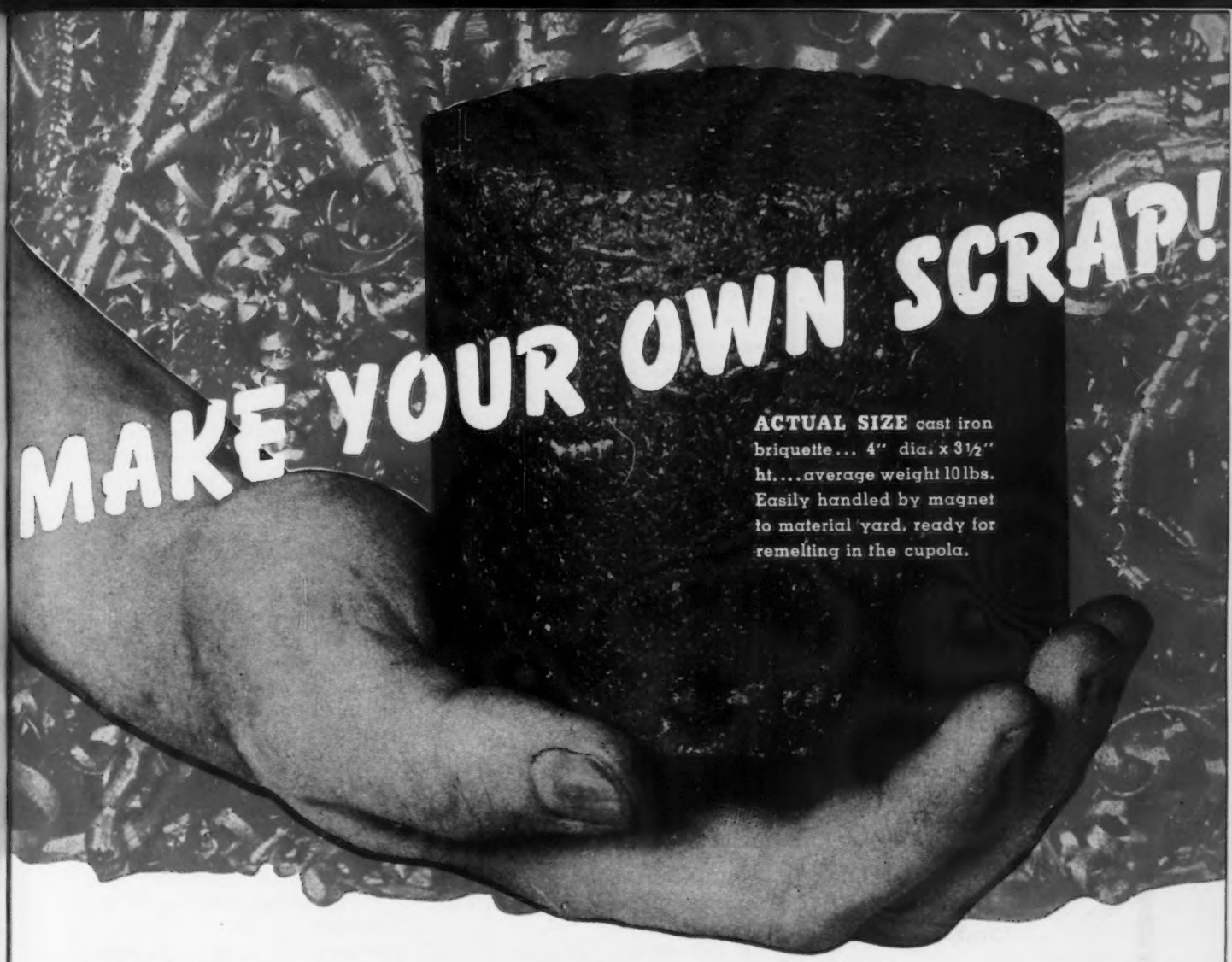
Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. For information, address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

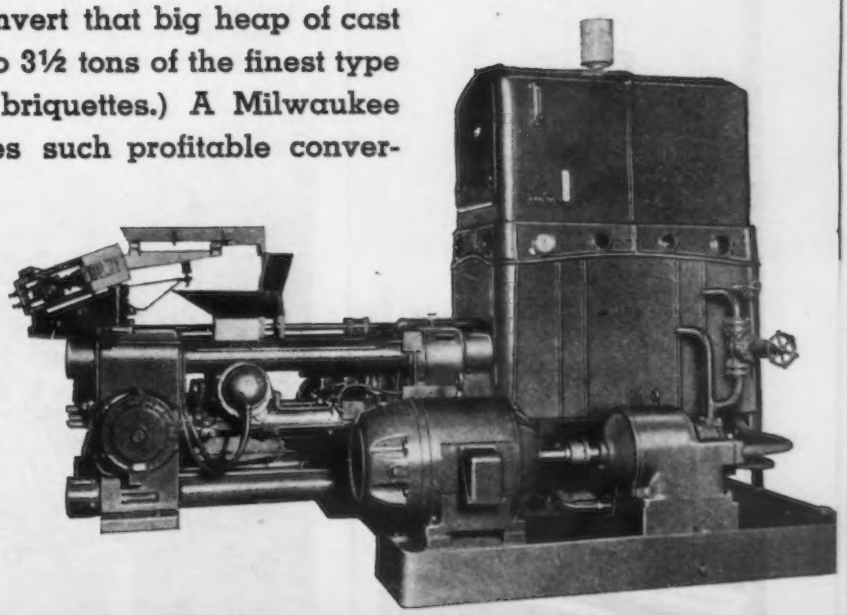
BRANDT of Baltimore—*Craftsmen in Metal Since 1890*



700 Cast Iron Briquettes Produced in ONE Hour...

Illustration shows large Milwaukee Hydraulic Briquetting Press with 3½ ton-per-hour capacity. Four other sizes available.

In just 60 minutes, you can convert that big heap of cast iron borings and steel turnings into 3½ tons of the finest type of cupola scrap. (700 individual briquettes.) A Milwaukee Hydraulic Briquetting Press makes such profitable conversion possible. It reclaims the highest percentage of materials... affords better metal control... effects substantial savings in melting costs. Used by practically ALL automotive manufacturers and other large industrial plants. Plan *now* for your post-war needs. Write for further particulars.



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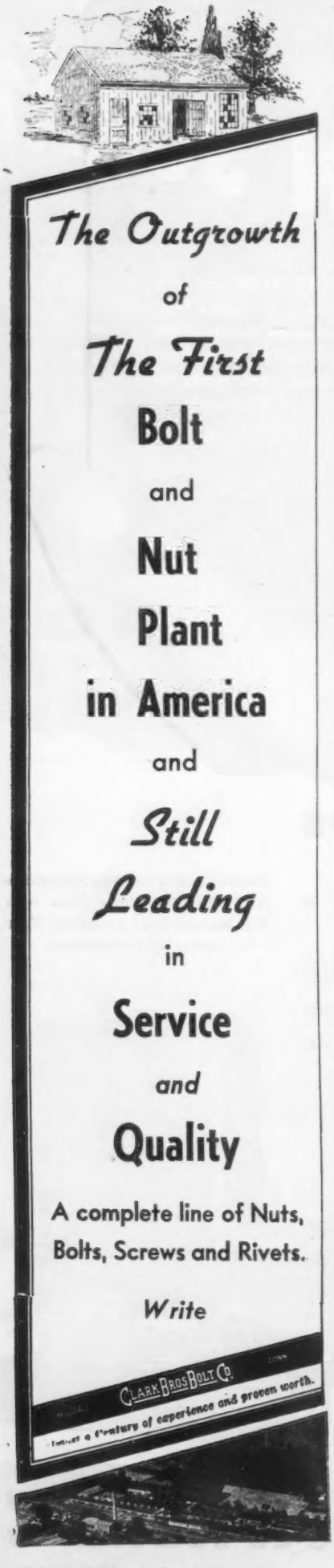


Installment Buying of Heavy Industrial Equipment Predicted

New York

• • • Use of installment financing in the purchase of commercial and industrial equipment promises to contribute much toward meeting the post-war problems of reconversion and expansion. Its extensive use by industrial and commercial concerns appears probable because the procedure makes it possible for the machinery or equipment to be paid for out of income which it helps to produce. This lightens the burden on the purchaser, and enables the financing agency to carry a minimum risk during the pay-out period because of the systematic reduction in the amount of debt involved. These findings are included in a report issued by the National Bureau of Economic Research, Inc.

On the basis of past experience it is likely that the greatest use of installment financing of equipment will occur among small and medium-sized manufacturing companies and in the service trades, where business units are typically small and frequently undercapitalized.

In its survey of the growth of equipment financing for commercial and industrial concerns the National Bureau states that the technique has developed as a result of the increasing mechanization of manufacturing, mining, and construction industries plus the pressure that competitive conditions have placed upon many concerns, unable to finance purchases of machinery on any other basis to modernize their processes.

In its first stages, equipment financing was promoted by non-bank agencies specialized to cope with unique credit problems. Later, commercial banks entered the field, as have insurance companies, industrial banking companies, and public lending agencies. It has been estimated that at the end of 1940 equipment financing agencies held receivables of about $400 million. This total is estimated to have increased to $470 million by the end of 1941. In addition, at the end of 1940 manufacturers themselves carried $125 to $200 million of instalment receivables originating in their sales.

Terms of the instalment payment contracts are determined mainly by the type of equipment financed and the credit standing of the purchaser. Where contracts are discounted by a financing agency with liability for them assumed in whole or in part by the vendor of the equipment, the terms of credits may be affected also by the financial responsibility of the vendor and by the type of recourse arrangement which is entered into.

Reports received during 1940 from

PIPELINE TERMINAL: *This is the terminal of a pipeline constructed and put into operation in one week so that Allied forces in Italy would have a constant flow of oil. Here, near the front, Jerry cans are filled prior to final distribution.*

It's better to be safe . . . After the accident happens, it's too late to start thinking of how to prevent injury to trained personnel. "A.W." Rolled Steel Floor Plate saves man hours by preventing costly falling accidents . . . Saves maintenance expense on floors that must withstand punishing hours of wear. "A.W." Super-Diamond Pattern (shown above) resists slipping in *any* direction. Pattern is uniform and can readily be matched when additional plates are needed. Write for Folder.

Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

FREE!

THIS 24" x 32" WALL CHART GIVES ROCKWELL, BRINELL, SCLERO, VICKERS HARDNESS AND TENSILE STRENGTH CONVERSIONS

• If you are a production executive whose responsibility includes the hardness testing of metals, you will certainly want one of these new charts for your office, shop, or laboratory. Handsome in appearance, printed in three colors, with the very minimum of advertising, it will prove its value every hour of every day. Type is large, easily read at a distance of several feet, yet the chart itself is only 24" wide and 32" high—about the size of a calendar.

Although a chart like this is relatively expensive to produce, and the quantity is rigidly limited, a copy is yours—free for the asking—if you request it on your letterhead.

Write Dept. IA, CLARK INSTRUMENT, INC., 10200 Ford Road, Dearborn, Michigan.

CLARK

TOMORROW'S ACCURACY TODAY

CLARK

HARDNESS TESTER FOR "ROCKWELL" TESTING

169 different manufacturers and distributors with regard to the face amounts of contracts which they originated revealed that for 141 of these the majority of contracts amounted to $5000 or less. Down payment percentages averaged around 33 1/3 per cent. Some installations, however, were reported as carrying down payments of 50 per cent, some 10 or 20 per cent. Down payments on heavy machinery were frequently lower than those on more easily repossessible machinery of low unit value, indicating that the buyer's credit standing might in such cases be a primary consideration in fixing contract terms.

The repayment period is clearly related to the cost and expected service life of the equipment and thus varies widely. Equipment and fixtures sold to service industry concerns most often required repayment in 24 to 36 months; longer terms of 48 or even 60 months frequently were reported on sales of heavy equipment of large unit value.

OPA and WPB Form More Industry Advisory Committees

Washington

• • • **Appointment of** an Industry Advisory Committee for Gray Iron Castings composed of 11 foundry executives, was announced recently by OPA. The committee, which will be ready to confer with OPA officials whenever pricing matters in the gray iron castings field arise, held its initial meeting at the Hotel Morrison, Chicago, on Feb. 25 and 26.

Members of the committee are: Walter Chadwick, president, Davenport-Besler Corp., Davenport, Iowa; O. R. Culling, president, Carondelet Foundry Co., St. Louis; H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J.; C. C. Ford, contracting engineer, G. C. Christopher & Sons Foundry, Wichita, Kan.; R. E. Kucher, vice-president, Olympic Foundry Co., Seattle; C. B. Magrath, president, Greenlee Foundry Co., Chicago; F. H. Rayfield, vice-president, Potter & Rayfield, Inc., Atlanta; A. B. Root, vice-president, Hunt-Spiller Mfg. Co., Boston; S. D. Russell, president, Phoenix Iron Works Co., Oakland, Cal., and W. S. Thomas, superintendent, Foundry Division, North Bros. Mfg. Co., Philadelphia.

The Office of Industry Advisory Committees, WPB, on Feb. 12, announced the formation of the Safes and Insulated File Industry Advisory Committee. George M. Chandlee, Consumers Durable Goods Division, has been appointed the Government Presiding officer.

Members of this committee are: Stanley R. Akers, Meilink Steel Safe Co., Toledo; E. V. Flaherty, Herring-Hall-Marvin Safe Co., Hamilton, Ohio; Harry H. Lynn, Mosler Safe Co., Hamilton, Ohio; C. E. Mann, Schwab Safe Co., Lafayette, Ind., T. E. Miller, Shaw-Walker Co., New York; A. J. Roos, Diebold, Inc., Canton, Ohio; A. N. Seares, Remington-Rand, Inc., Buffalo, and I. Laucks Xanders, York Safe & Lock Co., Baltimore.

COPPER PENNY RETURNS: *First shipment of .50 caliber cartridge casings arrive at the Denver mint. Cartridge cases will be remelted with zinc and copper for use in copper one-cent pieces. Bruce B. LaFollette, chief assayer, (left) and Elry J. Wagor, superintendent of melting and refining, examine portion of the initial shipment.*

Ael

FOR INTERRUPTED QUENCHES

✓ MARTEMPERING

✓ ISOTHERMAL HEAT TREATING

✓ AUSTEMPERING

Ms

HOUGHTON HAS THE SALT*!

Mf

Metallurgists have generally welcomed new salt bath quenching procedures as being most helpful in reducing residual strains and stresses.

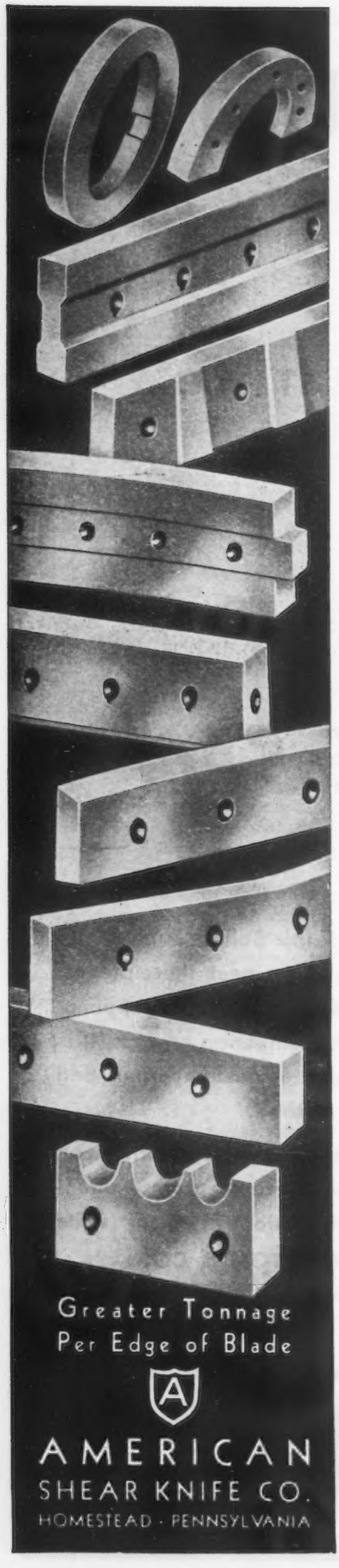
"Interrupted quenches require a salt which will possess these characteristics: Fast quenching speed through the critical • Low melting point • Wide working range • High thermo-conductivity • Stability—non-sludging, unharmful to steel surfaces • Fluid, to lower carry-away loss • Easy cleaning.

Houghton's Mar-Temp Salt has been developed specifically to meet these needs. Originally named because of its application in the new Martempering process, it is equally applicable to austempering and the "isothermal" method.

Your inquiries for details and prices on Mar-Temp Salt will receive prompt attention. Ask The Houghton Man, or write

E. F. HOUGHTON & CO.
303 W. Lehigh Ave., Philadelphia 33, Pa.

*MAR-TEMP



Contract Termination Included in Senate Bill

Washington

• • • **With minor changes,** Senators James E. Murray and Walter F. George introduced an omnibus termination bill recently carrying out recommendations made in the report of the George Postwar Committee. Other recommendations with respect to the Office of Demobilization and disposal of surplus property and plants are not included.

The bill sets up an Office of Contract Termination Settlement and a Contract Settlement Advisory Board consisting of the heads of the principal procurement agencies.

The Director of the Office of Contract Termination is permitted to make settlements on the basis of actual, standard, average, or estimated costs, or of a percentage of the completion of work under the terminated contract, or of other methods which he deems appropriate. Company wide and direct settlements are permissible.

Fabricators Ask Separate WLB Wage Hearings

Pittsburgh

• • • **More than 700 steel** fabricators and miscellaneous manufacturers of steel products are attempting, it is said, to have their own WLB panel hear their briefs and arguments in the steel union wage case, as opposed to being included with the 150 basic iron and steel companies. It is also understood that the steel foundry and iron foundries are also taking the position that they should have their own panel.

The steel fabricators and miscellaneous groups argue that their competitive conditions are different than basic steel, and, hence, the WLB should take this into consideration by separate hearings. The 22 demands of the CIO do not, in whole apply to their industry, it is claimed. There seems to be strength to the report that these smaller companies will also insist that any increase granted by the WLB, as a result of USWA demands, should be of smaller proportions than any which might be granted to basic steel. The unions position on this probably will be a flat request that the same increase, if granted, should be made to all steel workers covered by union contracts, regardless of the type of manufacture.

Truck Cleaning Expedited by Gadget of Army "Idea Man"

Washington

• • • **A high pressure hose** that expedites and simplifies the cleaning of mobile equipment of his engineer aviation battalion in England is the product of the ingenuity of Sgt. John P. Larsen of Long Island, N. Y., the War Department announced.

Working with salvaged materials, Larsen fitted a long steel pipe with a tapered nozzle and two connections for compressed air and water. Air is fed into the contrivance from a compressor and the water is injected from the most convenient spigot. The air forces the water through the nozzle at any desired pressure, greatly facilitating the task of cleaning trucks and heavy construction equipment. An oil solution is substituted for water when tar and other such substances must be removed.

F. M. Connell Appointed Canadian Metals Controller

Ottawa

• • • **C. D. Howe,** minister of munitions and supply, announced the appointment of F. M. Connell, Toronto, as metals controller, to succeed G. C. Bateman, who was recently appointed deputy member of the Combined Production and Resources Board. Bateman becomes associate metals controller and retains responsibility for handling international problems relating to metals, including dealings with Allied Governments in connection with aluminum. D. B. Davis, of Ottawa, has been appointed deputy metals controller and G. C. Monture, Ottawa, formerly executive assistant to the metals controller succeeds S. D. Pierce of Montreal as executive officer representing Canada on the C.P.R.B. H. J. Clarke of Toronto, who was chief of the allocations division, metals control, has been appointed executive assistant to Mr. Connell, and also succeeds Monture as alternative to J. H. Berry on the Crown Assets Allocation Committee.

Renegotiation Reserves

Washington

• • • **Reserves for renegotiation** refunds which war contractors may set up and show in their statements and annual reports are not to be regarded by government renegotiation officials as binding on contractors, according to a ruling by the Joint Price Adjustment Board, representing the six federal renegotiation agencies, it was announced Feb. 19.

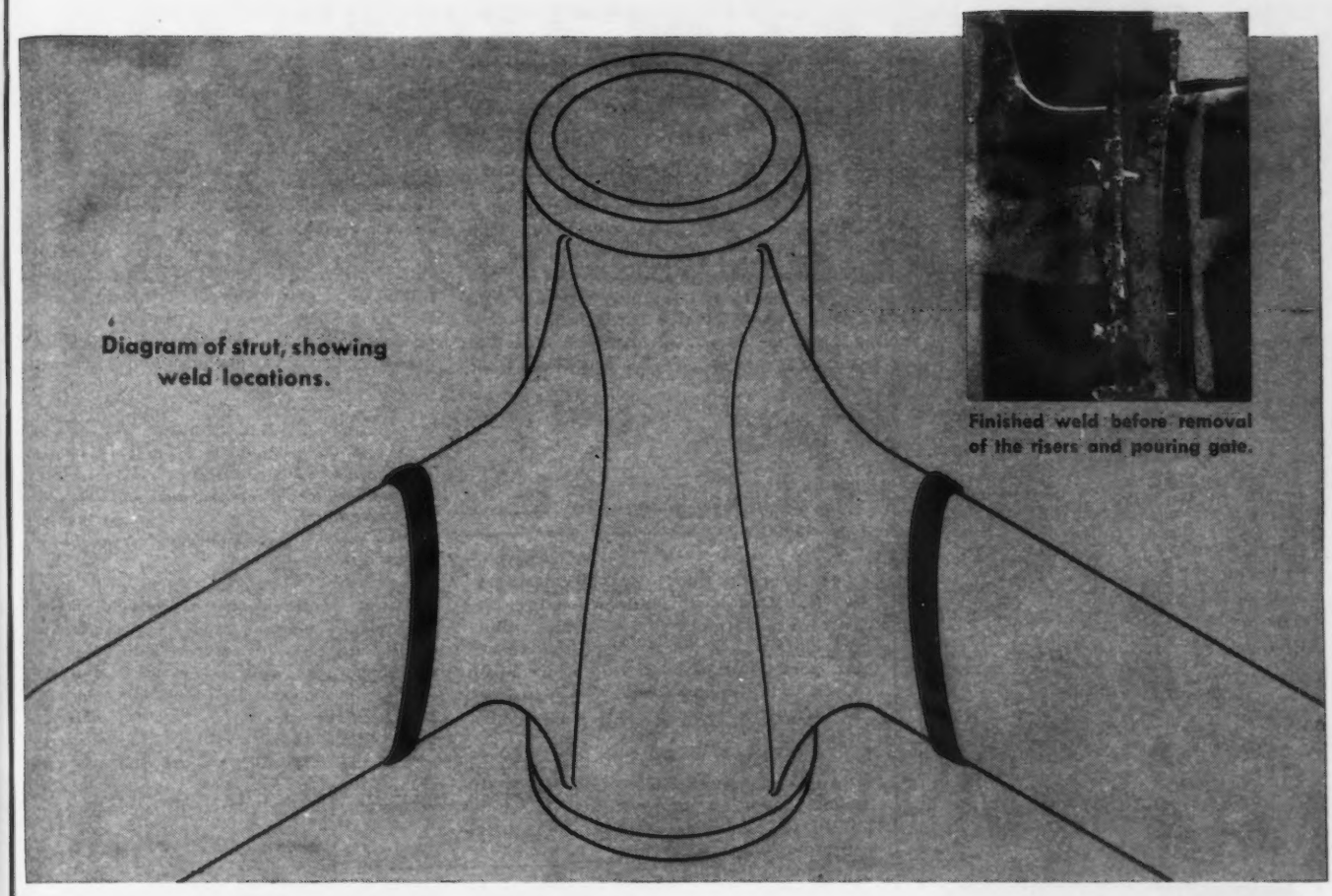


Diagram of strut, showing weld locations.

Finished weld before removal of the risers and pouring gate.

STERN STRUTS SPEEDILY BUILT BY *Thermit Welding*

Long used for the repair of heavy parts, Thermit welding is finding increasing application in the fabrication of large, heavy units from smaller and more easily transported castings, forgings and flame cut shapes.

An interesting example, illustrated above, is the fabrication by Thermit welding of stern struts for twin-screw ships. Only three days were required from the time workmen began preparing the mold for the first weld until both welds were completed, stripped of excess metal and ready for inspection. The mold for the second weld was prepared while the first weld was preheated. Pouring of the Thermit metal for the two welds took place within 24 hours.

Thermit welding obviates delays due to the unavailability of casting facilities for very large parts. Imperfections which may occur in larger castings and which result in rejection and consequent further delay need no longer be a source of concern. In point of fact, Thermit welding produces welds which are even stronger than the original castings of the same cross-section. As only one shrinkage is involved, serious local stresses do not develop...thus making stress relieving unnecessary.

For more complete information, send for 30-page booklet "Thermit Welding" describing many applications for both fabrication and repair of heavy parts.

METAL & THERMIT CORPORATION

Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

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HOBART'S ARC WELDING DESIGN
... a service that
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Initial Sheets are FREE!

No matter what your plans for the future, if you work with metal you can use these design sheets. They will unveil welding practices that guarantee short cuts in production yet give you a better product. Acclaimed by thousands of manufacturers, designers, engineers as the most outstanding contribution to industry in years. Yours for the asking. Write for "Practical Design for Arc Welding" on your letterhead today.

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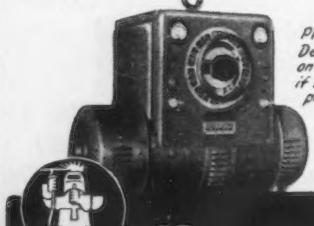


HOBART
"One of the World's Largest Builders of
Arc Welders"

Briefly Told—

• A half lb. of boric acid and 1 lb. of borax mixed in 1 gal. of water and heated to 130 to 140 deg. F. makes a fireproofing solution for cotton that will withstand a blowtorch, according to Thomas D. Cole, president of the Lockport (N. Y.) Cotton Batting Co. The firm is using the inexpensive process to make millions of pounds of insulation for war housing.

•

• *More than 20 plants in Upstate New York are producing parts for the Army's amphibious truck called the "duck," according to Col. Frank P. Atwood, chief of the Rochester Ordnance District. Duck production is being accelerated.*

•

• Old timers at the Harley-Davidson Motor Co., Milwaukee, smile when they see the 1944 government quota which allots 2130 motorcycles for essential civilian use and export purposes and that has to be shared with Indian. Harley is scheduled for 50,000 two-wheelers this year, all for armed forces.

•

• The Wisconsin Supreme Court recently handed down an unusual decision which upheld the previous decision of a Circuit Court judge allowing a judgment of $797, double the amount claimed as damages for payroll deductions on account of faulty workmanship. The suit was started by an employee of the Oshkosh branch of the Timken-Detroit Axle Co. on behalf of himself and 74 other employees. The firm claimed actually no deductions were made because the piece work agreement called for "completed and usable pieces".

•

• "It is satisfying to note that the Baruch report lays special emphasis on the need for orderly handling of contract cancellations and production revisions, to insure successful completion of our war effort," said WMC chairman Paul V. McNutt. "From the standpoint of the nation's manpower, it is believed that unless clearcut controls are established in dealing with these changes, there will be not only confusion, but also waste of sorely needed human resources. Fundamental to these controls is the recognition that we must protect the manpower balance in areas in which there are to be cutbacks."

•

• In a paper read at the annual meeting of the American Institute of Mining and Metallurgical Engineers, E. C. Wright discussed the development of "killed" bessemer steel. The "killing" process outlined was one in which the blown convertor bath is treated by additions of hot metal containing 4 per cent carbon, as well as some manganese and silicon. The bessemer heats so treated were found to be thoroughly "killed" and of good forging qualities. They could be teemed into regular hot-top ingot molds, rolled into tube rounds and satisfactory seamless tubes with practices equaling results obtained on open hearth steels. The seamless pipe process, which involves piercing of solid billets to produce a pipe of uniform wall thickness, is in itself a very difficult forging operation and requires a billet of uniform density and forging characteristics.

•

• A new type of refractory brick for open hearth steel furnaces is being tested by Electro Refractories & Alloys Corp., Buffalo, at its Lackawanna plant. It is believed the new brick will increase steel production per furnace by as much as five per cent. The company also has developed a new type of abrasive wheel for grinding tungsten carbide tools without burning them.

•

• ***Six large war plants in Buffalo are co-operating with the Smaller War Plants Corp.'s local office to aid small industries by subcontracting. Meeting fortnightly, the committee will give special attention to urgent cases where subcontracting might prevent small plants from closing due to cutbacks.***

•

• Detroit led the nation in volume of major war supply contracts and facility projects placed during the period from June, 1940, to the end of 1943, according to WPB statistics cited by the Chicago Association of Commerce. The Michigan automotive center's contracts totaled $12,526,528,000. The Chicago metropolitan district was second with contracts valued at $8,692,674,000; Los Angeles held $8,504,064,000; Newark-Jersey City, $8,358,175,000; and New York City, $4,963,464,000. The figures do not include contracts valued individually at less than $50,000, nor do they take into account food contracts, in which Chicago captured a major bounty. A government investment in Chicago in the construction of facilities during the period was $981,181,000, of which $881,371,000 went into industrial plants and $99,810,000 into non-industrial projects.

•

• The WPB is making a serious effort to impress New England with the current and expected increases in military, Lend-Lease, and essential civilian demand for heavy construction machinery. In this connection, a WPB officer says: "Since 90 per cent of all new equipment is now needed overseas, the bulk of essential construction work at home is being carried on with used equipment. Practically all new equipment, as well as some used equipment, will without doubt be needed overseas as military operations expand and additional territory is reclaimed from the Axis. This means we cannot afford the luxury of idle equipment, stored away and waiting for peacetime work. Cranes, shovels, motor graders and tractors are especially needed." Provision has been made by the Bureau of Internal Revenue to permit, under certain conditions, deductions from profit taxes on sales of such equipment. Arrangements for these provisions have been worked out between the WPB and the Treasury.

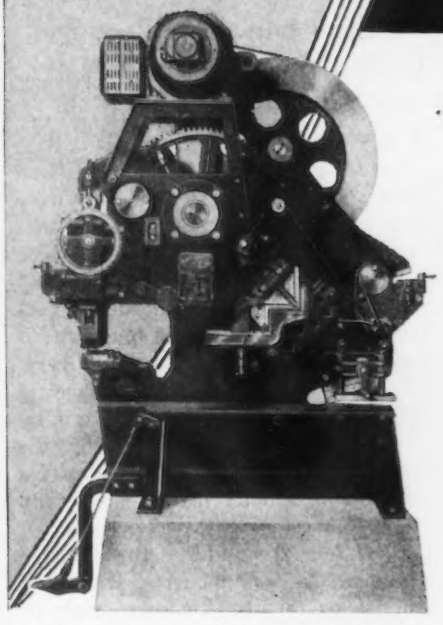
•

• On Feb. 16, a Boston office of the Bureau of Labor Statistics of the U. S. Department of Labor was set up. Its purpose is to collect and disseminate factual and statistical data in the price, wage, and employment fields, to have available regular statistical service to the OPA, WLB, and any other federal agency desiring such data. In addition, studies of post-war employment projects for selected communities for a few New England areas will be made.

POST-WAR PLANNERS!

...the Day is Coming When the DATE on Your Order Will Replace the Priority

Purchase ORDER
3/7/pp
Date

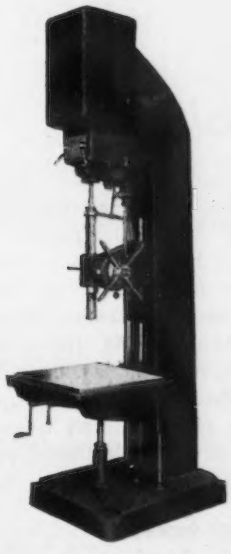


"Buffalo" UNIVERSAL IRON WORKER . . . a rugged, versatile, easy to control machine for punching, shearing, slitting coping, notching a wide variety of metal stock. Details in Bulletin 322-K.

• To be sure, there's but slight consolation *now* in the prospect of the day when priority ratings will no longer delay filling of your order, but that day is coming—hastened by the very fact that priorities are an emergency measure . . . Buffalo Forge engineers will be ready for that day—ready to expedite delivery of metal working machines to help you convert swiftly to post-war production. Right now, Buffalo Forge welcomes your request for information on machines to meet future requirements.

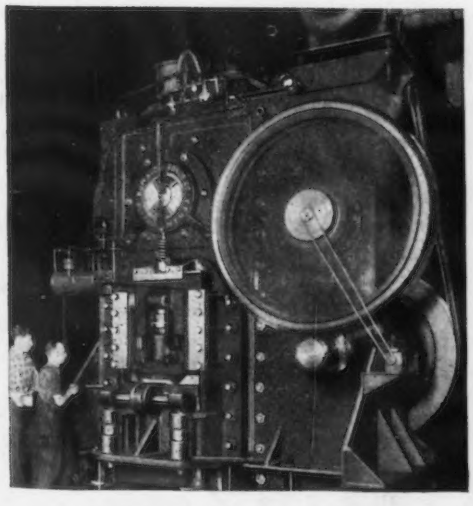
ARMY E NAVY

BUFFALO FORGE COMPANY
492 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd.,
Kitchener, Ont.



"Buffalo" RPMster DRILL for a wide variety of drilling operations, including tapping, spot-facing, counter-boring, hollow milling. Provides 100 different speeds. Details in Bulletin 3257.

"Buffalo" BENDING ROLL . . . an accurate, easy-to-operate machine for bending circular shapes from a wide range of stocks. Engineering data in Bulletin 352-A.



"Buffalo" BILLET SHEAR . . . an extra-heavy-duty tool for the accurate cutting of billets, bars and rods on a production speed basis. Models for handling rounds up to 10" diameter; squares, 9". Details in Bulletin 3295.

"Buffalo" MACHINES FOR METAL FABRICATION

MACHINE TOOLS

. . . News and Market Activities

January Order Backlogs Estimated to Be $174,000,000

Cleveland

• • • **A drop of more** than 50 per cent in new order volume is reported by the National Machine Tool Builder's Association for December, 1943, as compared with December, 1942, and a sizable decline from the November's booking was also reported.

New orders in December covered 8717 units valued at $32,296,864, which compares with 17,884 units valued at $73,226,864 in December, 1942, and 10,240 units valued at $37,610,773 in November, 1943. The projected estimate of new machine tool orders recorded January of this year is about 8600 units probably totaling $29,500,000.

Cancellations in December affected 665 units valued at $5,830,023, which compares with 1398 units of $6,111,515 in November and 3060 units valued at $21,227,461 in December, 1942.

Shipments in December, 1943, totaled 12,646 units at a dollar value of $58,945,893 as compared with 13,819 units or $69,352,657 worth the previous month and 27,736 units at a value of $126,416,360 in December, 1942.

Unfilled backlogs of firm orders for December, 1943, were for 40,335 units, valued at $203,512,935 compared with 45,014 units totaling $237,395,828 in November and 148,345 units valued at $837,595,788 in December, 1942. Estimated backlog in January of 1944 is 36,000 machines valued at $174,000,000.

New pool orders in December were non-existent as compared with 13 units valued at $132,704 in November and 7831 units totaling $53,648,683 in December, 1942. No pool orders are reported for January. Unassigned pool orders representing 4810 units or about $38,100,889 worth in December, 1943, compare with 5596 units valued at $43,273,268 in November and 27,019 units totaling $195,421,248 in December of 1942.

o o o

Disposal of Government Tools

Cincinnati

• • • **The ultimate disposition** of government-owned machine tools is a very definite problem now engaging the attention of management in this area, as well as in other areas. In Cincinnati, of course, it is particularly important because a large portion of the local economy is dependent upon the machine tool industry and its associated lines. Some feeling seems to be fairly well crystallized that the Baruch report is a constructive document, but there are some parts which are open to question on the part of the manufacturers.

The effect of the government entering the market with a supply that has been estimated at about a billion dollars worth of machine tools, would just about clean out the machine tool industry, since this figure is considered to be four to five years' normal business for the industry. Even those who have been indicating that war being waste, machine tools that have been over-produced for the current conflict should, to some degree be stopped, are agreeing that there is probably a substantial portion of the government held machines that must necessarily find their way into the normal avenues of trade. They feel, however, that should these go into ordinary operation, the machine tool industry should have a share in the disposition of them, and a share in the profits to be made therefrom.

•

Used Tool Sales

Washington

• • • **Certificates of satisfactory** operation may be substituted in place of guarantees in sales of second-hand machine tools made on behalf of the government or where the government is the largest creditor, according to amendment No. 2 to MPR 1, effective Feb. 23. This written certificate substituted for the warranty must be signed by a qualified person not engaged in the business of selling second-hand tools and who is approved by the purchaser. The certificate must state that such person has inspected the machine tool, that all worn or missing parts have been replaced or reworked, and the second-hand machine tools have been tested under power so as to prove that it has a substantially equivalent performance to that of the machine when new.

• •

Machine and Parts Price Ceilings Revised Upwards

Washington

• • • **Two changes in** the regulation controlling the prices of machines and parts, and machinery services, were announced by OPA. The first defines "emergency" conditions under which persons subject to the regulation may pass on to buyers extraordinary expenses incurred for the purpose of expediting production and delivery. The second permits an increase in price of machines or parts containing domestic or Treasury silver by the amount of the increased cost of silver solder and babbitt metal since Aug. 10, 1943.

OPA formerly allowed the addition of extra charges incurred where an emergency required that materials be obtained from a source more expensive than the usual source or that a machine or part receive special handling after its manufacture. The revised action allows the addition of extra material costs resulting from manufacturers or machinery service suppliers purchasing materials in an emergency, at the request of the buyer, from a source more expensive than the current usual source. It also permits addition of extra transportation costs resulting from shipping such machines or parts or materials used in producing a machine or part, or supplying a machinery service by means more expensive than the usual shipping method.

Only actual extra costs of the material or transportation services may be added to the maximum price. These extra costs shall be billed to the buyer separately and a copy of the invoice forwarded immediately to the Machinery Branch of OPA.

Various types of machines and parts covered by the provisions of this maximum price regulation contain silver solder or babbitt metal containing silver.

We would really like to know the answer ourselves. The facts in the case are that Genesee today is one of the Nation's major producers of Dovetail tools just as it is among the leaders in the production of many other types of special tools.

It may have something to do with jealous maintenance of quality—though we know other companies make good tools too. It may have something to do with deliveries—though we haven't been too happy at times in the past when we looked at our banks of unfilled orders. Somehow "price" can't be the answer, for we have never sacrificed quality for the sake of price.

Perhaps it's just a combination of all of them. If you know, won't you tell us?

We welcome your comments and inquiries.

GENESEE TOOL COMPANY

FENTON, MICHIGAN

★ Registered Trade Mark

NON-FERROUS METALS

. . . News and Market Activities

British Plan Extensive Program for Postwar Tin Technical Development

• • • **The British, in** planning for postwar production and distribution of its manufactured and raw materials, have more than a passing interest in the tin mining and smelting industry. Recently, John Ireland, director of the Tin Research Institute, described a plan involving the tin demands of postwar industrial and consumer markets. *Sheet Metal Industries*, a British trade publication, commented on the plan recently.

The plan shows that sales depend on the satisfaction of the ultimate consumer, and that where better service can be given expanded consumption follows.

The proposed scheme will harness to the problem of increasing the usefulness of tin, the full resources of a modern scientific organization. This will comprise a group of scientists whose work will be carried to the stage of practical application by research teams working on a semi-industrial scale under the guidance of committees representing each of the principal tin-consuming industries.

Information bureaus will be established in all the important tin-consuming centers throughout the world. These bureaus will be staffed by practical experts ready to go into works and put any tin-consuming process into first-class working order in the light of the most recent scientific knowledge. The experience gained in giving this type of service in Great Britain and on a smaller scale in the United States, has proved that there is a widespread need for it even in these areas where manufacturing technique is highly developed, and in other consuming countries there is even greater scope.

The report explains the proposed postwar organization in detail, and summarizes technical developments made in all the main fields of consumption. It gives the technical grounds on which are based the reasons for expecting to restore those uses of tin abandoned or curtailed during the present scarcity. The report also indicates some promising new uses arising out of the Institute's researches, and gives quantitative estimates of the increased sales that may be expected as the result of the new organization's activities at the end of a 10-year period.

The budget recommended for these activities is about $1¼ million per annum to cover research, development, world-wide technical service, and full supporting publicity. This sum, although much larger than that with which the present organization has been working, is much less than is devoted to other metals, and is only about one per cent of the gross value of the tin sold annually before the war.

•

Copper Scrap Pricing

• • • **Copper wire scrap** containing ashy, burnt, and dirty wire, with a copper content of 94 per cent should be priced at the maximum price of light copper rather than as No. 2 copper wire, according to a ruling issued by OPA. The maximum for No. 2 copper wire and mixed heavy copper, set at 8.75c. per lb., is subject to the requirement that the material must have a copper content of not less than 95 per cent. That specification applies to the scrap in the condition in which it is received by the consumer. The maximum price is not subject to any deduction for moisture, oil, grease, non-metallics, or other foreign materials, as are the prices for solids that are subject to Footnote No. 2 in the regulation.

The correct method of pricing copper wire with a copper content of 94 per cent is to price it at the maximum light copper price, where the copper content must be not less than 90 per cent. As such, it is entitled to the maximum base price of 7.75c. per lb., plus an addition of 0.11775c. per lb. for every 1 per cent above 92 per cent copper with proportionate adjustments for fractional variations.

•

New Copper Scrap Grade

• • • **Briquetted cartridge** brass turnings were provided with a 8.625c. per lb. ceiling, f.o.b. shipping point by the OPA. This price compares with a maximum price of 7.875c. per lb. for loose yellow brass turnings and for unbriquetted cartridge brass turnings. The new price for briquetted turnings is designed to offset costs incurred by the seller in briquetting the material, an operation normally performed by the buyers.

•

Lead Basing Point

• • • **Bayfield, Wis.,** was named a basing point for primary lead sales by OPA this past week because it has become a lead consuming center. The maximum price for lead, delivered at Bayfield in carload lots, is set at 6.50c. per lb. This is 0.10c. per lb. higher than other Wisconsin basing point to reflect higher freight costs.

•

Zinc Order Amended

• • • **Remelt zinc** was removed from allocation and scrap zinc deliveries are no longer controlled under amended order M-11. Also, the procedure in applying for and receiving authorizations to accept delivery of slab zinc has been altered to reduce paper work and simplify it. The order no longer requires dealers to obtain an AA-5 rating or better before making shipments. Remelt and scrap zinc changes are effective April 1, following filing of the new applications on March 12. The amended order also permits producers to make shipments upon notification from a purchaser of the date and serial number of his authorization certificate.

•

New Navy Plant

Pittsburgh

• • • **A new aluminum plant** to produce atomized aluminum is under construction at Glassmere, Pa., according to an announcement this week by the Navy. The plant, which is being built on a 32-acre tract purchased from the Ford Motor Co., will be operated by the Aluminum Co. of America under an agreement with the Navy.

The site was chosen because of its proximity to the Logan's Ferry plant of Aluminum Co., where atomized aluminum has been produced for some time.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.37	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on page, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1	
No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*
OPA Group 2	
Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
OPA Group 3	
Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]
OPA Group 4	
Automobile radiators	7.00
OPA Group 5	
Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated	
2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50
Plant scrap, mixed	
All solids	7.50
Borings and turnings	5.50
Obsolete scrap	
Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap	
Pure solids and all other solids, exempt	
Borings and turnings	8.00
Mixed, contaminated plant scrap	
Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Rail Scrap Price System Accepted Favorably by Trade

• • • **While the revised** railroad iron and steel scrap price schedule has not been in effect long enough to test its workability, there seems to be no doubt but that the schedule will be quite satisfactory both from a consumer and a scrap producer standpoint. There is one phase of the schedule that has caused some disturbance, however, and that is the fact that railroad scrap producers not on a basing point are not getting the price for their material that they received heretofore.

These producers, selling under the new basing point system, must absorb freight costs from the accumulation point to the nearest basing point, which was not so under the old schedule. Previously, producers not on a basing point had set prices, determined by average sales over a base period, to which were added freight charges. This was a neat setup for as long as it lasted, because frequently mills that had railroad scrap allocated to them by WPB found they were paying far more than would be paid for identical scrap from roads running through their mills.

Also, stricter grading of rail scrap under the new system that actually specifies what constitutes a given grade has cut into scrap proceeds of producers. Loose grading was more prevalent under the old system, but under the new plan the grade classifications are quite specific as to what is included.

The weakness in the low phos market during the past several months continues, with dealers in the east offering at $1 below the ceiling. However, because of the tightening up of this classification in Amendment 14 to RPS 4, where punchings, plate scrap, and bar crops minimum dimensions were raised and much of what formerly went as low phos now is listed as No. 1 bushelings, some authorities expect this low phos surplus to disappear and the demand become considerably stronger. The surplus of low phos has obviously been the result of consolidation of other grades into this classification to earn the grade premium. The cream of open hearth grades could well be worked into this classification. Better quality will bring better prices and stronger demand, and stricter measures may be adopted to keep open hearth heavy melting grades in their proper classes.

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PITTSBURGH—Heavy melting grades are in strong demand, but despite poor collections of dealers scrap no serious shortages have resulted. Some tonnages of short shoveling turnings have come into the district from distant points without the springboard, suggesting weakness at the source. Prices for this material here are at the ceilings, the local market showing no weakness. The Bureau of Mines suggestion that an acute situation will arise before the winter is out has met with mixed reactions here. Some sources believe the authority of the government to more forcibly use allocations and the fact that the Army could be used as a last resort, precludes any acute or serious shortage of scrap in the near future.

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BIRMINGHAM—Foundries in this district have limited freight charges to $3 per gross ton on cast grades, and on blast furnace grades some mills will only accept material at a price not to exceed $1 springboard although the district is allowed a $2 springboard. Trade sources here assert that while purchasers in the above instances are not absorbing the full freight charges, no scrap at present is being sold below ceiling in this area.

Going Scrap Prices

• • • Reports of under-ceiling sales for various grades of scrap specified were made in the following cities:

Buffalo—Alloys and stainless grades sold with alloy premiums waived.

Boston—Nickel turnings and solids find no markets. Would sell with premiums waived.

St. Louis—Machine shop turnings sales at $2 below ceiling.

New York—Low phos offered $1 below ceiling.

Cleveland — Short shoveling turnings being included in machine shop turnings shipments.

Cleveland—Nickel alloy solids and turnings sales without premium.

Cleveland—Blast furnace turnings sales out of area at $1 below ceiling.

Los Angeles—Open hearth grades sales at $2 under ceiling not in any manner indicative of general conditions as this is surplus scrap area.

LOS ANGELES — Basic open hearth and blast furnace grades move at $2.00 below ceiling or less. Low phos and electric furnace plate scrap principally from shipyards hold ceiling prices, but movement is sluggish and demand light. Steel turnings and borings are being compressed and crudely amalgamated as ship ballast on a fairly extensive scale for cargo vessels converted to troop carriers and naval auxiliaries. The demand for sheared, detinned, and baled cans is so light either for copper precipitation or melting grade that tin can collections may be discontinued. Present below ceiling prices will not cover collection and shipping charges to detinning plants.

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BUFFALO—Easing of the scrap situation in the Buffalo district is noted with the arrival of more shipments outside territories, including Canada. Despite improved weather, yard men reported operations remained slow.

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CINCINNATI — Dealers here indicate that current purchases still hold at ceiling prices and so far no reduction under the ceiling is reported except for isolated instances of refusal on the part of purchasers to pay "spring board" differentials. Machine shop turnings are plentiful and difficulty is experienced in disposing of them, but good scrap is at a minimum. Scrap consumers generally, however, are apparently receiving sufficient material to keep them operating and the pressure is not great.

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CHICAGO — Weakness is evident in sales of short shoveling turnings from $1.50 to $2.00 below ceiling, probably occasioned by withdrawal of a major purchaser. Basic open hearth grades remain stable, however. Electric furnace material is moving slowly without premiums and what few sales of alloy grades are being made continue at no premium over carbon grades.

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BOSTON—No improvement in the supply or shipment of scrap is reported by the average yard and some brokers maintain the past week was their quietest on record. As weeks progress without any stepup in supply, general opinion that a real pinch in the situation lies ahead gains ground. To substantiate reports from yards and brokers, railroads say shipments are now running less than 50 per cent of a year ago.

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ST. LOUIS—Sheffield Steel Corp., whose St. Louis plant has been operating only two of its six open hearth furnaces for some time, has taken these off because of cut backs and the resulting lack of business. There still is a shortage of heavy melting steel, with supplies sufficient only for the next 30 days' operations. A late heavy snow Feb. 28 will further slow up shipments from the country and handling of scrap here.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco.	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED			UNSEGREGATED SOLIDS	UNSEGREGATED TURNINGS
		Solids Per Lb. Cont. W	Turnings Per Lb. Cont. W		
Type 1.	12% min. W, 1% max. Mo	$1.80	$1.60	$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
Type 2.	5 to 12% W, 1% max. Mo	1.60	1.40	$1.15 per lb. contained W if 1 to 5%.	$1.00 per lb. contained W if 1 to 5%.
Type 3.	1 to 5% W, 1.5% max. Mo	1.25	1.25	$0.80 per lb. contained Mo if 1.5% or more.	$0.70 per lb. contained Mo if 1.5% or more.
*Type 4.	7% min. Mo, 2% max. W	0.125	0.105	If both W and Mo are within ranges, payment may be for both W and Mo content.	
*Type 5.	3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115		

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Revised price schedules, establishing dollars and cents differentials for railroad scrap and establishing revisions in cast iron scrap grades are shown on page 158. These schedules, amendment 14 to RPS No. 4, replace the previous schedules on Railroad Steel Scrap and Cast Iron Scrap sold by railroads.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 29, 1944	Feb. 22, 1944	Jan. 25, 1944	Mar. 2, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 29, 1944	Feb. 22, 1944	Jan. 25, 1944	Mar. 2, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 136-151.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Feb. 29, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 16
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	[13] Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[12]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[12]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.53¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield. Mass.. f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-48 Ann.
Philadelphia	$3.518	$4.872[a]	$5.018[a]	$3.922	$4.772	$3.605	$3.668	$3.882	$4.072	....	$7.118	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.788	3.758	3.853	4.103	$8.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.66	4.35[17]	3.81[13]	3.81[13]	3.78[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.857	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	8.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25¢	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ 60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80 1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle.	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00

Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

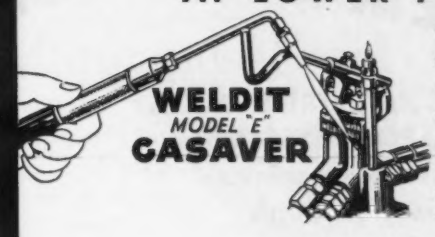
Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleve-

Safe Welding

AT LOWER PRODUCTION COSTS



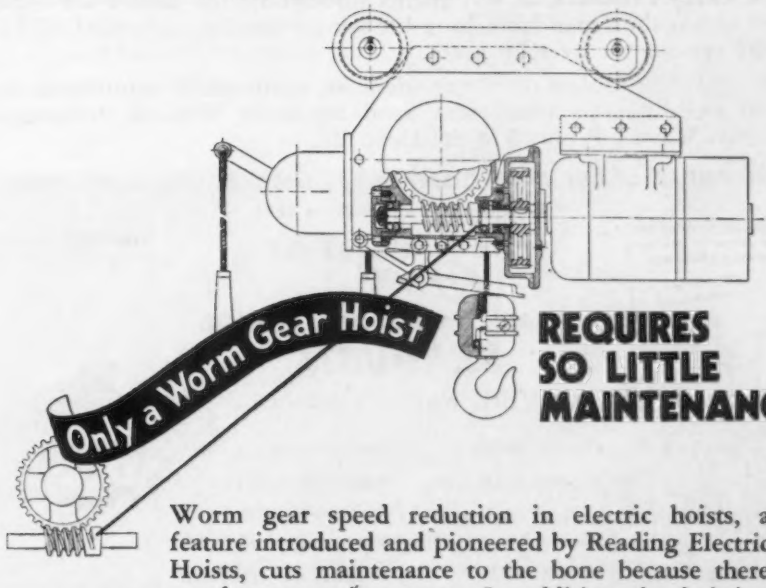
The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT ACETYLENE CO.
641 BAGLEY AVENUE • DETROIT 26, MICH.



REQUIRES SO LITTLE MAINTENANCE

Worm gear speed reduction in electric hoists, a feature introduced and pioneered by Reading Electric Hoists, cuts maintenance to the bone because there are fewer wearing parts. In addition the hoisting unit proper is compact and very simple with only four moving parts. The unit construction of Reading Hoists makes all parts easily accessible for inspection and maintenance by the average mechanic.

It will pay you to investigate the money-saving features of Reading Electric Hoists. For full technical information write for Bulletin 1004.

READING CHAIN HOISTS · ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING CHAIN & BLOCK CORPORATION 2101 ADAMS ST., READING, P[A]

Carey PRODUCTS KEEP 'EM WORKING!

WAR PLANTS • OIL REFINERIES • MILLS • MINES • TRANSPORT SYSTEMS • POWER PLANTS • *Achieve Peak Efficiency Through Proper Maintenance of Buildings and Equipment*

Industrial management well recognizes the need for proper maintenance of plants and equipment, in order to insure a continuous flow of vital war production.

But with many key men in the armed forces, managers, engineers and executives do not always have the time or help to check and re-check the multitudinous details involved.

Right here, CAREY is performing a vital role. Our nationwide engineering and distribution organization is working hand in hand with plant managers and engineers throughout the country—checking plants and helping to solve problems of efficient, economical repair and maintenance.

And Carey Products, in war plants throughout the nation are right now giving the dependable, long-life service that has made the CAREY name famous for over 70 years.

If you have a problem involving adequate, economical maintenance of plant buildings or equipment, send for book "Proved Protection Against Wasted Profits." Write Dept. 26.

THE PHILIP CAREY MFG. COMPANY, Lockland, Cincinnati, Ohio

Dependable Products Since 1873

Careyduct Air Conveying Systems conserve metals and increase efficiency.

Over 1900 Liberty Ship engines are Carey insulated.

PARTIAL LIST OF Carey ASPHALT-ASBESTOS-MAGNESIA **PRODUCTS** IN THE NATION'S SERVICE

BUILT-UP ROOFS — ROOF COATINGS
AIR-CONVEYING DUCT — INDUSTRIAL FLOORING
WALL BOARD AND SHEATHING — EXPANSION JOINTS
HEAT INSULATIONS
PIPELINE FELT — ASBESTOS OIL ABSORBENT
CORRUGATED ASBESTOS-CEMENT ROOFING & SIDING

Heat Insulation saves fuel in power plants.

Built-Up Roofs provide weather protection.

Asbestos Pipeline Felt protects "Big Inch" oil line against corrosion.

PRICES

land, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Ports
Standard wire nails	$2.55	....
Coated nails	2.55	$3.05
Cutnails, carloads	3.85	....
	Base per 100 Lb.	**Pacific Ports**
Annealed fence wire	$3.05	$3.85
Annealed galvanized fence wire	3.40	3.90
	Base Column	**Pacific Ports**
Woven wire fence*	.67	.85
Fence posts (carloads)	.69	.85
Single loop bale ties	.59	.76
Galvanized barbed wire†	.70	....
Twisted barbless wire	.70	....

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

In the Production of Magnesium, Both Amsco Alloy and Amsco Manganese Steel Have Found a Place

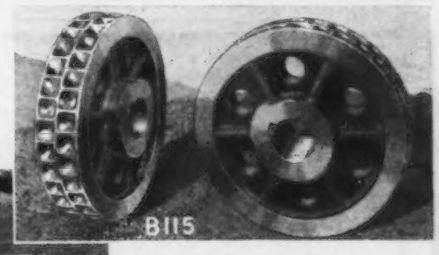
Multiplying by many times America's output of magnesium to meet such needs as lightweight aircraft parts and incendiary bombs has been one of industry's major accomplishments.

In the Pidgeon process of magnesium production, both Amsco Alloy and Amsco Manganese Steel are used in applications where their respective properties help make continuous operation possible. This process consists of distilling metallic magnesium in the form of vapor from briquettes made of a mixture of ferro-silicon and dolomite under low pressure in a furnace, operating at a temperature of about 2150° F.

There are usually twenty retorts to each furnace, laid side by side. After gases (principally hydrogen) have passed off, the retort is sealed and a vacuum, as nearly perfect as possible, is produced. The retort castings must, therefore, be leakproof. The vapor is condensed by a water jacketed condenser sleeve inserted prior to sealing in the open end of the retort, crystals forming in a dense mass in the sleeve. These crystals, averaging about 15 lbs. per retort at the end of an 8-hour run, are melted and cast into pigs.

Picture R-864 shows some of the Amsco Alloy retorts employed, and in picture K-26 appears one of the many carloads of these retorts which have been shipped during the past two years to producers of magnesium by the Pidgeon process.

Amsco manganese steel also has a part in the same process, in the form of the pressure rolls shown in picture B-115, used for forming the briquettes of powdered ferro-silicon and dolomite. Here the high resistance of manganese steel to pressure loads and abrasive wear affords maximum service life.



Bulletin 108 describes the uses of Amsco Alloy in all industry; and 1041A deals specifically with heat-treating containers.

Send for Bulletin 941W on Amsco Conservation Welding Rods.

Amsco

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

AMERICAN Brake Shoe COMPANY

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh ..... 21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh ..... 20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe ..... 13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe ..... 40c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe ..... 63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe ..... 30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe 42c
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe ..... 90c.
Aluminum, 100 and 200 mesh *23 to 27c
Antimony, 100 mesh 20.6c
Cadmium, 100 mesh $1
Chromium, 150 mesh $1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.
Manganese, 150 mesh ..... 51c.
Nickel, 150 mesh ..... 51½c.
Solder powder, 100 mesh, 8½c. plus metal
Tin, 100 mesh ..... 58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb. $2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. $2.60
Under 100 lb. $3.00

*Freight allowed east of Mississippi.

BOILER TUBES

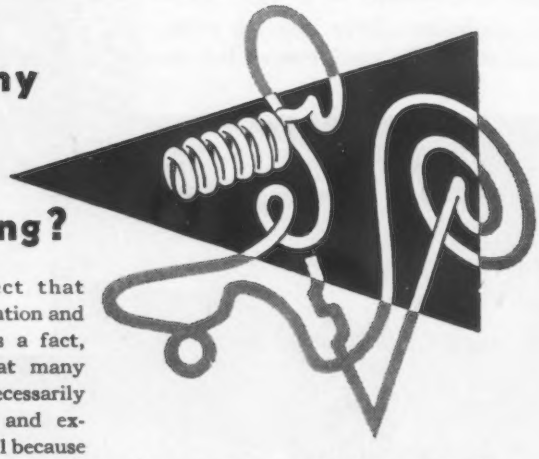
Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over ..... Base
30,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 29,999 lb. or ft. 10%
10,000 lb. or ft. to 19,999 lb. or ft. 20%
5,000 lb. or ft. to 9,999 lb. or ft. 30%
2,000 lb. or ft. to 4,999 lb. or ft. 45%
Under 2,000 lb. or ft. 65%

How many BENDS in a Spring?



Here's a subject that deserves close attention and investigation. It's a fact, sad but true, that many springs are unnecessarily intricate, difficult and expensive to make, all because of lack of understanding of the ultimate purpose. Ofttimes, a simplified design—or a different type of material can do wonders in the way of reducing costs and "upping" performance. Here's where experience in spring design pays off. Let the springmaker in on your requirements—in the early stages if possible.

A good spring in time saves nine!

DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots
Per Cent Off List

½ in. & smaller x 6 in. & shorter...65½
9/16 & ⅝ in. x 6 in. & shorter.....63½
¾ to 1 in. x 6 in. & shorter 61
1⅛ in. and larger, all lengths 59
All diameters over 6 in. long.....59
Lag, all sizes 62
Plow bolts 65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller 62
9/16 to 1 in. inclusive.....59
1⅛ to 1½ in. inclusive.....57
1⅝ in. and larger 56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.....	..	60
9/16 in. to 1 in.	59	
1⅛ in. through 1½ in.....	57	58
1⅝ in. and larger	56	

In full keg lots, 10 per cent additional discount.

Stove Bolts *Consumer*

Packages, nuts loose .....71 and 10
In packages, with nuts attached 71
In bulk 80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)
Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets
(7/16 in. and smaller)
Per Cent Off List

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham .....65 and 5

Cap and Set Screws *Consumer*
Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in..... 64
Upset set screws, cup and oval points 71
Milled studs 46
Flat head cap screws, listed sizes.... 36
Fillister head cap, listed sizes 51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton $40.00
Angle splice bars, 100 lb..... 2.70

(F.o.b. Basing Points) *Per Gross Ton*

Light rails (from billets) $40.00
Light rails (from rail steel)..... 39.00

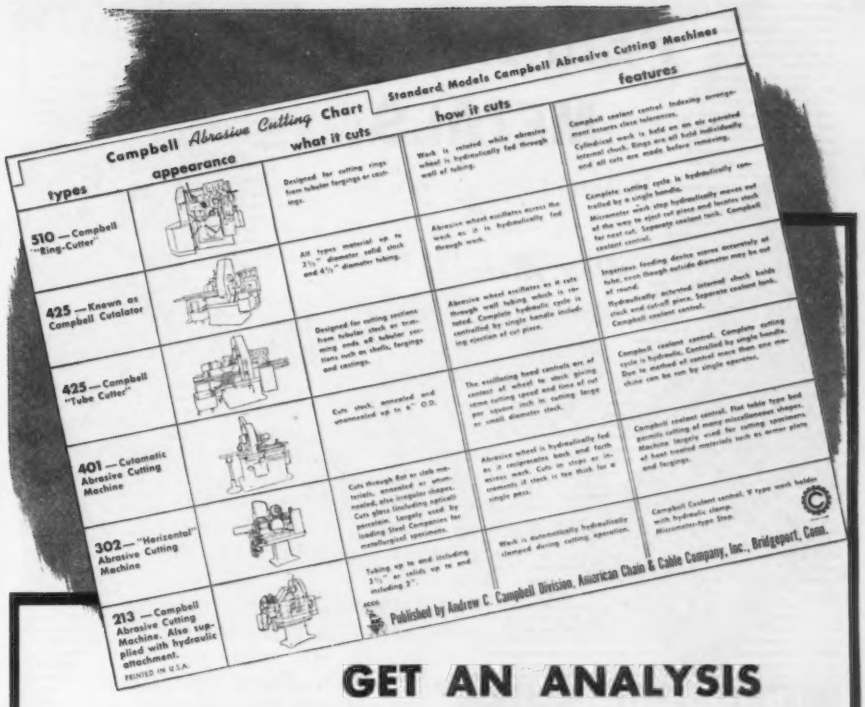
Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 5.15c.
Tie plates, steel ..... 2.15c.
Tie plates, Pacific Coast ..... 2.30c.
Track bolts ..... 4.75c.
Track bolts, heat treated, to railroads ..... 5.00c.
Track bolts, jobbers discount 63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C. ...	$6.00	$12.00
15-lb. coating I.C. ...	7.00	14.00
20-lb. coating I.C. ...	7.50	15.00



GET AN ANALYSIS OF YOUR CUTTING JOBS

—without obligation

Based on the actual production records of the CAMPBELL complete range—the only complete range—of Abrasive Cutting Machines, Campbell engineers will gladly work up cost sheets and production procedures for your cutting. • All you need do is state the materials, shapes and sizes you are cutting, lengths before cutting, lengths of cut-off pieces and production required per hour. • The schedules given you will be practical and attainable. They will be based on the performance of some one of the 8 types and 19 models of CAMPBELL Abrasive Cutting Machines that are currently cutting all grades of steel, annealed and unannealed, non-ferrous alloys, plastics, glass and ceramics—solid bars, tubular and flat stock. • Ask for a copy of the chart shown above, too. It will give you fundamental information on the possibilities of abrasive cutting—at a glance.

Campbell Cutamatic No. 401
Oscillating and Rotating Wheel. Cuts steel up to 6".

Campbell No. 302
Odd shapes, Flat Stock, Slotting Flat Stock, etc.

Campbell No. 213
Cuts Tubing up to and including 3½". Solids to 2".

Campbell Cutalator No. 425
Cuts Tubing up to and including 4½". Solid Bar to 3½".

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For **INDUSTRIAL** purposes a great variety of sizes and shapes of perforations are required, ranging from very fine to as large as 6" or more in diameter. We are equipped to supply all standard perforations in all kinds and thicknesses of metals.

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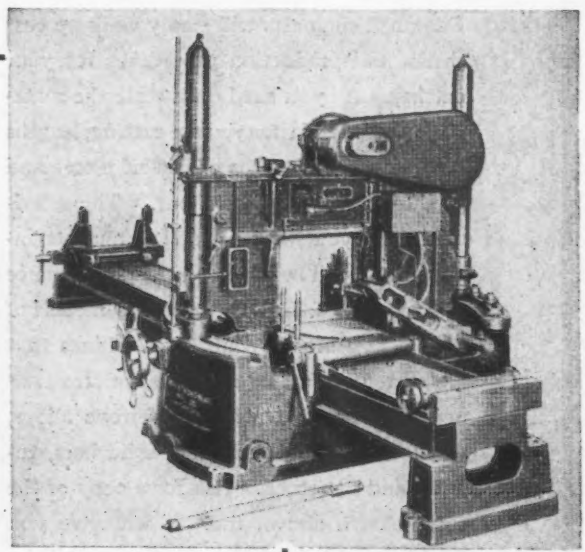
CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

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5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.30c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr. 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more	$1.90
Ferrovanadium, 50-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.	
Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.	
2000 lb. to carload	$1.20
Under 2000 lb.	1.30
Per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)	
Carload lots	25c.
2000 lb. to carload	26c.
Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)	
Carload lots	58c.
2000 lb. to carload	59c.
Grainal No. 1, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis, per lb.	87.5c.
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.	
2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload	$142.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ½c. for spot sales	
Carload lots	14c.
Zirconium, 12-15%, contract basis, lump, f.o.b. plant with usual freight allowances, per lb. of alloy	
Carload, bulk	4.6c.
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	6.5c.
Ton lots	7.25c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.

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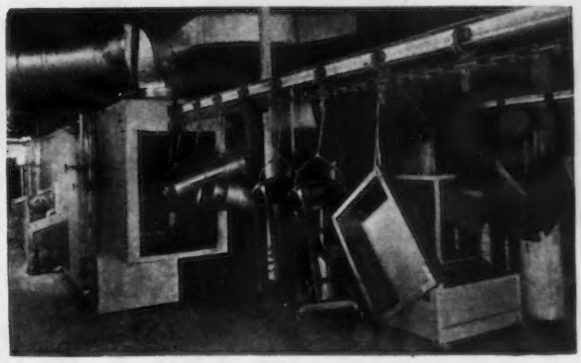
Large or small, clean them all with this modern practically designed equipment. Years of experience on our part save time and money on your part.



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Write us your problems. Let the RANSOHOFF ENGINEERS suggest the solution . . . today on war products . . . later on post-war items.

Illustrated is a monorail wash, rinse and dry machine for preparing work before painting. Work is carried through the machine suspended from hooks attached to chain conveyor.

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LEE SPRING COMPANY, Inc.

30 MAIN STREET BROOKLYN IN.Y.

LEE-BUILT TRADE MARK SPRINGS

HOW A SCRAP STORAGE BATTERY PINCH HIT FOR A NEW ONE

. . . A Salvage Story for Users of Industrial Trucks

A few years ago, an Edison Alkaline Battery, operating an industrial truck in a New England railroad terminal, was retired from service as "worn out." It had passed the usual "retirement age" and was beginning to show signs of no longer having adequate capacity for the work.

So the electrician in charge issued instructions to have it crated and shipped back to our factory for scrap credit. The battery was crated but in some unaccountable manner was not shipped. Instead, it was sidetracked into a corner of a dead storage room where it remained unnoticed for more than a year.

By lucky coincidence it was discovered again at a time when the terminal happened to be short of industrial-truck batteries. It was uncrated, charged, and put into one of the trucks just to see what it could do. It did so well that it was kept in regular use and was not finally replaced with a new one until more than a year later.

What this incident illustrates, more than anything else, is the fact that even after an alkaline battery reaches the normal end of its useful service life, and no longer delivers its full rated capacity, it is still a dependable power source, not in the habit of failing unexpectedly. Some of the unique characteristics of the Edison Alkaline Battery which account for this great reserve of dependability are cited in the column at the right.

ADVANTAGES OF THE EDISON ALKALINE BATTERY IN INDUSTRIAL TRUCKS AND TRACTORS

★ It is durable mechanically. High strength steel construction is used in the containers, grids, pole pieces, etc. The electrolyte is a preservative of steel.

★ It is foolproof electrically. It may be accidentally short-circuited, over-charged, over-discharged, or even charged in the reverse direction without injury.

★ It can be charged rapidly. It is not subject to finish-rate limitations. It requires no equalizing.

★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.

★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.

★ Its tray assembly and cell connections are extremely simple.

★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.

EDISON STORAGE BATTERY DIVISION, THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

Edison

ALKALINE BATTERIES

the
IRON AGE

ESTABLISHED 1855

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March 9, 1944

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Two Views on Postwar Employment

INDUSTRY, knowing that it has a job to do in connection with postwar employment that is fully as big as the wartime job it has so well done, should be interested in "expert" opinion on this subject.

The first thing that industry wants to know, because it is essentially practical, is "How big is the job going to be?"

You can get any number and kind of opinions on that subject, depending upon where you go to get it.

You might go to Stuart Chase, for example, author of "A Honeymoon Experiment" and other works on economy-social, political and otherwise. Chase, by the way, is said to be the President's favorite authority on economics. He is said to have frequently read this author before going to sleep, possibly for the same reason that I have sometimes taken Gibbon's "Rise and Decline of the Roman Empire" to bed with me.

Chase is what you might call a surrealist in economics. In this respect he parallels Salvador Dali in the field of art.

These surrealists have no use for details, or in other words, for facts. They paint with bold strokes, putting in neither background of factual data nor foreground of logic. Thus a piece of spaghetti, pictured as shooting the chutes at Coney Island, might well be labeled as a "noodle descending a staircase."

But to switch back from art to economics, we were discussing postwar employment. Here is what Stuart Chase, with his bold surrealistic strokes says, about it:

"If over 29 million . . . are to be turned suddenly into the labor pool, and if private industry is unable to absorb them quickly, our whole economic system will go into a downward spiral." (And then, hurrah boys, send in the fire alarm on Nov. 4 and summon the New Deal fire department.) Bang! It's just like that. On Tuesday we are sitting pretty and on Wednesday we have to provide new jobs for 29 million people!

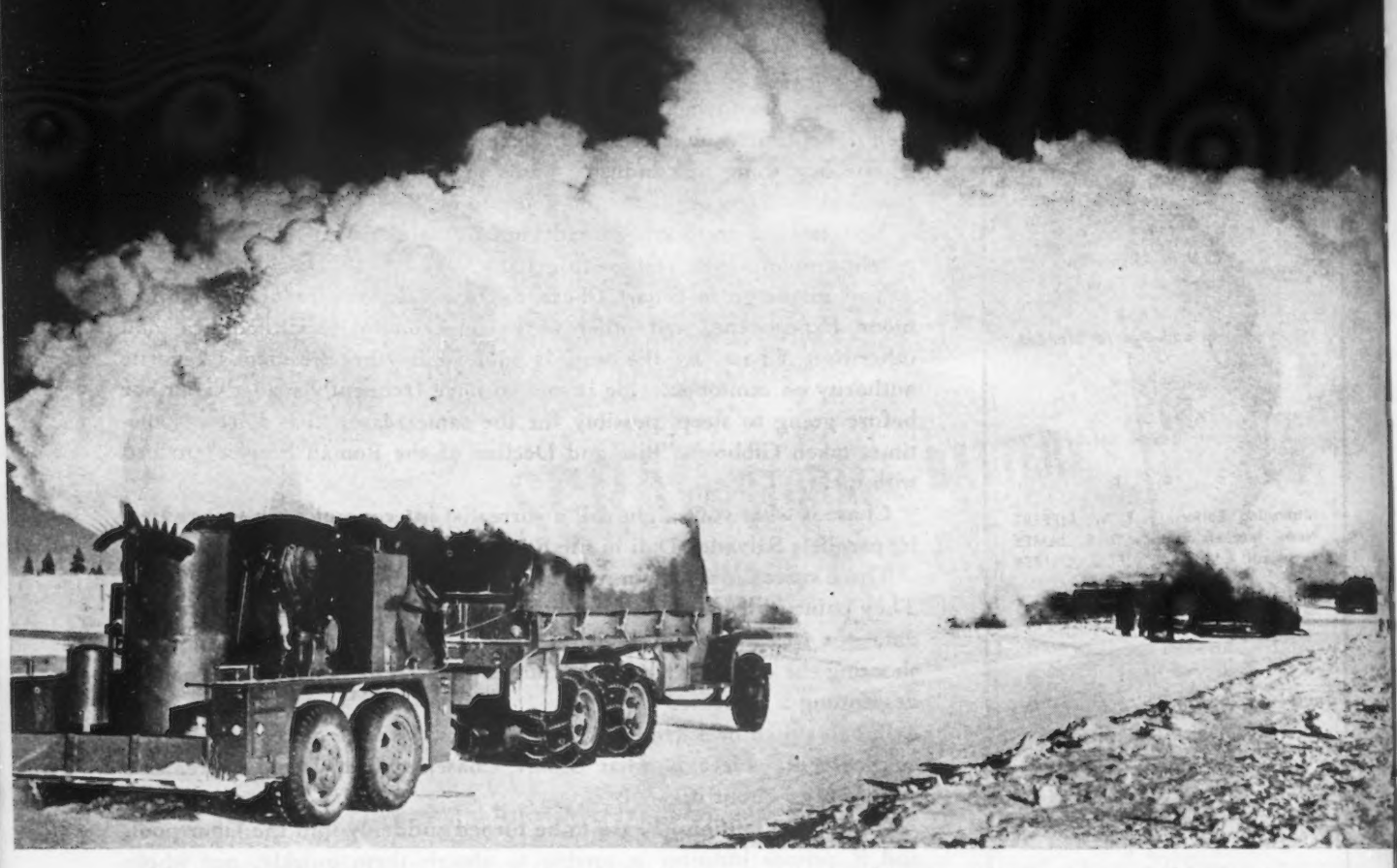
If you want to get the realist rather than the surrealist approach to this problem, it might be well for you to get a copy of "Post-War Re-Employment," by Karl T. Schlotterbeck, from the Brookings Institution, Washington. This is an institution that deals with facts and not with fancy.

Mr. Schlotterbeck in approaching his subject from the angle of probabilities rather than prophecies, takes into account the magnitude and the rate of demobilization, the withdrawals from the present labor market, the postwar outlook for employment and the outlook in the transition period. And his conclusions are summarized in the following words:

"Since there is good reason for believing that the level of production and employment will be for some years substantially above that of 1940, the outlook for satisfactory employment is distinctly encouraging."

To quote an expression: "You pays your money and you takes your choice." My choice is Schlotterbeck.

Blinding the Enemy with Clouds



This new generator blankets large areas with smoke made from materials ejected from special apparatus mounted on a trailer

—Another War Use of Inland Steel

Unusual clouds shrouded harbors and ports in North Africa and Sicily—man made clouds that reduced enemy artillery fire and bomber effectiveness by 85 per cent. They literally "blinded" the enemy and saved many American lives.

These strange clouds came from smoke generators that were developed by the Chemical Warfare Service of the U. S. Army Service Forces. Many of these generators were built by The Heil Company of Milwaukee. They can be used on landing barges and small craft, but are most often mounted on trailers towed behind fast trucks. Chemical Warfare Service smoke generator companies equipped with formations of these fog machines are even now blanketing Italian cities against aerial attack. One smoke unit covered the city of Palermo, Sicily, with smoke within 15 minutes after the starting signal was given.

Large shipments of Inland steel—plates, sheets, structurals, and 4-way floor plate—are used in these new mobile units, which generate smoke—obscuring enemy vision and bringing Victory closer at lower cost in lives and material. Devoted now to the production of steel for war, Inland is planning the production of steel for peace.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Sales Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

The IRON AGE
MARCH 9, 1944

NEWS FRONT

► The latest Truman Committee report recommends that strict war controls be relaxed to permit smaller steel companies with idle capacity to seek "some civilian, non-essential business."

The committee also plugged the peacetime melting of National Emergency steels, contending that despite possible higher costs of some NE analyses, any wholesale return to the more complex alloy steels would again dangerously drain nickel and chromium supplies.

► Great Lakes vessel operators predict a possible opening for full fleet movement early in April, 19 days ahead of last year's beginning.

► High speed tool steel has gone through more erratic gyrations during the war than any other steel product. Considered the most critical of all metals right after Pearl Harbor, these tool steels now are practically a drug on the market.

Ordnance depots have some three or four months stock on hand which refuses to move. Even though this surplus, as measured in tons, is comparatively small compared with other steels that have piled up and still are accumulating, the disposal problem is becoming one of the most worrisome in the industry.

In 1942, with excessive domestic ordering and heavy British and Russian demands, ingot output of high speed steels topped 136,000 tons; 1943 production dropped below 80,000 tons; and, current output is at an even slower pace.

High-molybdenum low-tungsten analyses of high speed steels, of course, far outweighed the hitherto dominant high-tungsten (little or no molybdenum) tool analyses. In 1942 the former types accounted for some 82 per cent of the total, whereas in 1943 these molybdenum types made up about 65 per cent of the total.

► Although plastics production is expected to show slight improvement by the middle of the year, the supply situation will remain critical throughout 1944, leaving little for civilian allocations.

Gordon Lefebvre, president of Cooper-Bessemer Corp. foresees commercial airlines powered by diesel engines and burning furnace oil costing only 6c a gal. instead of high octane gasoline.

Charles E. Sorensen, vice-president and manufacturing head of the Ford Motor Co. has resigned, thereby moving Harry Bennett closer into the center of the Ford stage.

► Of the 59,760,000 tons of semi-finished and finished products shipped in 1943, the American Iron and Steel Institute reports that 19.1 per cent, or 11,433,000 tons, went to naval and merchant vessel shipbuilders. In the previous year, 9,440,000 tons were delivered.

Export tonnage under lend-lease went down slightly in 1943 to 14,158,000 tons, against 14,848,000 tons in 1942.

► German glider bombs are propelled by liquid fuel jets and released from an airplane flying parallel to its target. The bomb is released at a fairly low height and at a distance from three to four miles from the target.

The radio-controlled bomb has large fins, which cause it to be confused with the glider bomb. It is released at high altitude, well over 20,000 ft., and radio control is employed to improve accuracy.

Both types leave smoke trails, so that their trajectory may be followed. The airplane controlling either type cannot take rapid evasive action if attacked. Direct attack on the bomb itself has been successful in defense.

► Since the first of the year, about 1000 beehive coke ovens have been taken out of operation. Reasons given are the falling off in demand, increased production costs and consumer insistence on better quality.

► Sunday supplement enthusiasm for helicopters leaves the experts cold. One expert thinks the helicopter, as it stands today, has not progressed beyond "an advanced state of pure research."

. . . Forecasting Tool and

By SERGIUS D. BROOTSKOOS
Mechanical Engineer, Washington, D. C.

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THE procurement of expendable tools, dies, jigs, fixtures and gages has always been a considerable headache for men in charge of production work. The determination as to what quantities of expendable tools and gages must be held in stock in the plants in order to assure uninterrupted production is usually based on the previous personal experiences of the shop management.

In times of great industrial upheavals, as well as during war times, these experiences may lead either to underestimation of the requirements of tools, which may endanger the production schedules, or to overestimation, which may in turn lead to overstocking and unnecessary investments in tools.

However, by blending personal experiences with the knowledge of laws governing tool procurement, the shop management may determine beforehand with a sufficient degree of accuracy and surety the number of tools and gages which must be held in the plant store room and tool rooms. The knowledge of these laws would place the procurement of expendable tools and gages on a firm foundation and make it less dependable on personal experiences of tool buyers. It would also permit intelligent supervision by plant managers of stocks on hand, and control the requisitions by tool rooms, and purchasing orders.

Requirements of Expendable Tools

The determination of production methods and types and numbers of machine tools to be used, as well as of the general tooling-up of the job is usually done by the planning and production departments of the plants. After their work is completed and approved by the management, additional machine tools are procured on the basis of monthly production schedules. The number and the type of the selected machine tools determine the design and procurement of the necessary jigs and fixtures which insure the interchangeability of the parts to be produced.

The selection of machine tools and the jigs and fixtures in turn determines the types and quantities of the necessary expendable tools. The procurement of these tools, however, cannot be based exclusively on total or even on monthly production requirements because expendable tools, as their name implies, are replaced only when they are worn out, get dull, or break. Procurement of these tools in bulk and at one time may command low prices, but will tie up too large a part of the working capital of the plant. Furthermore, large stocks of expendable tools require large storage space which increases rent costs or real estate taxes; involve more supervision and overhead costs, and finally, increase the danger of rusting and pilferage. Hence, procurement of the total estimated number of expendable tools at one time may in the end become more costly than buying the

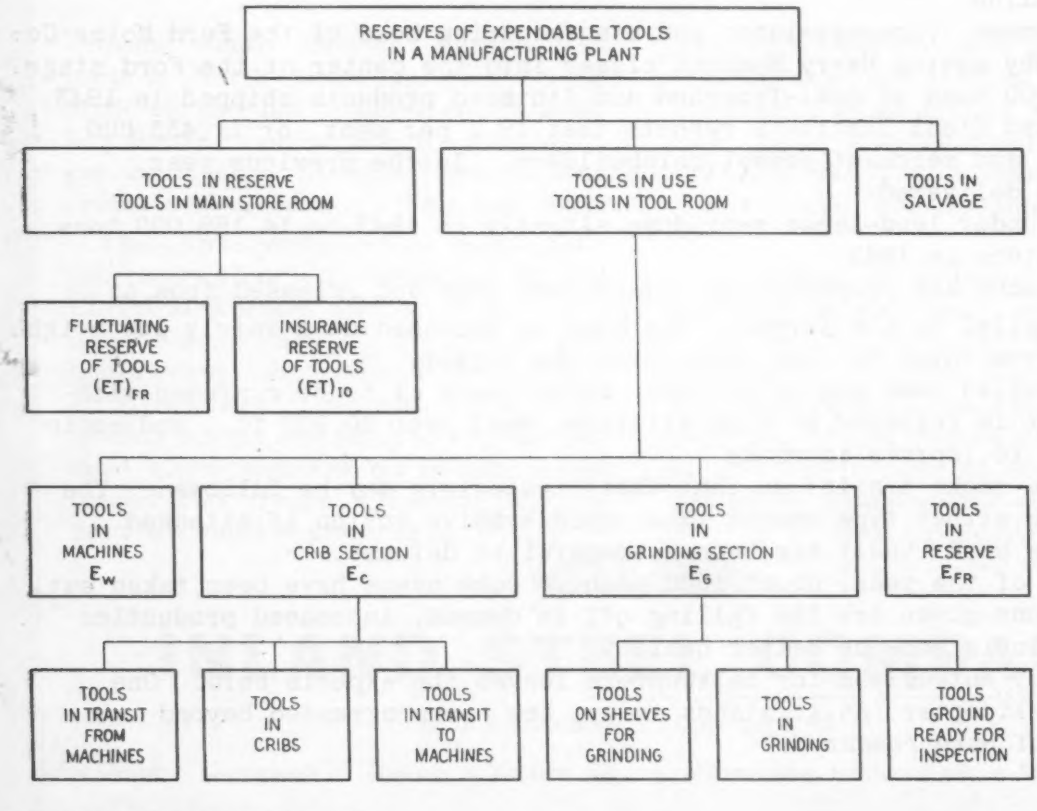

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FIG. 1—The distribution of expendable tools in individual tool rooms showing tools in reserve, tools in use and those in salvage.

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Gage Requirements . . .

. . . Tools that are to be used in the shop tool rooms and those that should be held in reserve in the main store room can be accurately estimated by applying simple mathematical rules. In this article the author develops formulas in which he substitutes symbols for figures that should be used to forecast tool purchases, and in the concluding article next week, an example of the application of the formulas is presented.

tools in partial lots large enough to assure uninterrupted operation of all machines in the plant and to warrant reasonably low prices.

The procurement of expendable tools must, therefore, be based on accumulating and keeping only such reserves of tools which would:

a. **Insure uninterrupted operation of all machines in the plant;**
b. **Insure reserves of tools in the main store room ample enough to take care of timely deliveries to all tool rooms in the plant;**
c. **Permit buying of these tools in lots that would warrant reasonably low prices.**

The stocks of available expendable tools in a plant are found in:

1. **The main store room: Tools in Reserve;**
2. **The tool rooms of individual shops: Tools in Use;**
3. **The tool salvaging shop: Salvaged Tools.**

Assuming that the resharpening and reconditioning of expendable tools is done in individual tool rooms, the distribution of these tools could be presented by a chart such as shown in Fig. 1.

The basic principles for calculating tool requirements were first advanced by S. A. Dumler, a Russian engineer, in his article "Calculation Methods for Tool Reserves," published in 1937 in the magazine, THE METAL INDUSTRY HERALD. *However, his presentation of these principles was made to suit conditions in the metal working industries of his country.*

Tools in Use

Number of Expendable Tools in the Machines: The latest tendency in manufacturing plants is to supply every machine operator with only one set of working tools. The replacement of worn, dull or broken tools is done exclusively by the tool setters. Therefore, the number of the particular expendable tools in actual use in the machines of a certain type can easily be ascertained on the basis of the total number of these machines used in the shop.

The number of machines needed for each machining operation is determined by the formula:

$$m = \frac{Pt_m}{T_m} \qquad (1)$$

where

m = Number of machines of a selected type to be used for a particular operation

P = Monthly output of parts to be machined

t_m = Time, in hours, required for machining a specific part in the machine of selected type

T_m = Accepted "actual" working time, in hours, per month, of machines in the plant (usually 75 per cent of the total working machine hours per month).

The number of expendable tools at work in the machines is then

$$E_w = mk = \frac{Pt_m}{T_m} k \qquad (2)$$

where

E_w = Number of tools at work in the machines

K = Number of identical tools, if any, used in each machine.

In order to keep all machines in the shop in continuous operation the tool room must keep a stock of replacement tools. Those tools which are in usable condition are kept in the crib section of the tool room ready to be handed to the tool setters in exchange for a dull or broken tool; the worn or dull tools which can be resharpened are sent to the grinding section of the tool room.

Number of Tools in the Crib Section: The minimum number of usable replacement tools to be kept in the

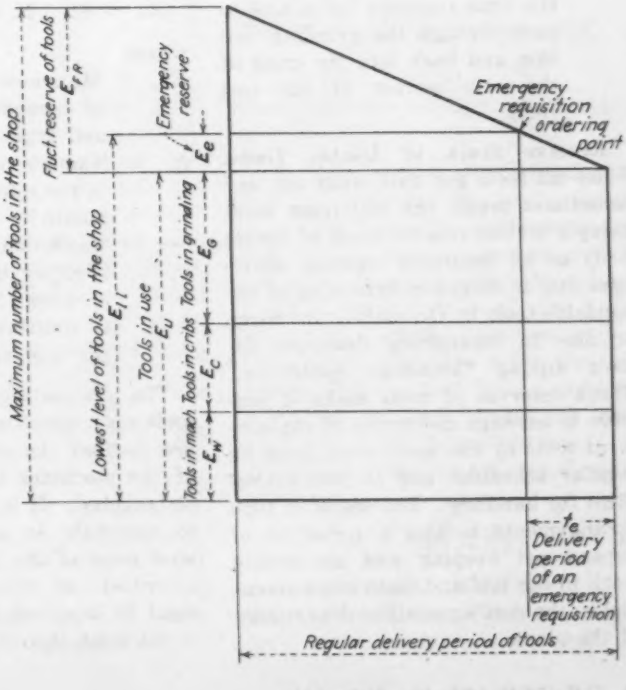


FIG. 2—Classification of "tools in use" in the shop, including tools at work in machines, tools in the crib and tools being reground. The ordering point for emergency requisition of tools from the main store room is indicated.

crib section in relation to that already at work in the machines depends on the ratio of the "working cycle" of the tools to their average working time in the machines:

$$\frac{E_c}{E_w} = \frac{t_c}{t_w}$$

$$E_c = \frac{t_c}{t_w} E_w = \frac{t_c}{t_w} mk \qquad (3)$$

where

E_c = Number of expendable tools to be kept in the crib section

t_c = Working cycle of a tool, in hours; it is the time it takes a tool to leave its crib, reach the machine, be set in the machine, perform its work, and be returned to the tool room for resharpening or scrapping

t_w = Average working time of a tool in a machine between grindings.

Number of Tools in the Grinding Section: The worn and dull tools returned to the tool room in exchange for new ones are sent either to the grinding section for resharpening or to the salvaging shop, or they are scrapped altogether. The permissible maximum number of tools to tbe held in the grinding section in relation to that in the crib section of the tool room must be in direct proportion of the grinding time to the working cycle of the tool:

$$\frac{E_g}{E_c} = \frac{t_g}{t_c}$$

$$E_g = \frac{t_g}{t_c} E_c = \frac{t_g}{t_c} \times \frac{t_c}{t_w} mk$$

$$= \frac{t_g}{t_w} mk \qquad (4)$$

where

E_g = Number of expendable tools in the grinding section;

tg = Grinding time in hours; it is the time required for a tool to pass through the grinding section and back into the cribs of the crib section of the tool room.

Reserve Stock of Usable Tools: Since all tools get dull, wear out and sometimes break, the tool room must carry a limited reserve stock of usable tools as an insurance against shortages due to delays in deliveries of expendable tools by the main store room, or due to emergency demands for tools during "breakage epidemics." These reserves of tools make it possible to arrange deliveries of replacement tools by the main store room on regular schedules and in lots convenient for handling. The result of such arrangements is also a reduction of paper, cost keeping and accounting work in the tool and main store rooms and in the cost accounting department of the plant.

Hence, the total number of usable tools available in the tool room varies from a maximum at the time of delivery of a fresh shipment of tools to a minimum which is indispensable for continuous work of the machines in the shop and which consists of tools in the machines and in the crib and grinding sections of the tool room. The calculation of this minimum stock of expendable tools in actual use has been discussed above.

The reserve stock of usable tools in the tool room may, therefore, be called the "fluctuating reserve" of tools. In determining the size of this fluctuating reserve of tools it must be kept in mind that shipments of large lots of tools from the main store room to the tool room necessitate the use of large bins or of long and deep shelves. On the other hand, deliveries of tools in small lots cause more frequent shipments, higher transportation costs, more paper work, and may even endanger production in case of unforeseen delays by the main store room of the plant in filling out the requisitions.

The size of tool lots for delivery to the tool rooms should be based on calculations of overhead costs involved: rent, light, upkeep of tools in the store and tool rooms, paper work and inside plant transportation. These overhead costs can be ascertained quite precisely, but the general practice in most manufacturing plants is to make deliveries of expendable tools to the tool rooms a weekly, bi-weekly or monthly shipment.

The fluctuating reserve of expendable tools of one size and type in the tool room may now be expressed by the formula:

$$E_{FR} = (E_w + E_c + E_g)\, a = aE_m \qquad (5)$$

$$E_m = E_w + E_c + E_g \qquad (6)$$

where

E_{FR} = Maximum fluctuating reserve of expendable tools of one size and type in the tool room

E_m = Number of certain tools used in the selected machines in one month

a = Coefficient, the value of which is either ¼, ½ or 1 depending on weekly, bi-weekly or monthly deliveries of new tools to the tool rooms.

The fluctuating reserve of usable tools may sometimes run dangerously low so that the continuous operation of the machines in the shop may be endangered. It is therefore advisable to ascertain in advance the lowest level point of the stock of usable tools at which an emergency requisition must be sent out from the tool room to the main store room. It takes time even for an emergency requisition to pass through the usual red tape in the various offices of the plant, to have the requisitioned tools assorted, packed and sent to the toolroom which originated the requisition.

The lowest level of reserve tools in the tool room may be considered to be equal to the number of tools which may reasonably be requested by the tool setters while an emergency requisition is being filled. This emergency reserve stock of tools therefore must be proportional to that in the crib section. This proportion in turn equals the ratio of the average length of time which it usually takes for an emergency requisition to materialize, to that of the working cycle of the tools, to wit:

$$\frac{E_e}{E_c} = \frac{t_e}{t_c}$$

$$E_e = \frac{t_e}{t_c} E_c = \frac{t_e}{t_c} \times \frac{t_c}{t_w} mk$$

$$= \frac{t_e}{t_w} mk \qquad (7)$$

where

E_e = Number of tools which may be required by the tool setters while an emergency requisition is being filled out

t_e = Average time, in hours, between the issuance of an emergency requisition and the delivery of the tools to the tool room.

The lowest level of usable tools in the shop and the tool room when an emergency requisition must be issued is then equal to:

$$E_{ll} = E_w + E_c + E_g + E_e = E_m + E_e \qquad (8)$$

All above formulas can easily be expressed in terms of monthly production requirement figures. The total number of expendable tools of one type and size to be used in a manufacturing plant in one month for a certain machining operation can be determined beforehand by a general formula:

$$E_m = \frac{Pt_mK}{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)} \qquad (9)$$

where

E_m = Number of certain tools used in the selected machines in one month

P = Monthly output of parts to be machined

t_m = Time, in hours, required for machining each part in the selected machines

K = Number of identical tools, if any, used in each machine

t_w = Average working time, in hours, of a tool between grindings

g = Average number of grindings before the tool is turned over to the salvaging department or is scrapped altogether

l = Percentage of losses and breakages of tools in the shop.

The number of expendable tools held in the crib and grinding sections of the tool room, including the emergency reserve stock, can then be expressed in terms of general monthly tool requirements as follows:

$$E_c = x\,E_m \tag{10}$$

$$E_g = y\,E_m \tag{11}$$

$$E_e = z\,E_m \tag{12}$$

where x, y, and z, are certain coefficients. Using the formulas 1, 2, 3, 4, and 7, the values of these coefficients are:

$$x = \frac{E_c}{E_m} = \frac{t_c}{t_w}\,mk \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \left(\frac{t_c}{t_w} \times \frac{Pt_m}{T_m}\,k\right) \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \frac{t_c}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) \tag{13}$$

$$y = \frac{E_g}{E_m} = \frac{t_g}{t_w}\,mk \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \left(\frac{t_g}{t_w} \times \frac{Pt_m}{T_m}\,k\right) \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \frac{t_g}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) \tag{14}$$

$$z = \frac{E_e}{E_m} = \frac{t_e}{t_w}\,mk \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \left(\frac{t_e}{t_w} \times \frac{Pt_m}{T_m}\,k\right) \times \left[\frac{t_w\left(g+1\right)\left(1-\frac{l}{100}\right)}{Pt_mk}\right] = \frac{t_e}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) \tag{15}$$

Since the number m of selected machines is known and since the monthly consumption of tools E_m and the coefficients x, y and z can be determined with a sufficient degree of approximation in advance, the maximum and the minimum number of usable tools to be held in the tool rooms for each type of machines can easily be ascertained. The classification of tools held in the shop tool rooms are graphically presented in Fig. 2.

Tools in Reserve

All figures of current and future requirements of various tool rooms for expendable tools are collected and segregated by the production department according to their types, sizes and the time when these tools are required. Either tables or charts are compiled to determine the reserves of expendable tools to be accumulated and held in readiness at the main store room of the plant for insuring timely delivery to the various tool rooms. On the basis of these data the purchasing department shapes its procurement policy. Standard tools are usually bought from outside manufacturers while special tools are either made in the tool shop of the plant, if it has one, or they are ordered from contract die and tool shops which specialize in making tools to order.

The accumulated reserves of tools in the main store room can be divided in two groups in order to assure smooth operation of all shops in the plant as well as of the purchasing and cost accounting departments as follows:

1. **Fluctuating reserve**
2. **Insurance reserve**

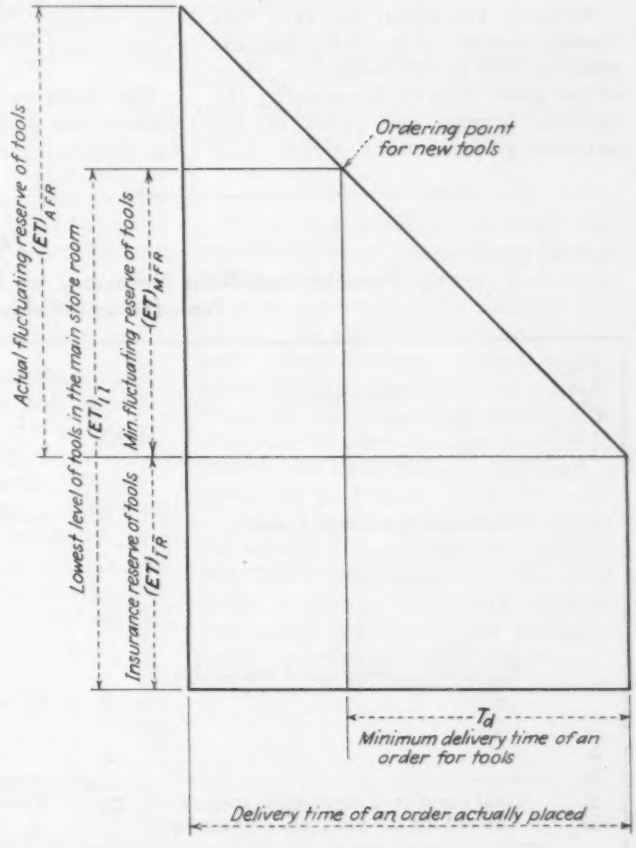


FIG. 3 — Expendable tools held in reserve in the main store room, showing the ordering point for new tools.

The fluctuating reserve is the stock of individual expendable tools from which all tool rooms requisitions are filled. It is at its maximum when a new shipment of tools arrives at the main store room and it is exhausted when it reaches the level of the insurance reserve.

The insurance reserve is the stock of individual expendable tools which must be kept in the main store room of the plant as a precaution against any delays in deliveries of the ordered tools by suppliers, as well as against "breakage epidemics," which may place undue pressure on the main store room for deliveries of replacement tools.

The procurement and deliveries of expendable tools from the suppliers as well as from the plant's own tool shop should always be arranged in lots equal to or in multiples of the monthly requirements of the tools. Since the monthly requirements of individual expendable tools and the average delivery time by the suppliers or the tool shop are known, the minimum size of the fluctuating reserve of each tool, can now be expressed by the formula:

$$(ET)_{MFR} = E_m\,T_d \tag{16}$$

where

$(ET)_{MFR}$ = Minimum size of the fluctuating reserve of an ex-

pendable tool in the main store room of the plant

T_d = Average time, in months, consumed from the issuance of the requisition until the receipt of the tools by the main store room of the plant. This includes the time consumed by the red tape in various departments of the plant, the time for getting the bids and issuing the orders and the average time of delivery of the tools by the supplier.

However, the actual size of a fluctuating reserve of an individual expendable tool in the main store room of the plant must be governed by the business acumen and policy of the purchasing department which may find it more advantageous to order the needed tools for several months in advance. In case the plant has its own tool shop, the maximum size of the fluctuating reserve of a particular tool is governed by its production costs.

The actual size of the fluctuating reserve for an expendable tool can now be expressed by the formula:

$$(ET)_{AFR} = bE_m T_d \qquad (17)$$

where

$(ET)_{AFR}$ = Actual size of the fluctuating reserve for an expendable tool in the main store room of the plant

b = Coefficient, the upper and lower limits of which will be determined later.

The issuance by the main store room of the plant of a requisition to the purchasing department for a new stock of an expendable tool is determined by its level in the bins or on the shelves in the store room. The stock reaches this level when the available number of the particular tool equals to:

$$(ET)_{ll} = (ET)_{MFR} + (ET)_{IR} \qquad (18)$$

where

$(ET)_{ll}$ = Number of available tools at its lowest level in the bins or on the shelves of the main store room when a requisition must be issued

$(ET)_{IR}$ = Insurance reserve of the same tool to be held in stock in the main store room of the plant.

The size of this insurance reserve can easily be determined by taking into consideration the two major causes which make the accumulation

TABLE I

Formulas and Data Necessary for Determining the Number of Expendable Tools for an Individual Machining Operation

Location of Tools	Description	Mathematical Formulas		Necessary Data
		No.	Expression	
SHOP	Number of machines at work	1	$m = \frac{Pt_m}{T_m}$	P = Monthly output of parts t_m = Actual machining time, hours T_m = Actual working time of the shop, hours per month
SHOP	Monthly requirements of expendable tools	9	$E_m = \frac{Pt_m k}{t_w (g+1)\left(1 - \frac{l}{100}\right)}$	K = Number of identical tools in a machine t_w = Working time of a tool in a machine, hours g = Number of grindings before the tool is sent to the salvaging department l = Percentage of losses and breakages of tools in the shop
SHOP	Total number of expendable tools required for the production program	22	$E_t = E_m T_p$	T_p = Planned production time, months
SHOP	Fluctuating reserve of expendable tools in the tool room	5	$E_{FR} = a E_m$	Coefficient which depends on delivery periods of tools to the tool room
SHOP	Emergency reserve of expendable tools in the tool room	12	$E_e = zE_m = E_m \frac{t_e}{T_m}(g+1)\left(1 - \frac{l}{100}\right)$	t_e = Time needed for an emergency requisition to materialize, hours
SHOP	Lowest level of tools in the shop and its tool room when an emergency requisition must be issued	8	$E_{ll} = E_m + E_e$	
MAIN STORE ROOM	Minimum fluctuating reserve of expendable tools	16	$(ET)_{MFR} = E_m T_d$	T_d = Time needed for a store room requisition to materialize, hours
MAIN STORE ROOM	Insurance reserve of expendable tools	19	$(ET)_{IR} = E_m T_d (cd - 1)$	c = Coefficient for "breakage epidemics" d = Coefficient for delivery delays
MAIN STORE ROOM	Lowest level of tools in the store room when a requisition must be issued	20	$(ET)_{ll} = (ET)_{MFR} + (ET)_{IR}$	
MAIN STORE ROOM	Minimum size of an initial order for expendable tools	21	$(ET)_{1.0} \geqq E_m (1 + a + edT_d)$	

of it obligatory: First, that a breakage epidemic may be expected in the shop, and second, that the supplier may fail in his promised deliveries. The monthly consumption of expendable tools due to the breakage epidemic may be expressed in terms of regular monthly consumption of tools, as:

$$c\,E_m$$

where the coefficient c is larger than unity ($c > 1$).

The time of delivery under the second condition would then be:

$$d\,T_d$$

where the coefficient d is larger than unity ($d > 1$).

In such a case a new requisition must be of the size:

$$c\,E_m \times d\,T_d = cd\,E_m\,T_d$$

The size of the insurance reserve is then:

$$(ET)_{IR} = cd\,E_m\,T_d - E_m\,T_d = E_m\,T_d\,(cd-1) \quad (19)$$

A requisition for new tools must thus be issued when the fluctuating and insurance reserves in the main store room reach the level:

$$(ET)_{II} = (ET)_{MFR} + (ET)_{IR} = E_m\,T_d + E_m\,T_d\,(cd-1) = cd\,E_m\,T_d \quad (20)$$

The average values of the coefficients c and d are:

$$1.1 \leqq c \leqq 1.3$$
$$1.1 \leqq d \leqq 2.0$$

We will now determine the minimum size of the initial procurement of expendable tools $(ET)_{1\cdot0}$ which should insure uninterrupted production in the plant. This initial procurement must be of such magnitude as to cover the requirements in tools of the shop and the minimum reserves of them in the tool room and also in the main store room of the plant. This can be expressed by the formula:

$$(ET)_{1\cdot0} \geqq E_m + E_{FR} + (ET)_{II}$$
$$E_M + E_{FR} + (ET)_{II} = E_m + aE_m + cd\,E_m\,T_d = (1 + a + cd\,T_d)\,E_m$$
$$(ET)_{1\cdot0} \geqq (1 + a + cd\,T_d)\,E_m \quad (21)$$

The total (maximum) requirements of each tool for the contemplated production program is:

$$E_T = E_m\,T_p \quad (22)$$

where

E_T = Total number of each tool required for the contemplated production program

E_m = Monthly requirements of each tool

T_p = Time, in months, of the contemplated production program.

Hence the purchasing department knowing the maximum and minimum requirements for each tool is in a position to plan its search for the best prices and delivery terms.

After the initial order for the tools has been placed, the consecutive procurement orders of tools for the fluctuating reserve in the main store room of the plant are based on formula 17:

$$(ET)_{AFR} \equiv bE_m\,Td$$

The maximum value of the coefficient b when only one additional order for tools will be placed is then:

$$bE_m\,T_d \leqq E_T - (ET)_{1\cdot0} \quad \text{or}$$
$$bE_m\,T_d \leqq E_m\,T_p - (1+a+cd\,T_d)\,E_m$$
$$b \leqq \frac{1}{T_d}\,[T_p - (1+a+cd\,T_d)] \quad (23)$$

If several consecutive procurement orders for the same tool were placed for keeping up this fluctuating reserve the sum of all coefficients, b′, b″, b‴, etc., then used must always be:

$$b' + b'' + b''' \ldots\ldots \leqq b \quad (24)$$

This will exclude any possibility of ordering superfluous tools and will assure the full use of all procured tools in the actual production work.

Tools in Salvage

It is impossible to forecast the number of tools which the salvaging department may salvage and turn over to the main store room of the plant. The salvaged tools are, therefore, pure savings which permit slight fluctuations in current requisitions for additional expendable tools. The classification of expendable tools held in the main store of the plant is presented by Fig. 3.

Table I gives a summary of formulas which are necessary for determining the requirements in expendable tools. It also presents such information and data which are indispensable for solving these formulas.

(To be concluded)

Polythene—A New Du Pont Plastic

POLYTHENE is the generic name for a new tough plastic manufactured by the polymerization of ethylene. In announcing that polythene is now being manufactured in commercial quantities, E. I. du Pont de Neumours & Co., Inc., emphasizes that the material is available in substantial quantities only by specific allocation for war purposes. The original development work was done by Imperial Chemical Industries, Ltd.

Supplies of polythene heretofore available have gone into production of items urgently needed by the armed services, where this new plastic has demonstrated its advantages as a covering for electric wiring and cable.

Outstanding properties upon which it is expected that many important uses will be based include flexibility and toughness over a wide range of temperatures, unusually good resistance to water and to penetration by moisture, chemical inertness and excellent electrical properties. Possible future uses for polythene, when available, will be various types of containers, including collapsible tubes for food and cosmetics; gaskets and battery parts; flexible tubing or more rigid piping; waterproof and chemically resistant coatings, and adhesives for general industrial use.

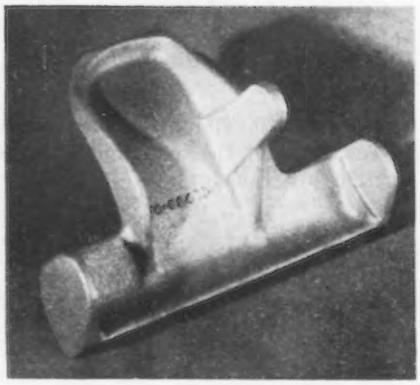
In thin sections, Polythene may be classified as non-rigid, yet it does not have the limp rubbery quality that characterizes most non-rigid plastics. However, thick specimens exhibit sufficient stiffness to warrant classification of the material among the more rigid plastics.

The new plastic is readily molded and fabricated by present methods with existing molding and shaping equipment. It can be extruded, injection molded, compression molded and calendered. In sheet, rod or tube form it can be machined, cut, blown, blanked or swaged.

Castings and Forgings Replace

MUCH has been written in the past few years about the extension of the use of welding, and rightly so, because without the development of welding techniques during the past two years the war effort would not have progressed nearly so far nor so fast. However, with the increase in welding came the need for experienced welders by the thousands, a difficulty that was partly overcome by quick training of anyone willing and able to hold a torch or electrode in shops all over the country.

Especially did the aircraft industry find it difficult to obtain welders in the numbers required. This difficulty, along with a few others connected with welding, led the Stinson Division of Consolidated Vultee Aircraft Corp., at Wayne, Mich., to move toward the use of castings and forgings to eliminate the necessity of welding as quickly as the design of one of the Stinson ships, the L-5, became standardized or "frozen."



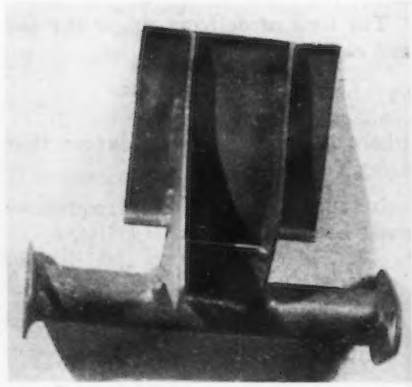


FIG. 1—The cast aluminum brake pedal, left, replaced the welded assembly at right. In addition to saving considerable welding and forming, rejections were reduced to nothing.

Some examples of the substitution of forged and cast parts for welded assemblies are shown in the accompanying illustrations. Fig. 1 shows a cast aluminum brake pedal that was substituted for a welded steel pedal made up of seven parts. This eliminated 19 in. of welding and five machining operations.

Fig. 2 illustrates how a six-piece welded part was eliminated by a one-piece cast aluminum part, shown at the left. This flap bellcrank formerly required 5 in. of welding, and in the new design five machining operations were cut out. Likewise, the forged part shown above in Fig. 3 replaced the seven piece welded assembly below. Five machining operations were eliminated in the new design, as were 23 in. of welding.

To change an aircraft design from welded parts to cast or forged parts, there must be serious consideration given many factors. The change must be feasible from an engineering standpoint. The design must be frozen so as to justify the cost of making dies or patterns. The castings or forgings must be available in desired quantities, the latter of which are still difficult to obtain with any reasonable delivery Last, but not least, it must be economical.

In spite of all the "ifs" of such changes, Stinson found that cast and forged parts are highly satisfactory and economical. From the standpoint

TABLE I

• Comparative Costs of the Welded and the Aluminum Cast Bellcrank Assembly Wing Flap Control for the Stinson L-5. Time shown is in manhours per ship, with two assemblies per ship.

	Welded Steel Assembly	Cast Aluminum Assembly
Based on Normal Efficiency of Operations		
Direct Labor, 2.1 hr. at $1.20 per hr.	$2.520	$0.328
Overhead, at 150 per cent of labor cost	3.780	0.493
Material	0.320	2.000
Tool cost at $700 amortized over 1500 ships*	.....	0.467
Total	$6.620	$3.288
Standard Cost Based on 100 per cent Efficiency		
Direct Labor, 2.1 hr. at $1.20 per hr.	$2.520	$0.33
Overhead, at 150 per cent of labor cost	3.780	0.49
Material	0.320	2.00
Tool cost at $700 amortized over 1500 ships*	.....	0.47
Scrap loss	.380	....
Total	$7.00	$3.29
Standard Cost Based on 50 per cent Efficiency		
Direct Labor, 2.1 hr. at $1.20 per hr.	$5.04	$0.66
Overhead, at 150 per cent of labor cost	7.56	0.98
Material	0.32	2.00
Tool cost at $700 amortized over 1500 ships*	....	0.47
Scrap loss	.65	....
Total	$13.57	$4.11

* Original cost of welding jigs and fixtures not shown.

Aircraft Weldments . . .

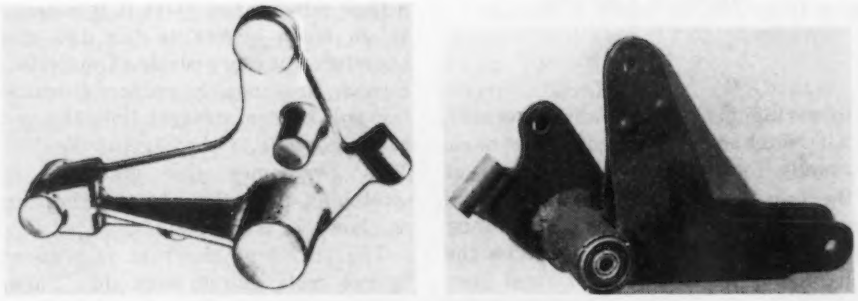


FIG. 2—This one-piece cast bellcrank (left) eliminated the six-piece welded part shown on the right. Cost breakdowns for making each of these parts are shown in the accompanying table.

of cost, it can be seen from Table I that in the case of the bellcrank assembly for the wing flap controls, the casting is considerably cheaper than the former method of welding. Even without including the costs of the original jigs and fixtures for welding, the aluminum cast part ran about 50 per cent less than the cost of welding the assembly. This has been borne out in practically every one of about a dozen such changeovers.

Other reasons prompting the switch to cast or forged parts where possible in the Stinson L-5, which is known as the "Flying Jeep" and used for Army liaison work and artillery directing, were: High scrap losses encountered in welding, poor tolerance control, because of shrinking of the tubular structures after cooling; the difficulty of inspecting the weld; and the ease with which less experienced welders burned through the light tubing of the fuselage frame.

Whether the use of such parts replacing welding will become widespread in the aircraft industry depends largely upon how quickly designs of given planes will be stabilized. It would be impractical to make forging dies for a given part in a plane if within a few months the design would be changed and the part would either have to be made differently or be completely eliminated.

Both forgings and castings have been difficult to obtain, some of them coming to Wayne from as far away as Denver, Colo., but the program has been set up and many of these difficulties are gradually being ironed out. It is believed that before long most of the supply problems will be eliminated and a reasonably free flow of required forged and cast parts will be coming into the plant without undue interruptions.

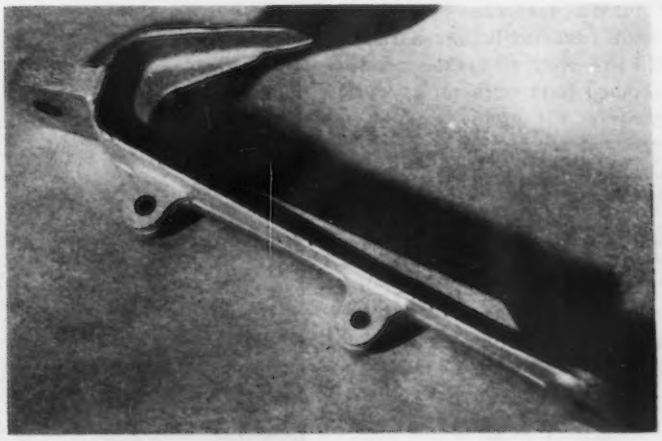
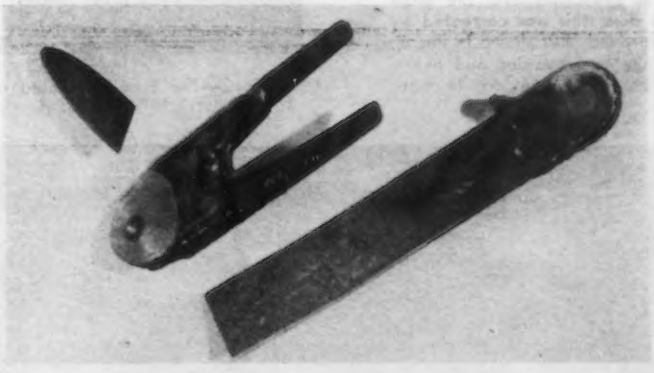


FIG. 3—The intricate forging shown on the above replaced a seven-piece welded assembly below. This assembly, a lower lift strut fitting, required 23-in. of welding and in addition, five facing and machining operations were eliminated.



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. . . Stretch Forming

By R. H. RUUD
Assistant Factory Manager
North American Aviation, Inc.
Inglewood, California

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STRETCH-forming of sheet metal has become a major process at North American Aviation, Inc. Starting with the installation of an Erco stretching machine in September, 1941, developments have progressed until at present a number of nacelle skins, landing gear door skins, cowl sheets and fuselage skins are being formed by stretching. Some parts are *partly* stretched prior to the drop hammer operation, thus eliminating much time and rubber which would have to be used if parts were made entirely on the drop hammer.

In the beginning, a number of forms were made from wood but it was found that it required too much work on these forms to obtain a properly contoured part. Hence dies of wood or plastic material have been abandoned in favor of hollow Kirksite dies which are easy to make and deliver a finished part with no re-work necessary.

For data on casting of hollow Kirksite dies see the following articles in THE IRON AGE: *"Coring Kirksite Dies," April 8, 1943, and "Kirksite Die Casting Technique," June 10, 1943. For data on stretch forming see "Stretch Forming Contoured Sheet Metal Aircraft Parts," June 10, 1942, and "Stretch Forming Speeds Aircraft Production," Oct. 1, 1942.*

The belief has been proved false that relatively flat skins cannot be stretched unless the form is made in a small arc and parts are expected to spring back to the shape wanted. All North American's dies are made exactly to the shape and contour of the finished part, and do not depend upon any spring-back (Fig. 1). Many improvements have been made on the stretching machine. The original jaws shown in Fig. 2 have been replaced by the swivel jaws shown in Fig. 3. This photograph also shows the graduated scales placed on the base to indicate the position of the jaw beams, thus cutting down the setup time considerably when repeating jobs at odd intervals. The swivel jaws have a dual advantage: First it is possible to go much nearer to the dies and therefore cut down waste of material; second, breakage is reduced because the pull is in a straight line, tangent to the contour at the edge of the dies. This overcomes the difficulty of stretching over the edge of the dies as shown in Fig. 1.

The travel of the ram is reduced by two rests, one on each side. These rests stop the ram from going down any farther than is required to clamp the sheets.

For the past several months North American has been using a clad

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BELOW

FIG. 1—Shown here is a stretching die that is made exactly to the dimensions of the finished part. No subsequent springback is allowed for. There was some difficulty in stretching over the edge of the dies; this was corrected by the improved jaws shown in Fig. 3. Note the large radius and hence flat contour of the arc in both directions.

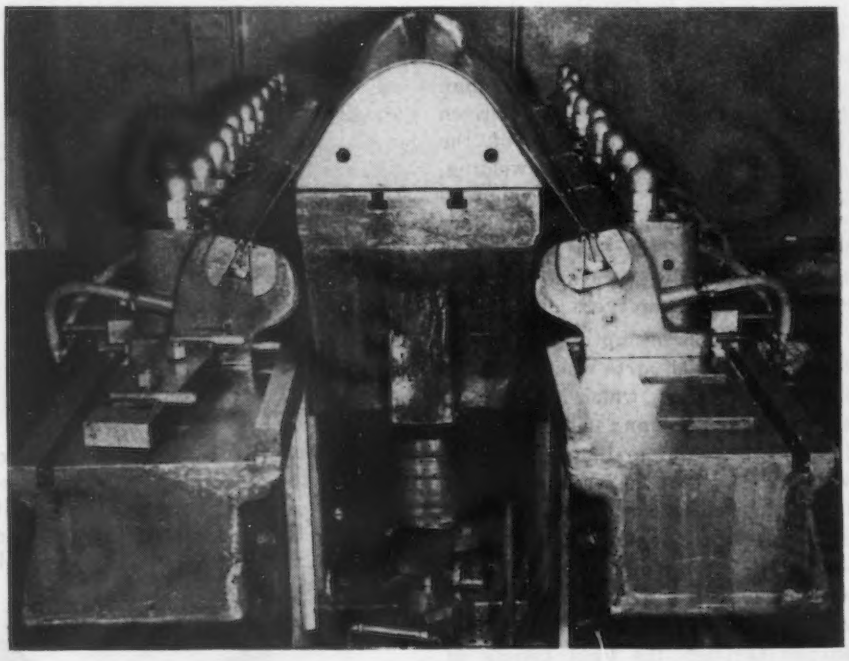

FIG. 2—The Erco stretching machine with its original jaws. This die has a relatively flat camber in the transverse plane.

Aircraft Parts . . .

. . . The belief that relatively flat skins cannot be stretch-formed unless the form is made in a relatively short arc, allowing for spring-back of the stretched parts to the shape wanted, has been nullified. The author describes a method of stretching with a die made to the exact shape and contour of the finished part, and includes much valuable data on physical properties of stretched material.

forming sheet supplied by Reynolds Metal Co., known as 24S-UT Pureclad, which means 24ST unstretched or unflattened. The percentage of elongation of this material is much higher than in fully flattened (stretcher leveled) sheets. Many parts are now being made from sheet in this special S-UT condition that formerly had to be made in the SW condition —thus eliminating re-heat-treat and storage in ice box as well as the danger of corrosion which will set in within a few hours on parts formed directly after heat-treat. Such parts have to be wiped off immediately after forming to prevent corrosion.

Recently, two dies of similar length were installed side by side in the stretching machine and it was found that with the extra elongation and better formability in the heat-treated, unstretched Pureclad sheet, the difference in crowns between the two dies could be overcome by stretching the low crown part just slightly more to allow the high crown part to stretch out completely. If the parts have only a slight contour, two parts may be stretched on one die by placing one sheet over the other; and with two dies four parts are completed with every stroke of the machine. This is also being done with parts made from SO material that are finished on drop hammer dies after being pre-stretched on starter dies.

Table I shows the average tensile strength and per cent elongation of 24S-UT Pureclad alloy sheet as compared with ordinary stretcher leveled 24ST. There is no doubt of the improved workability, particularly in the "as received" condition, in which

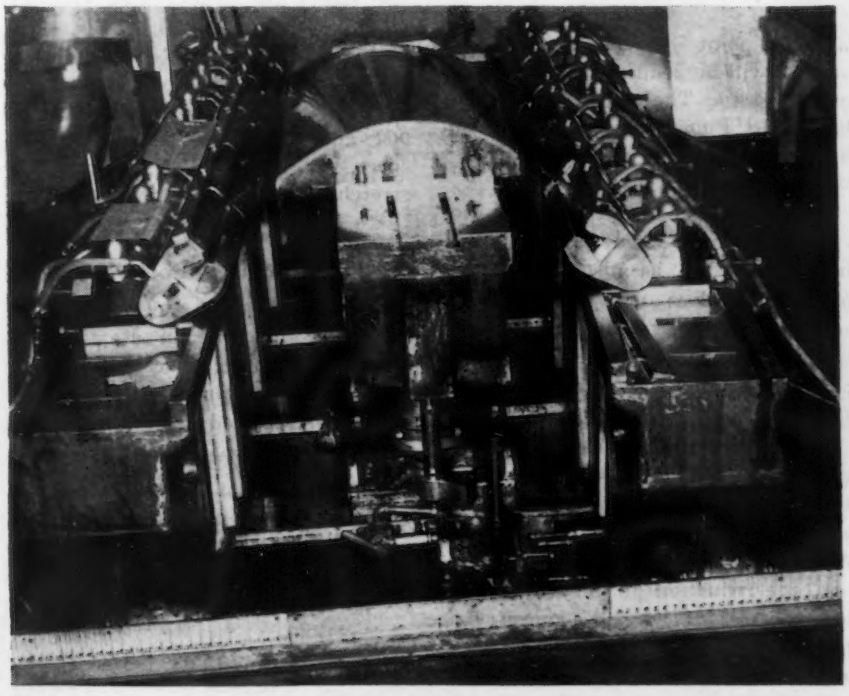

FIG. 3—The improved swivel jaws shown here make it possible to grip the sheet much nearer the dies, cutting down waste of material. The pull is always in the same direction as the contour at the edge of the dies. Graduated scales on the base, indicates position of the jaw beams. Travel of the ram is reduced by two air-operating rests.

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FIG. 4—Skin made from regular 24ST aluminum alloy, stretcher leveled. Figures show material stretch (per cent elongation). See also Fig. 5, showing an ST-unstretched skin of the same material.

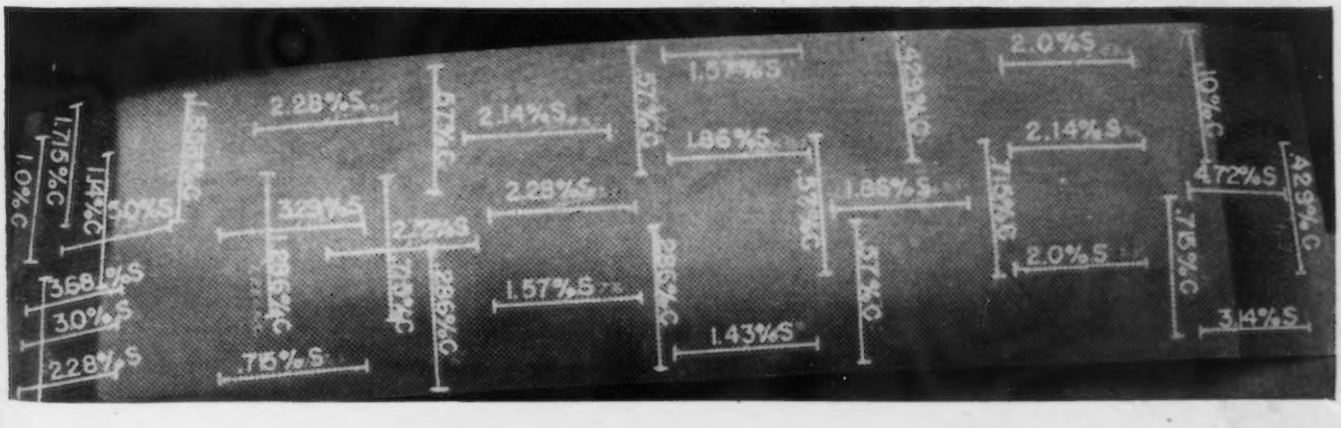


TABLE I

Comparison of Tensile Strength and Elongation of Unstretched (Not Flattened) 24S-UT Aluminum Sheet with Standard Stretch Leveled (Flattened) 24-ST

No. of Tests Advg.	Direction of Test	Final Mill Operations on Sheet	Tensile Strength Lb. per Sq. In.	Yield Strength Lb. per Sq. In.	Per Cent Elongation	T.S. minus Y.S.	Advantage
			As Received				
3	With grain	Not flattened	63,170	42,000	18.2	21,170	6610
3	With grain	Flattened	66,030	51,470	15.3	14,560	
3	Cross grain	Not flattened	60,730	39,830	19.3	20,900	7540
3	Cross grain	Flattened	63,030	49,670	16.3	13,360	
			Sheet in the SW Condition (Re-Heat Treated but not Aged)				
3	With grain	Not flattened	50,400	20,200	23.5	30,200	870
3	With grain	Flattened	50,230	20,900	23.0	29,330	
3	Cross grain	Not flattened	48,270	19,100	23.8	29,170	640
3	Cross grain	Flattened	48,330	19,800	23.0	28,530	
			Sheet in the ST Condition (Re-Heat Treated and Fully Aged)				
3	With grain	Not Flattened	65,800	39,500	20.3	26,300	2170
3	With grain	Flattened	65,630	41,400	19.0	24,230	
3	Cross grain	Not flattened	63,830	38,530	20.7	25,300	1330
3	Cross grain	Flattened	63,600	39,630	19.7	23,970	

case the elongation in regular flattened sheet varies from 15 to 16½ per cent compared with 18 to 20 per cent for the new material. The difference is not so marked for the re-heat-treated and fully aged material and the material in the "green" state (re-heat-treated but not aged). In the table, the advantage between unflattened and flattened sheets listed in the extreme right column represents the increased working stress range available with sheets received from the mill in the unstretched condition. It should be remembered that the plastic working range available is bounded by the yield point of the material at the low end of the scale and the ultimate strength at the high end. The wider this range, the better is the forming quality of the material. That is why tough, resilient materials with a yield point near the ultimate strength are so difficult to form.

Fig. 4 shows a skin made from the regular 24ST. Note figures showing material stretch and compare with figures on Fig. 5, showing the same skin stretched on the same die, but of S-UT material.

Reduction in Thickness

It is important to know how much the thickness of material is reduced by this method of stretch forming. There is some reduction of thickness and it can best be determined by measuring a stretched part. In most cases a reduction of 3 to 5 per cent is shown on parts that can be stretched of ST material. This means that parts made of 0.032 in. material at the point of the most severe stretch will be reduced to a thickness of 0.0304 in. The reduction is much less if S-UT material is used and can hardly be measured unless the stretch is at least 4 per cent.

The grain structure in S-UT material seems to be somewhat finer than in standard ST, because the orange-peel effect does not appear after severe forming. Thus the better formability of S-UT material can be partially attributed to its finer grain structure.

It has been found that the reduction in thickness is about 40 per cent of the elongation required to form the part. By this is meant, if a part is stretched with a 12 per cent elongation, the reduction of the material is 40 per cent of 12, or 4.8 per cent, the resulting thickness being 95.2 per cent. For example, 95.2 per cent of 0.040 in. thickness is 0.0381 in.

In conformance with Poissens ratio, the material contracts spontaneously opposite to the direction of the stretching, thereby minimizing the reduction in thickness. This may only be taken into consideration if parts to be formed are about 24 in. wide or less. On wider parts the contraction takes place only along the edge of the part, and this in all cases is very helpful in preventing the parts from breaking.

Figs. 6 and 7 illustrate a part stretched in the SW condition (quenched but not aged). This part has been stretched to its limits and could never be made of fully heat-treated and aged ST material. The stretch ranges from 3.13 to 13.53 per cent. Again the reduction and stretch are found to be extreme between the jaws and the die. Tests have shown that a part made of 0.040 in. SO material, stretched in the SW condition with a stretch of 13.5 per cent reduces in thickness to 0.0378 in. or 5.4 per cent.

There is no safety margin in such severe stretch operations and they cannot be recommended because of the loss in material; if only one piece in ten is lost, it generally represents one-half of a sheet. In many cases going to the next heavier gage material is the only possible recommendation and this is frequently rejected by the engineering department because of the additional weight.

Stretch forming parts in the SW condition improves the physical properties of the material to a point near the values for heat-treated and cold worked SRT material. The tensile strength of the latter is 66,000 lb. per sq. in. and the yield strength 50,000 lb. per sq. in. as compared with 62,000 and 41,000 lb. per sq. in., respectively, for 24S-UT material. The stretch, however, should not exceed 10 to 12 per cent.

A Stainless Steel Job

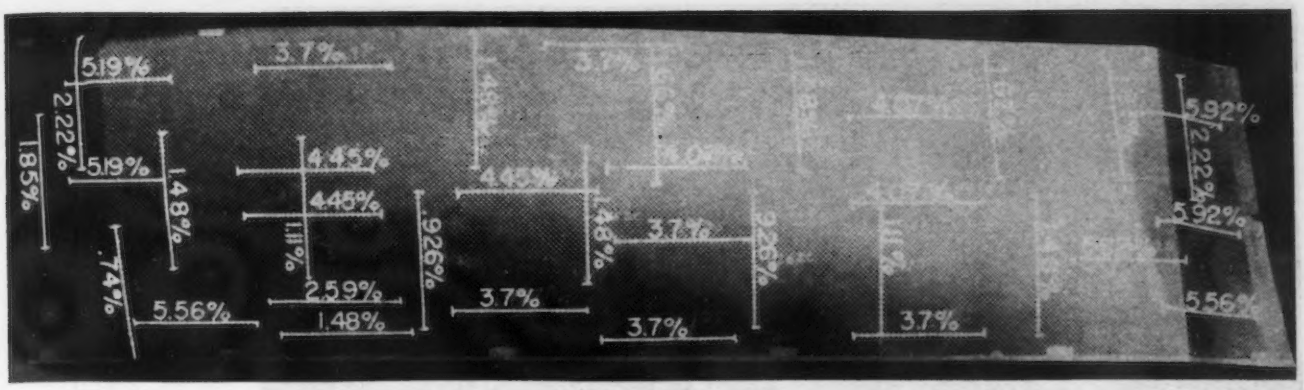
In one instance, the use of the stretching machine in starting the parts has been incorporated in a new method of forming parts for the stainless steel fixed cowl. This method

TABLE II

Average Tensile Strength and Elongation of Specimens of Fully Aged 24S-UT Pureclad Sheets After Stretching in Erco Press

Sheet No.	Tensile Strength Lb. per Sq. In.	Elongation in 2 In. Per Cent
	Specimens parallel to direction of rolling	
1	60,600	12.8
2	62,800	13.3
	Specimens perpendicular to direction of rolling and parallel to direction of stretching	
1	59,100	14.3
2	58,900	12.2
	Specimens paralleled to direction of "stretcher strains"	
1	57,800	11.0
2	58,900	12.5
	Specimens perpendicular to direction of "stretcher strains"	
1	58,100	11.0
2	59,200	14.0
(Required AN-A-13 specification:	56,000	15.0)

Direction of stretcher strains are at an angle of 60 deg. with the direction of rolling; direction of stretching is perpendicular to direction of rolling.



saves considerable material and eliminates the use of rubber, formerly needed in the drop hammer.

The old method began with a drop hammer starter die in which the parts were started one at a time, using considerable rubber and necessitating five or six hits per part. The excess material was then trimmed and the parts then hit in the drop hammer finish die. More often than not the parts had to be smoothed by the planishing hammers and re-hit before being sent out. The drop hammer starter die required constant re-work and replacement of punches due to the necessary rough usage.

The new method involves the use of a single stretching machine die which performs the starting operation on four parts at a time in about 1 min. This piece is then sheared into four pieces and finished in the same drop hammer finish die as formerly used, but with this new method no smoothing operations are required because the parts finish perfectly.

A comparison of the time required

ABOVE

FIG. 5—The same skin made on the same die as the ST part shown in Fig. 4, but using ST unstretched material, instead of regular 24ST. Compare the per cent elongation figures with those shown in Fig. 4.

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RIGHT

FIG. 6—Part stretched in the SW condition. Note the figures indicating extent of stretch, and the fact that reduction and elongation are extreme between the jaws and the die. The part has been stretched to its limits.

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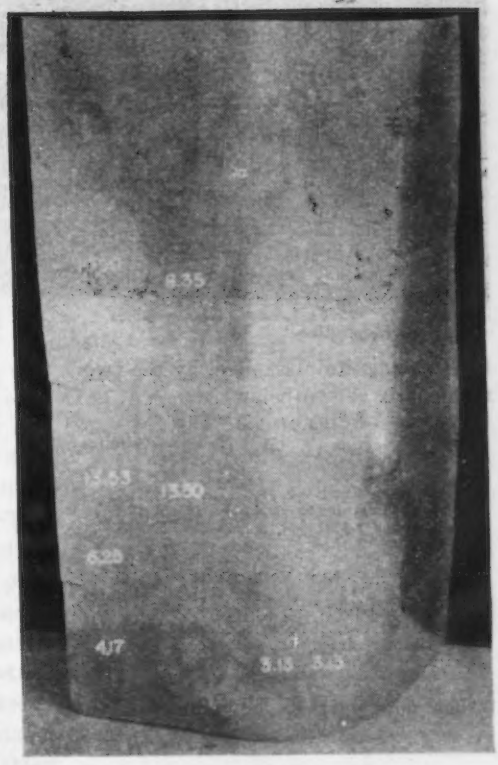
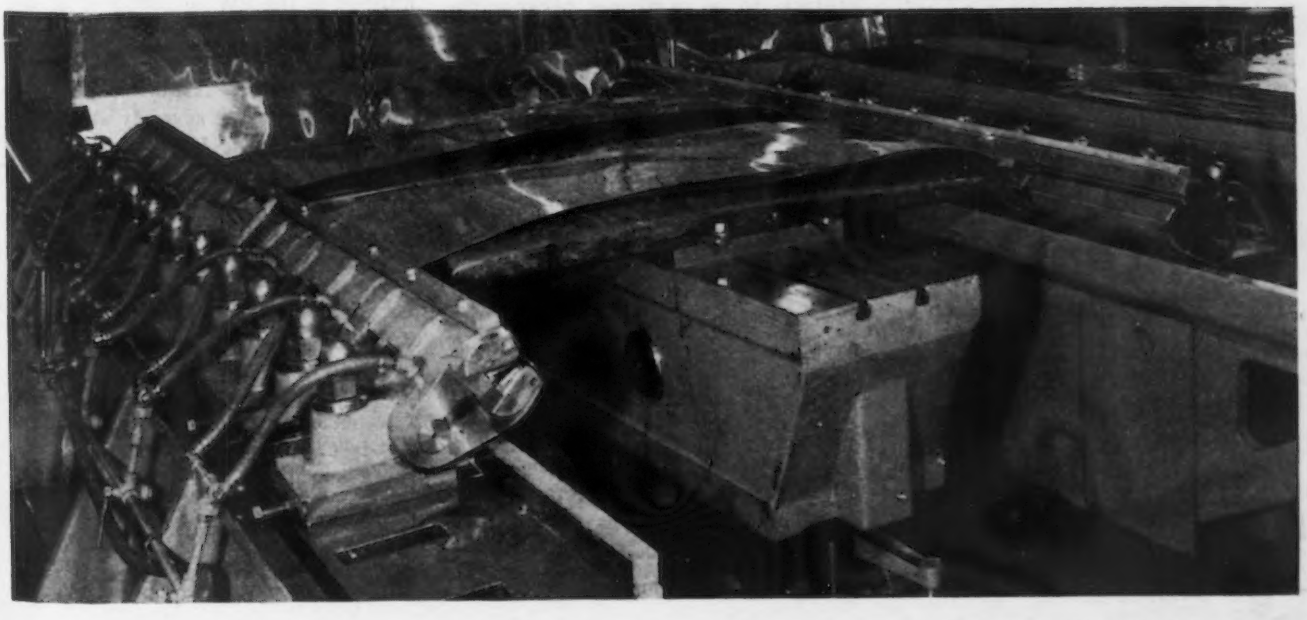
BELOW

FIG. 7—The skin shown in Fig. 6 is shown here on the die. There is no safety margin in such severe stretches. This part, stretched to its limits, could never be made of ST material.





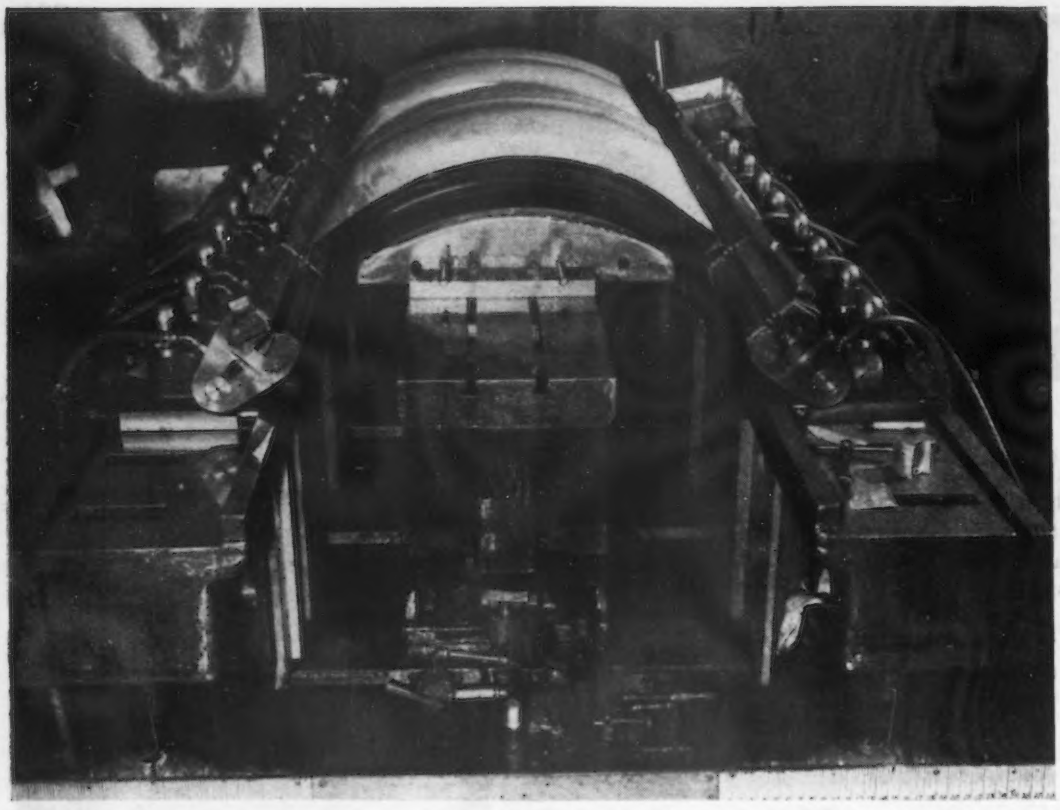


FIG. 8—Parts for stainless steel fixed cowl, in the manufacturing of which the use of the stretching machine has been employed replacing the drop hammer method formerly used. The single stretching machine die starts four pieces at a time (two pairs) which are then sheared and given a drop hammer finish. The parts finish perfectly, with no smoothing necessary.

for forming stainless steel by the two methods is shown below:

Old Method

	Minutes
Drop Hammer	5
Shear	2
Drop hammer finish	1
Planishing hammer	1
Drop hammer re-hit	1
	10

New Method

	Minutes
Erco press starter	1
Shear	2
Drop hammer finish	1
	4

The new part is shown in Fig. 8.

TABLE III

Stretch in 1 In. During Forming as Determined by a Grid on 24ST 0.040 In. Pureclad Sheet, Formed in the Non-Aged Condition after Heat Treatment (see Fig 10.)

Tensile Bar No.		Variation over Gage Length of Tensile Bar Per Cent	Average Stretch Per Cent in 1 In.
1		1.5–3.0	2.3
3		3.5–5.0	4.3
5		5.0–5.5	5.3
7	Specimen	3.0–4.0	3.5
9	Parallel to	3.0	3.0
11	Direction of	3.5–5.0	4.3
13	Stretching	6.5–7.0	6.8
15		3.0–3.5	3.3
17		4.5–5.0	4.8
19		5.0–5.5	5.3
2		1.5–3.0	2.3
4		4.0–5.0	4.5
6		5.0	5.0
8	Specimen	3.5–4.5	4.0
10	Perpendicular	4.5–5.0	4.8
14	to Direction	5.0–6.5	5.8
16	of Stretching	4.5–6.0	5.3
18		5.5–6.0	5.8

No stretch was found perpendicular to the direction of stretching. Any compression of the material was within the limits of accuracy of the grid and thus could not be measured.

The same production method is followed on the new parts which are now made from SO clad material except that the heat-treat operation had to be added before the drop hammer operation.

The nacelle door outer skins is the first complete unit to be transferred completely and successfully to the stretching machine. The original method of making these parts consisted of first forming in the drop hammer out of 24SO material. The parts were then trimmed and heat-treated. The warpage caused by heat treating was perhaps the greatest obstacle to be overcome, because the only way possible to iron out distortions was by use of power hammers which takes considerable time. Even after fitting each individual part to a form they were not as satisfactory as when formed on the stretching machine. First, the stretching machine eliminates completely the need for heat-treatment because 24ST material is used, thereby eliminating power hammer work. Second, the stretching machine uses merely a fraction of the time taken by the drop hammers in forming. For instance, in less than two shifts (18 hr.), 500 outer skins were formed, including trimming and setup time for two setups. Third, the parts fit much better and are all identical.

A comparative time table of the old and new methods for forming 24S material is shown below:

Old Method (24SO)

	Minutes
Drop hammer	5
Trim	2
Heat treat	3
Power hammer	20
Total	30

New Method (24ST)

	Minutes
Erco stretch press	1
Trim	0.5
Total	1.5

Some results of specific stretch forming tests, all of which show that the elongation is reduced by the stretching operation are given below.

Specimens were taken from a part pre-formed in the SO condition and finished in the SW condition (Fig. 9). The test revealed that this method cannot be recommended. Note that tensile specimen 2 is taken where the part has been most severely stretched. At this point the break has started because of the stretch applied to this area in the SO condition. The tensile stretch here is only 47,000 lb. per sq. in. Specimens 9, 11 and 12 show a tensile stretch of 63,000 to 63,900 lb. per sq. in., which is an improvement of 1900 lb. over standard 24ST clad material. This verifies the statement that physical properties are improved if a normal stretch is applied after heat-treat, as was done in the area where specimens 9, 11 and 12 have been removed.

This particular part is now manufactured in 24S-UT clad material with one re-heat-treat operation ap-

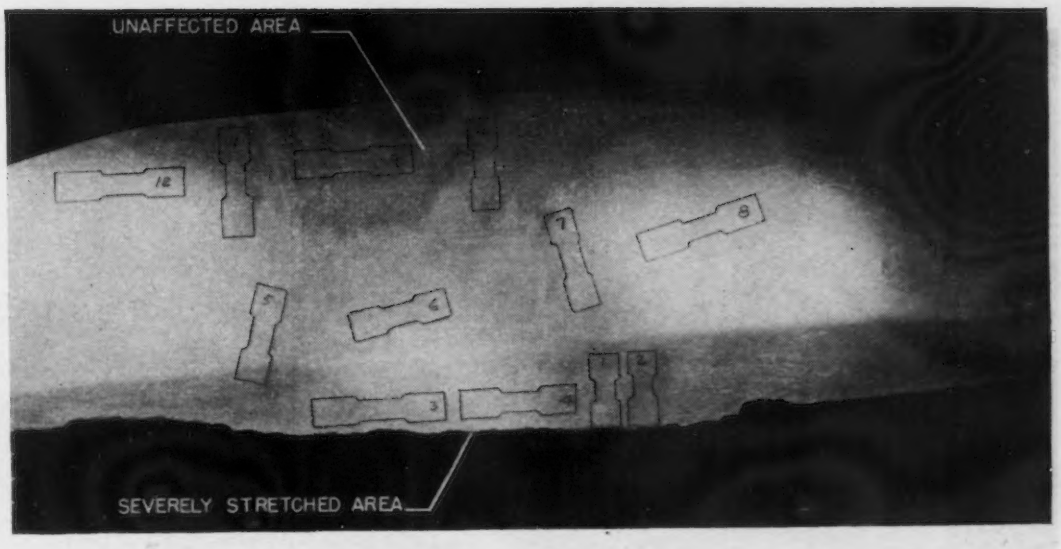


FIG. 9 — Skin preformed in SO condition and finished in SW condition from which the indicated specimens were taken. The break has started where the part has been most severely stretched (specimen 2), because of the stretch applied here in the SO condition. Data on the tensile test coupons shown in the photograph are tabulated below:

Specimen Number	Direction	Dimensions, Inches	Area, Sq. In.	Load, Lb.	Tensile Strength, P. S. I.	Elongation, in 1 In. Per Cent
1	T*	.037 x .393	.0145	835	57,600	5
2	T	.038 x .392	.0149	700	47,000	5
3	L	.037 x .497	.0184	1040	56,500	9
4	L	.038 x .501	.0191	1050	55,200	8
5	T	.038 x .500	.0190	960	50,500	5
6	L	.038 x .499	.0190	1100	58,050	15
7	T	.039 x .500	.0195	1040	53,300	5
8	L	.038 x .500	.0190	1085	57,200	12
9	L	.040 x .500	.0200	1260	63,000	18
10	T	.039 x .499	.0195	1200	61,700	12
11	T	.039 x .501	.0196	1240	63,500	19
12	L	.039 x .501	.0196	1250	63,900	15

*—T-Specimen taken transversely to the axis of the "stretcher-strain".
L—Specimen taken longitudinally with the axis of the "stretcher-strain".

plied before stretching, which was found to be the only solution to this problem. The original SO material that had been subsequently heat treated has not the strength in the SW condition that the S-UT re-heat-treated material has. It is likely that the difference in grain structure also is a factor.

In a second test, the 24ST aluminum sheet submitted for examination had been partially formed in the SO condition; heat treated but not aged, and finish formed in the SW or "green" condition over a form block on the stretching machine. The sheet broke at the edge of the stretcher jaws. In the most severely worked portion of the submitted aluminum sheet, the thickness of the sheet was reduced 7.5 per cent, the ultimate tensile stretch reduced 8.7 per cent and the elongation of the material reduced 72.0 per cent, as compared with the corresponding physical properties for a slightly stretched portion of the sheet.

In a third test, samples of 24S-UT Pureclad material were cut from the severely stretched portion of the sheet between the stretched jaws and the form block. The material was formed in the SW condition and allowed to age at room temperature for four days before being tested. The severely stretched samples did not have the required elongation but did have the required minimum tensile strength of 56,000 lb. per sq. in. The relationship of tensile strength to direction of rolling to direction of stretch and to the direction of the stretcher strains is shown in Table II.

In a test to determine the physical properties of stretched 24S-UT and 24ST Pureclad sheets after they had been completely formed into the same part shape by the method of fabrication applicable to each type of material, the 24ST sheet was heat-treated and formed on the stretcher press in the SW condition and the part was allowed to age completely before testing; the 24S-UT sheet was formed on the stretcher press in the "as received" condition.

Both of the parts examined had satisfactory physical properties for the respective type of material from which they were formed. The 24S-UT sheet had an average of 9.0 per cent greater tensile strength and 22.5 per cent greater elongation in 2 in. than the 24ST sheet after fabrication.

An attempt was made to gain some knowledge of the amount and location

TABLE IV

Physical Properties of the Tensile Test Coupons Shown on the Stretch Press Formed Part, Fig. 10, Made of 0.040 In. 24ST Pureclad Aluminum Alloy

Tensile Specimen	Tensile Strength Lb. per Sq. In.	Elongation in 2 In. Per Cent	Total Elongation Per Cent
24ST formed "Green". Specimens parallel to direction of stretching.			
1	55,100	8.0[1]	10.3
3	55,100	5.5	9.8
5	59,300	11.3	16.6
7	56,500	11.3	14.8
9	59,700	13.5	16.5
11	58,500	13.0	17.3
13	61,500	13.0	19.8
15	60,500	14.8	18.1
17	56,000	14.5	19.3
19	57,300	11.0	16.3
Average	57,950	11.6	15.9
[1] Broke outside gage marks.			
24ST formed in "Green" condition. Specimens perpendicular to direction of stretching.			
2	60,300	10.0	....
4	59,500	13.0	....
6	56,900	11.3	....
8	59,060	13.8	....
10	59,300	12.5	....
14	59,500	14.0	....
16	58,500	10.5	....
18	57,500	11.5	....
Average	58,813	12.1	....
24S-UT unleveled sheet formed as received. Specimens parallel to direction of stretching.			
1	61,300	15.8	18.1
3	62,900	15.0	19.3
5	64,000	15.0	20.3
7	62,800	17.0	20.5
9	62,300	14.0	17.0
11	64,000	14.5	21.3
13	64,000	14.5	21.3
15	63,500	14.5	17.8
17	62,000	14.5	19.3
19	63,100	14.3	19.
Average	62,990	14.9	19.5
24S-UT unleveled sheet formed as received. Specimens perpendicular to direction of stretching.			
2	68,100	15.8	....
4	65,000	17.0	....
6	64,800	13.5	....
8	64,800	15.5	....
10	65,800	12.3	....
14	64,500	14.0	....
16	64,200	14.0	....
18	65,600	11.0	....
Average	65,350	14.1	....

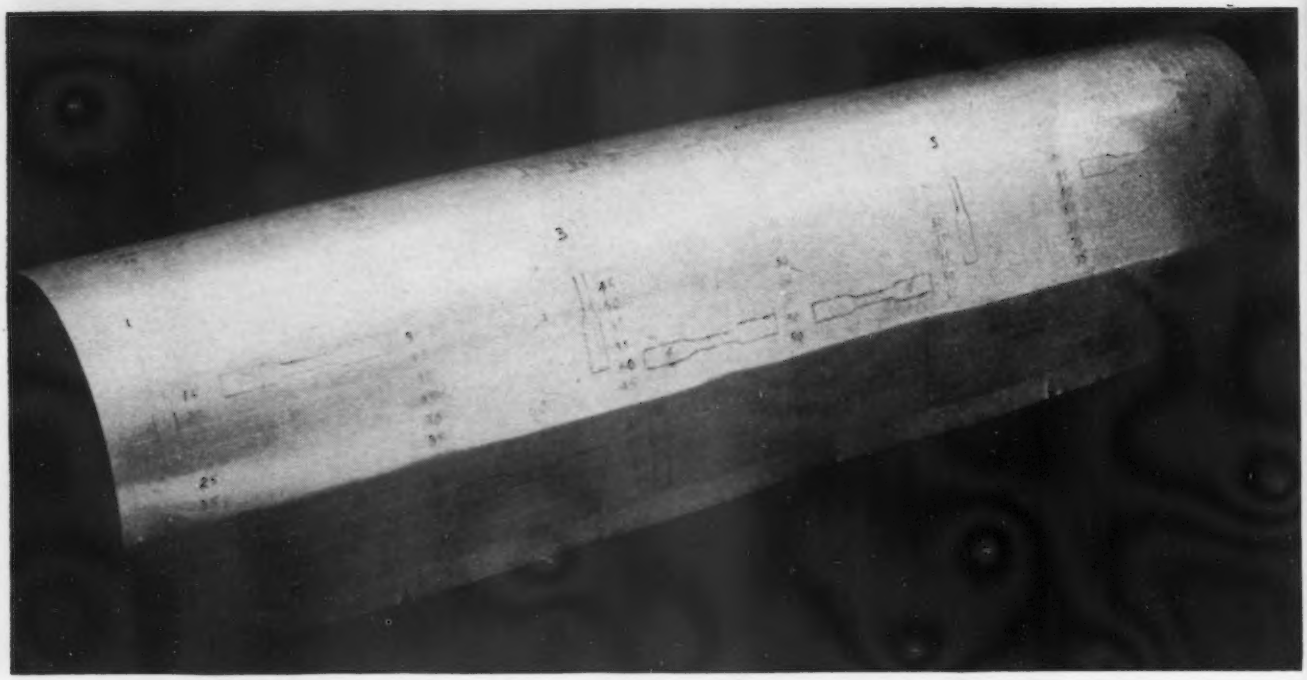


FIG. 10—Part formed from 24ST 0.040 in. Pureclad sheet in the SW or "green" condition (re-heat-treated but not aged). Before stretching in the Erco press, the part was marked with a 1-in. grid. Physical data on the tensile bars marked on the sheet are given in Table IV. The amount of elongation in the direction of stretching is given at inch intervals in tenths of a per cent (thus 15 equals 1.5 per cent). The stretch data are summarized in Table III.

of the stretch which took place during fabrication operation on the form stretcher. Because of the lack of facilities for placing a non-destructive grid on the parts to be tested, another sheet of 24ST Pureclad was marked with a grid by lightly scribing lines on it 1 in. apart. This sheet was then heat-treated and stretch formed in the green condition. The amount of stretch at various locations are shown in Fig. 10, and in Table III. The values give a general picture of the amount and location of the stretching. The accuracy of this method is limited by the accuracy of the grid. To obtain an estimate of the total amount of elongation the material was subjected to, the values determined on this sheet were added to the elongation of the respective tensile specimens (see Fig. 10) from similar locations to obtain the total elongation. The physical properties of these tensile coupons are tabulated in Table IV.

Stretch forming is surely the only expedient way to fabricate many parts, and this method should take its place alongside the deep-draw method, which should also be used more for the manufacturing of airplane parts.

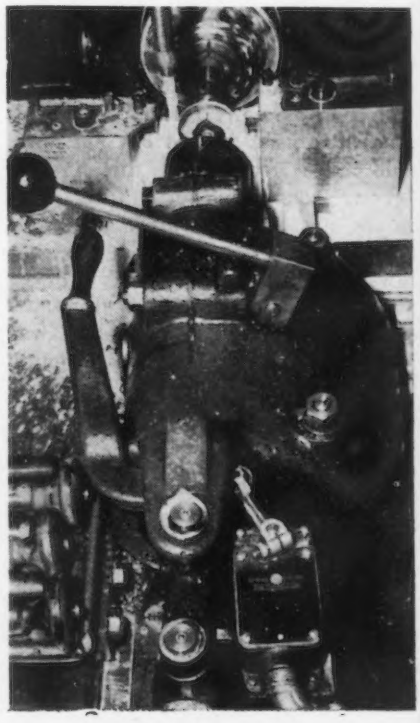
Stellite Faced Valve Machined with Carbides

MACHINING of Stellite and steel simultaneously with the same cutting tools on a mass production basis is being achieved by Thompson Aircraft Products Co., Euclid, Ohio, manufacturer of a large variety of precision aircraft engine parts. Carboloy cemented carbide tools are used to accomplish this.

The part is an alloy steel aircraft engine valve with Stellite applied to the o.d. of the head and seat. It is machined on a Sundstrand automatic stub lathe having a front and rear tool slide. The front slide carries a Carboloy turning tool while a Carboloy forming tool for finishing is mounted on the rear tool slide.

The valve is held on the stem end by means of a collet in the work spindle and supported at the head end by the tailstock center. The operator pulls in and locks the tailstock with a lever the movement of which also actuates a toggle switch mounted on the tailstock (see cut) which starts the spindle as well as the feed of the two slides. Feed is automatic and the machine stops when the cycle is completed.

The carbide turning tool makes its cut across both the steel and the Stellite surfaces at the same speed (80 ft. per min.). The instant the tool clears the work, the forming tool comes in for the finishing plunge cut. Excellent results are reported from this combined operation, both as to production and the quality of the surface finish, as well as tool life, considering the difficulties involved.



How to Use Triclorethylene Solvents

. . . Written by a shop man for shop men, this article describes solvent types of cleaning equipment, their use and maintenance. Proper utilization gives superior cleaning at less cost, with dangers inherent in handling this chemical reduced to a minimum.

o o o

By HERBERT H. HINES
Springfield, Vt.

o o o

VERY little has appeared in print about triclorethylene. In various forms it is being used by numerous plants in this country and Europe, by the army and navy. Yet in the plants where it is used very few foremen know what it is or how to handle it. The heads of departments know that it is better than the old soda kettle method of cleaning metal, have heard that it is dangerous to the health of the operator, that it is hard to keep operators on the job, but haven't read anything about it and know little authentic about it except what is seen casually as they go down the alley in the plant.

There are adequate, though generally antiquated, articles in chlorinated hydrocarbons in mechanical encyclopedias. Most of them are prewar and out of date. The writer's practical experience with it has been entirely during this war period. It came fast. New data have not been compiled. Comparative information, which is needed, has not been made public, or at least is not generally known. The chemistry of it is fairly common knowledge, but the average shop superintendent and certainly the usual operator is not a chemist.

There is a bewildering confusion in the medical profession as to whether it is toxic, causes heart trouble, or has any permanently pernicious effect upon those who use it. Operators disagree and shops vary as to opinions and decisions. Salesmen even compete in arguments for their elimination of disagreeable effects, and advertisements have begun to recognize that there is an argument to be met.

This article is not a chemical treatise or a medical examiner's report or an engineer's verdict. It is written by an operator who has had about two years' experience on degreasers and is now in charge of all such operations in a machine tool plant flying two well-won "E" pennants. It is written at the request of plant superintendents for simple information. The writer has had practical experience, has read everything he can get his hands on concerning the job, has pumped chemists, doctors, professors and salesmen for detailed information. He had six weeks' hospitalization which may have been caused by contacts with these solvents. His hands are burned with it. One doctor told him that he was doing a sacrificial patriotic service to industry to operate with it. He has seen many operators come and go. He has tried to do a good job with it. Perhaps the present governmental limitation of its sales by 30 per cent will force the industry to change the product or find a substitute. For the present the industry has triclorethylene to use. In a day laboring-man's language, what is it and how is it being used?

Like a good many of scientific necessities the first degreasers were used in Germany. They had to get a quicker and better cleaning job for materials that had gone to or through production lines. The Germans made the first triclorethylene to meet this demand. Every piece of steel, except a few of the higher grades, has to be covered with some sort of grease that will prevent rust. This has to be removed before assembly. The old method was to use a soda kettle or a pail of kerosene and a rag. It was too slow, inefficient and a considerable fire hazard. Chemists worked for years to find a quick boiling solvent that would cut grease and dry immediately. Chlorinated hydrocarbons had been used for various cleaning jobs, and dry cleaning plants had developed their use in many of these jobs.

The first use of triclorethylene in Germany was not highly successful. It did a good job on steel and the operators. It degreased both. Many operators died. The form of it developed in this country was a better product, purer and cleaner and less

dangerous. It was made non-inflammable by changing the flash point, and it was made safer. Individual companies, buying new trichlorethylene, added their own stabilizers and volatilizers. The result, sold under various trade names, is a solvent that boils twenty-four degrees quicker than water, is volatile (has the same chemical formula in its vapor or distilled form), is five and one-half times heavier than air, so normally stays down in the machine. It cuts most grease instantly, cleans adequately, and when properly handled causes no more trouble than is found in any other part of the factory.

About 1935 American companies that had been working on this problem for about 20 years began to produce machines to use this new solvent. Three types became common: immersion, vapor and spray. These today are found in various combinations, and in sizes varying from bench models to huge conveyors. These machines, with heating attachments, have compartments large enough to take baskets of work and yet small enough so as not to crowd the building. Each machine is a still, working over its own solvent for a clean dip, bath or spray.

In the vapor type machine the solvent is heated by either electric coils or steam. Steam is more easily controlled and cheaper if available the year around. The solvent boils at 86.7 deg. C., or 188.6 deg. F. Vapor from it rises in the tank. About two-thirds of the way up the tank are water coils or a water-jacket (a patented feature of one company.) The height of the vapor line is regulated by thermostats and the temperature of the water. When the vapor strikes the cool coils or water jacket it condenses and is returned eventually to the bottom of the tank. The baskets of work are dipped into the vapor. This clean vapor is from the solvent only. Pieces have no contact with anything else. The baskets may be small and hand-dipped, or they may be large and operated with an electric hoist. A spray hose may facilitate the work.

In the immersion type there are usually two dips after a vapor bath, one to cut the grease and the other for a final rinse. The immersion type is faster, as most pieces require only a 30 sec. dip and a quick rinse. It also penetrates holes that would be untouched with a spray. It is better for smaller parts.

The cost of degreasing has been cut in half in recent years. When original cost is compared with the cost of the old soda kettle it may seem a luxury. But when the tremendous amount of work that these machines will do in a day is taken into account, and also the money and time involved in the old methods of hand cleaning, the saving is evident. Men on the assembly floor who used to hand-clean their own work in a pail almost doubled their assembled output with machine cleaning.

One expensive high grade steel piece valued at $275 was protected with a special grease. It required 20 min. and a high priced grease remover to clean it. The machine did 20 pieces in 20 min. and did a more thorough job. Machines are built to take anything from minute parts to airplane wings, even with paint-dip and drying attachments. Companies are sold machines adapted to their jobs, and each machine is sized for certain weight limits per hour. This is not an argument for buying degreasers, for the government has recently said that there are enough in plants and forbids the companies manufacturing any more at present. This is just an explanation to aid in understanding what we have in operation now.

Is It Dangerous?

Is trichlorethylene a dangerous solvent to use? Of course anything might be dangerous under certain conditions. Can it be handled so that there is no danger at all? Perhaps not enough information is available to answer this question fully now. Even doctors disagree. The 53-gal. drums that bring it to the shop have labels with a toxic warning. Perhaps if there was no warning operators would be less careful.

Some plant doctors would put it out of the building. Some medical books analyze the known ills that come from it and believe there is no permanently harmful effect. One girl drank some by mistake, was given olive oil, and went to a dance that night. Some men have developed a "narcotic craving" for it. It gives them a cheap drunk.

One doctor in a very recent report told of using it as an anesthetic to cure severe headaches. It cured the headache, but the patient died of ventricular fibullation. Several cases are known of deaths of operators of the conveyor type. They died of asphyxiation while within the machine working on repairs. It may have been the solvent that contracted the heart muscles until they acted singly instead of together and stopped the flow of blood. In one case the doctors believed the solvent harmed the heart so that the operator could not pass Army or Navy physical examinations. There was one case of acute kidney and bladder stoppage that most likely would never have happened if the operator had been working in a hay field. These can be multiplied in each plant.

Careful diagnosis has not always been made. A company will transfer an operator from a degreaser job if he says it hurts his feet or prevents sleep. The word of the operator is accepted without much medical opinion. It is, of course, no secret that many people do not like the smell of it and say so violently. This is taken into large type in some advertising. Some men are allergic to it and feel sick to their stomach when near it, much as some are if they smell too much paint. One man said it gave him a quinzy throat. Investigation said that he had been treated for such a throat condition years before. Yet the solvent may have aggravated an already unhealthy condition. Honest diagnosis is necessary and comparative information should be known.

Manufacturers, to be on the safe side, say it is toxic; therefore, it is wise to be careful. Companies do transfer operators from degreasing machines on complaint. Some give regular health examinations. They feel they must do it. Operators do get dizzy, and some do not like to work with it.

The trained operator knows what it is and how to handle it. Yet, in spite of caution, a gust of wind may blow the vapor at him and give him a dizzy, staggering, dopey feeling. His hands may be burned with it. He may splash it on his face or in this eyes. Usually a few minutes in the fresh air will clear the operator's head. He gets used to it, and when splashed by it generally will just stand still for a minute and let it evaporate. There is no after hurt. Most operators do not think that the effects from it are permanent. Even the one who had bladder trouble cleared it up in a few weeks. Like some other contacts, it may hit a weak spot. Some people, especially negroes, should not handle it at all.

The simple precautions are: Wear dry gloves, do not stand over the machine any more than is necessary, do not smoke over or near it, keep the vapor in the machine, and take time to dry off the work.

If machines are in proper condition and are properly used operators have very little trouble and learn to like their jobs as they become experts. Much of the bad odor attributed to it comes from burned oil. New smells usually require time to tolerate.

These solvents have high resistance to rust. They will clean even when dirty. They are fast and satisfactory when properly operated. The operator who is trained by his foreman, and experienced, knows that the heat of the vapor almost equals the heat of the boiling liquid. Therefore, he is careful. Hold a clean, dry hook in the vapor inside a degreaser and watch the distilled solvent run from it. Baskets must be raised or lowered slowly, about 9 to 12 ft. per min. Loads must be kept small. It saves time in bringing up the vapor level, and does not force the vapor out of the machine into the room. This is one of the simplest and most difficult tricks to teach new operators. If they take a little more time they save time. It means protection to them and less complaints from other machine operators in the same bay.

The same lesson applies to smoking. There is no danger as regards the solvent, as most of them have been made non-inflammable. A dip tank, which usually is a part of the operator's equipment, is filled with a greasy oil with a paraffin base which dries quickly and keeps pieces clean and rust free for the stockroom. This may be inflammable and necessitate special care. The attempts to find a very thin dip that is satisfactory, quick-drying, and would require no further degreasing before assembly is still one of the trade necessities and an unsolved goal of the oil companies.

To avoid all fire hazards and prevent harm to the operator, the customary warning is "No smoking in this restricted area." Usually the harm is not to the solvent, but to the operator. The fumes of the vapor combine with nicotine and produce a third acid which is harmful to the throat and lungs.

Most degreasing machines have been placed in factories as afterthoughts. Some corner that was unused, or some handy open space along the side of an alley has been cleared out and the degreaser installed. It may be that work benches or other machines are too near. It may be a draughty place where air currents will drive the vapor out into the room. Released vapor, being heavier than air, settles to the floor. A top ventilator is insufficient. Some factories put a case around the degreaser which will take off all fumes. Some have an especially air-conditioned room. This could be built easily even into older buildings. If the machine is sunk into a pit there must be a special floor blower. Home-made blowers to carry off the vapors have not been highly satisfactory. It is a problem for the air conditioner, and since the average older factory hasn't taken this problem seriously, the situation for a degreasing operator is generally no worse than for the operator of other machines. Something like the electric precipitron should be in the plans for the future. It is an investment in economy as well as health, and ought to be compulsory.

Much of the trouble with degreasers has come from cheap, poorly paid help, untrained in caution, operating a machine they do not understand. Some of the trouble has been deliberate, done to get a transfer, or to get the machine moved to another part of the factory building. Most of this trouble can be prevented.

Gas masks may be necessary in rare instances. They are valuless unless they cover the eyes as well as the nose and throat. Most operators never wear them.

Some plants do not allow women operators on degreasing machines. In their monthly periods these solvents may affect some women much as paint does to a pregnant woman. With proper replacements some factories are operating as many as three-fourths of their degreasers with women. The usual operator has to do a great deal of lifting, in spite of the electric hoist, so that outside of departments cleaning small work such as die parts, a strong able-bodied man is usually required.

Care and Caution

Degreasing problems came into factories so suddenly that little was done at first to unify the work or correct mistakes. About 1940 plant superintendents, at some machine tool show, saw a degreaser in operation for the first time and said that that was what they needed in their plant. It was ordered, placed in an unused corner, and put under the direction of a foreman who did not know how to operate it. Other degreasers were later added to the plant, each placed under the supervision of a different department. The results depended up the luck of finding a good operator who would keep his machine in good condition and do his work reliably. He cleaned it when he thought it necessary, or when he had a slack hour.

This turned into confusion. No one was responsible. Machines were constantly breaking down. Once in a while one would become short-circuited and the oil in the tank catch afire. Neighboring machinists got up a petition to have the degreasers removed from the plant. Service men from the manufacturing company did all they could. It was a headache to the master mechanic. The consumption of a solvent was so large that the factory was about ready to go back to soda kettles.

This bad situation was soon cured. In one plant it came gradually. One operator had been working for about a year on an immersion type machine. He had complete charge of it. It worked well and was never out of repair. When something went wrong he fixed it himself. There was no one in the plant who knew anything about degreasers beyond casual observation. Being interested in his work he determined to be the plant authority on dgreasers. He went to two engineering schools and talked with professors. He read every article or booklet on the subject he could lay his hands on. He pumped salesmen, service men, plumbers, electricians and chemists for information. The result was that when another degreaser in the plant needed special attention he would be sent to repair it. Finally a new arrangement was set up putting him in charge of all degreasing machines night and day. He saw that all machines were running satisfactorily at all times and that work was done as it should be. Soon the headaches disappeared, neighboring operators stopped complaining, and plant officials forgot they had any degreasers.

This is the easiest solution. Put a trained operator in charge of all degreasing machines. Give him opportunity to learn the routine and needs of each machine. Let him supervise the cleaning (which should be done by the same man each week), have the right to shut down any machine he requires, and keep all machines in running order. Then there will be few troubles or complaints.

There are five main responsibilities of the chief operator. The first is toward the men under him. Good operators are absolutely essential. They must be broken in by the chief operator, taught to know their machines, to do satisfactory work and guard their own safety. They must know the nature of the solvent. They must be quick to recognize anything wrong with the machine. They must cooperate with the foremen from whom they get their work and to whom they send it. They must be "good housekeepers." They must be provided with plenty of leather gloves, hooks, baskets and other necessities.

At first operators were selected from older men who were tired of sweeping floors. It was enough to show them how to operate the hoist and how to put the basket into the vapor and take it out. Now it is rec-

ognized that the operator should be as strong, alert and intelligent as any other machinist. It takes as long to be a good operator on a degreaser as to break in a raw workman on a turret or milling machine. He should be given good equipment. One bad case of rust was traced back to dirty gloves. He should be encouraged to handle his work carefully. Gear teeth are easily marred, and scratches may spoil precision, particularly where high accuracy is demanded.

The job of the operator of a degreasing machine should be recognized as essential and respectable. It ought to be well paid, so that the operator will have an incentive to take greater interest in his work. Sometimes he needs help. Frequently he needs special encouragement. The chief operator can absorb his headaches and give him the cooperation he needs.

His second responsibility is the degreasing machine. He must know each one. He must know how to operate them and what is required of them. He must see that they are cleaned so regularly that they are always free from dirt, rust and water. Some need to be cleaned every two or three days and some once a week. It must be done on schedule. If the machine accumulates too much acid a soda bath may be necessary. He must know what to do and be willing to get dirty.

The machine must be repaired at necessity promptly. It must be kept filled with solvent to a proper level. The thermostats must be properly set and regulated. There must be an adjustment of the water used through the coils or jackets to the humidity in the air. Typical repairs are to hoists, wiring, coils (which burn out like light bulbs), pumps, air hose, hooks, baskets, faucets or gages. A rusty machine may be rezinced.

The third responsibility is for cleaning the machine. This must be done regularly, as often as accumulated sludge demands. Most solvents will still clean when dirty. But it is harder on the operator and more liable to start rust. In cleaning, the solvent is distilled in the machine as far down as the coils permit. If the residue is taken out with an electric pump it will cause less trouble. The sludge contains solvent plus the oil from cleaned material. The still pays for itself in a short time in solvent saved. A further argument for a still is that the solvent saved will titrate higher than the original solvent, and is a life-saver in rust prevention—one of the other headaches in all steel plants. The still is simple to operate. In fact a small sized immersion type degreaser answers the purpose. The boiling point should not exceed 260 deg. F. And, do not try to pour cold sludge into boiling liquid.

The coils must be taken out of the lower door so that all carbon can be removed from them and the floor of the degreaser thoroughly cleaned. Sometimes a vacuum pump helps. Generally it is a job for a broom and a hoe. Proper gaskets, well lubricated, must be replaced to avoid leaks, and the machine put back into working condition. This operation may require from 1½ to 5 hr. The immersion type takes longer. The work may be speeded up by pumping all solvent from the machines and doing all distilling at the still. The most important item is to have a regular calendar for cleaning and a constant check to see that it is done right.

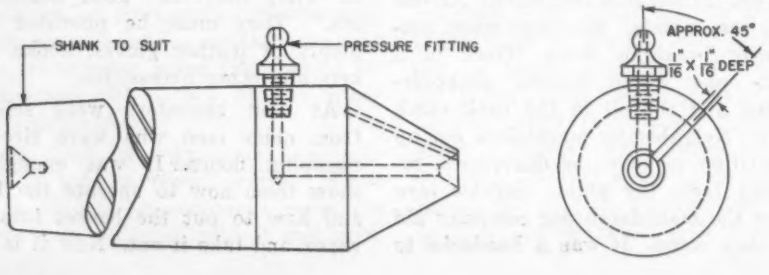
A fourth responsibility is the avoiding of rust. What is its cause? Where does hydrochloric acid come from? How did the water get into the machine? Humidity is most unwelcomed in a steel plant. There are two months in each year when it is especially troublesome. Some men's hands are so oily that a piece of steel they touch at night will be rusty the next day. Pans of machined parts may rust in a day. The water in the air, the moisture from pipes, a leaky water pipe, rain through a window, any of a number of things may cause corrosion. A near-by foundry sends off acid into the air that eats the copper roofing. It is in the air. A strange acid may be found to come from a woolen mill far up-stream. The causes have to be studied. It is less expensive to have rust prevention than rust removal.

If there is rust in a degreaser it may spread to the work it is supposed to clean. One machine rusted from excessive water. Service men could not find the leak. They washed it out completely with soda water. It still contaminated the work that went through it. Finally a leak in a water pipe was discovered, corrected and the trouble stopped. Pipes drip water on humid days. Moisture accumulates. The amount of water run through the coils must then be cut down, and the water in the machine, not otherwise taken out by the water separator, removed. A chamois skin dipper works easily. Machines must be neutralized if an acid condition exists. Some solvents do not take aluminum or magnesium, and acid may result. The easiest and surest test for rust resistance is to titrate samples of distilled solvent from each machine. If this is done regularly once a week, or on suspicion, there is positive evidence as to the presence or absence of acid. If the score of each machine is kept for a few months, and the average per cent of rust resistance known, there is no guesswork as to how the machine is running. If the per cent is low it may be built up with fresh solvent or with "super solvent" from the still.

The fifth responsibility is for the consumption of solvents. If this is not watched the whole job might be considered a luxury. In one shop the average of 3 gal. per day per machine for the immersion type and 5 gal. for the vapor type were established. These were medium sized machines. It was reduced 20 per cent by using the still and almost 10 per cent by careful supervision.

Lubricated Lathe Center

A SPECIAL lubricated lathe center devised at General Electric's Pittsfield Works prevents shaft centers from "picking up" when machining heavy shafts. Lubricant is introduced into the hole in the center of the shaft by a pressure gun through a fitting on the shank of the lathe center. It is forced into the shaft center and when full it is indicated by exuding along a 1/16 x 1/16 in. groove on the outside of the lathe center. As the shaft turns, the lubricant is wiped against the shaft center. The groove is positioned where there is low pressure between the machine center and the shaft center. This obtains the best possible adhesion of the lubricant to the shaft center.



With this arrangement, the shaft center can be lubricated while a cut is being taken.

Speeding Heat Treatment of Aluminum Alloys

By S. G. ANDREWS
Process Engineer, Lockheed Aircraft Corp. (Plant A, formerly Vega)

SOAKING time for heat treatment of clad aluminum alloys which is longer than necessary reduces the productive capacity of the ovens and causes diffusion of the copper into the aluminum alclad, and surface blisters, Tests recently undertaken at Vega Aircraft Corp. indicate that the minimum soaking time required to obtain satisfactory results for 24SO 0.125 gage aluminum alloy is 30 min. for 24SO, 0.051 gage aluminum alloy it is 15 min.

The furnaces must be so controlled that the temperature does not vary ± 4 deg. F. from set heat treating temperature of 920 deg. F. A Knapp "Quick-Quench" vertical overhead type furnace, with one thermostat at top is used. With a different type of furnace or with three thermostats, some of the following statements would not apply: Parts must be loaded on heat treating racks to allow free circulation of air about all parts. There should be no overlapping of edges on parts. To avoid the possibility of mechanical disorder in the furnace, the specified minimum soaking time should be 3 to 5 min. above absolute minimum.

By using the soaking time specified in Chart I, the different gages of material can be heat treated accordingly. In comparison with previous specifications, by using this specified soaking time, 10 to 15 min. per load can be saved, which in a 24-hr. run will give five to six additional production hours. It should be pointed out that the AN-QQ-H-186 soaking times are wide in range and that the minimums shown are broken down for gages and are applicable because proper control is exercised to see that the loadings consist of only one gage of material as far as is practicable.

The 0.125 in. samples heat treated for 29 min. and 40 min. all met physical requirements of Air Corp specification 11067-A, and corrosion resistance of specification AN-QQ-H-186. The 0.040 in. and 0.051 in. samples heat treated for 15 min. at 920 deg. F. all met requirements of Air Corp specification 11067-A except one sample which was low in yield and two which were low in elongation. All specimens met corrosion test of specification AN-QQ-H-186. The 0.051 in. samples heat treated for 20 min. at 920 deg. F. all met physical requirements of Air Corp. specification 11067-A, except two specimens which were low in yield strength. In all cases, the low yield samples were found on the very bottom of heat treating racks where most unusual conditions would exist.

The results of shorter soaking time are as uniform as those of longer soaking time as taken on previous heat treat checks. The variance in low yields or elongation occur in both cases.

TABLE I

Minimum Soaking Times Required for Heat Treatment of Clad Aluminum Alloys

Specification AN-QQ-H-186

Gage of Material In.	Soaking Time, Min.
0.20 and less	20
0.020 to 0.032	25
0.032 to 0.063	30
0.063 to 0.125	45
0.125 to 0.250	60
0.250 to 0.500	90

Vega Specification 521

Gage of Material, In.	Soaking Time, Min. Permissible Range	Desired Minimums
0.020	5 to 15	10
0.025	10 to 20	10
0.032	10 to 20	15
0.040	20 to 30	20
0.051	20 to 30	25
0.064	20 to 30	25
0.072	30 to 40	30
0.081	30 to 40	30
0.091	30 to 40	35
0.102	30 to 40	35
0.125	30 to 40	40
0.156	40 to 50	45
0.250	50 to 60	60
0.500	70 to 90	80

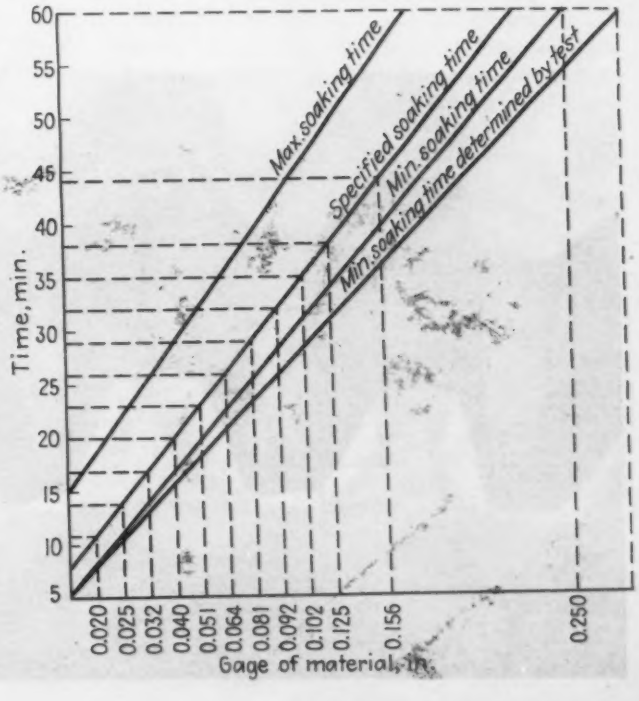


FIG. 1 — Soaking time for heat treating 24S clad aluminum alloys.

Flame Hardening Aircraft Gears

FABRICATION of gears for retractable landing devices on Army P-39 Airacobras, built by the Bell Aircraft Corp., Buffalo, N. Y., includes a flame-hardening process on gear teeth that permits close control of gear teeth hardness and better quality of the finished product. A special Gleason surface hardening machine permits almost automatic treatment and makes possible the acquirement of desired surface hardness characteristics in the individual teeth while at the same time maintaining a desirable softness in the teeth cores.

The parts treated is a gear sector that moves the leading wheels into desired position, being driven from an auxiliary power system in the plane. The arrangement also permits operation by a hand crank in event the landing mechanism is damaged. This automatic landing mechanism must respond under the varied climatic conditions prevailing on the scattered fields of war all over the world. Also, the tremendous impact of the plane in striking the earth at high speeds makes extreme care essential in fabricating and assembling, so that sufficient strength is built into it.

The gear sector used is machined from a chromium-molydenum steel forging. It is heat treated to a tensile strength of 150,000 lb. per sq. in., and the gear teeth are hobbed on standard hobbing machines. The flame hardening operation that follows to harden the gear teeth surfaces must be carefully controlled to assure that the bearing surfaces acquire correct hardness but do not alter too much the soft core in the center of each tooth and thus alter the tensile strength of the part. Bell uses a No. 1 Gleason surface hardening machine with two oxy-acetylene flame jets. The jets are adjusted so that the two flames, as they are moved by the carriage, strike the teeth simultaneously on either side. The travel speed of the burners over the part can be adjusted, depending upon the desired hardness of the gear tooth surface. An experienced operator can accurately determine by the coloring of the tooth under heat when the correct metal temperature is reached, a dark cherry red being most desirable for this operation. The heating temperature is about 1500 deg. F.

If the teeth were hardened successively on the gear, overheating would occur at the core of the teeth. For this reason, the jets traverse the first tooth, hardening it, then stop clear of the forging while the machine automatically indexes the third tooth into position for hardening. The odd numbered teeth are hardened in the first rotation. The gear is then reset, and moved through another rotation which brings the even numbered teeth into position for processing. After a tooth has been hardened, the jets stop their travel momentarily while the machine turns a succeeding tooth into position. The back travel of the jets is rapid over the new tooth,

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AFTER flame hardening, the gear teeth are examined for hardness depth. The teeth ends are filed lightly and acid hypo is applied. The hardened area remains bright, but the soft core area is dulled by the hypo action, clearly indicating the depth of hardness penetration.

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performing a slight preheating operation. A soluble oil is used in the water coolant to prevent rust. This coolant is directed well below the base of the teeth and used only to dissipate and carry away the heat that is conducted into the gear base.

To insure proper quality control, each gear hardened is examined to determine exactly the area and depth of hardness. The ends of the sample teeth are filed clean and painted with acid hypo, common in a photographic laboratory. Under these conditions the hardened area is visible in cross-section, standing out as a shiny surface. The soft core area is contrastingly dull.

After heat treat the chromium-molybdenum steel forgings register a hardness of about 33 Rockwell C. After flame hardening, the teeth surface areas register a minimum of 60 Rockwell C. Final machining completes the gear and it is ready for assembly.

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THE bearing surfaces of the teeth of landing gear sectors for the P-39 Bell Airacobra are flame hardened. Following a quick preheating pass of the flame jets over the surfaces, they are heated to about 1500 deg. F., and air cooled. The coolant jets shown play on the web structure to help dissipate conducted heat.

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New Polyvinyl Resins Developed

TWO unique polyvinyl resins have recently been developed. They are identified as Geon No. 202 and 203 and are entirely new vinyl chloride, vinylidene chloride copolymers, much different from any of the others previously developed.

This new resin series was created to meet the need for polyvinyls which combine increased solubility and thermoplasticity with exceptional stability, chemical resistance and wide useful temperature range. Their resistance to hydrolysis by boiling water or even hot alkali is outstanding in the field of vinyl chloride copolymers. The No. 202 is a general-purpose copolymer, more soluble and thermoplastic than either of the No. 100 resins, while these characteristics are still further stepped up by the No. 203.

The new resins can be processed easily on existing equipment, and will expand the field served by this class of plastic materials. These resins can be used in coating of fabrics, paper, foil and other materials, insulation of wire, manufacture of film for packaging, and the manufacture of extruded and molded products. Purchases of any of the resins are subject to allocation by the War Production Board, although reasonable quantities are available for experimental purposes.

These resins, when compounded with other materials can be processed in many ways, including injection and compression molding, extruding, calendering, solution coating and film coating. Compositions varying from the rigid thermoplastic to a very soft jelly can be obtained by modifying the resins with other compounding materials. Each composition exhibits to a high degree the many desirable characteristics of the base resin used.

In addition to furnishing the resins in powder form with the compounding done by the purchaser, this material can be secured in ready-to-use form, either as granules or sheet. Tailor-made formulations can be supplied for special purposes. It is pointed out, however, that because these materials can be varied so widely in useful properties, it is to the advantage of the user to consult the manufacturer in choosing a compound formulated to fit a specific need. These resins have been developed by the Chemical Division of the B. F. Goodrich Co., Akron, Ohio.

Properties of the four Geon resins are

Geon No.	Specific Gravity	Average Acetone Extract	Average Specific Viscosity*	Recommended Solids in M. E. K.**		Plasticizer Index***
				at 20 deg. C.	at 70 deg. C.	
		Per Cent		Per Cent	Per Cent	
101	1.41	15	0.55	4.5	12	43
102	1.41	14	0.59	4.5	12	43
202	1.43	48	0.40	8	17	34
203	1.44	56	0.36	14	25	31

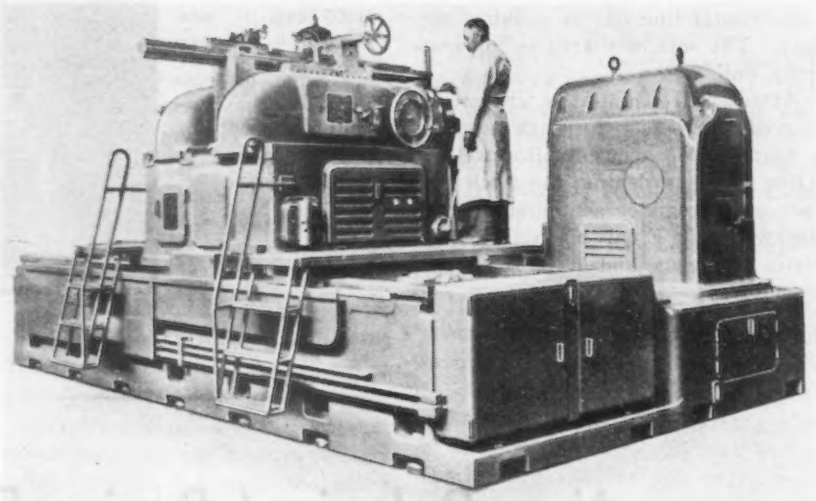
* At 20 deg. C. of 0.4 per cent solution in nitrobenzene
** Methyl ethyl ketone
*** Weight of dioctyl phthalate per 100 weights resin to give comparable hardness at room temperature.

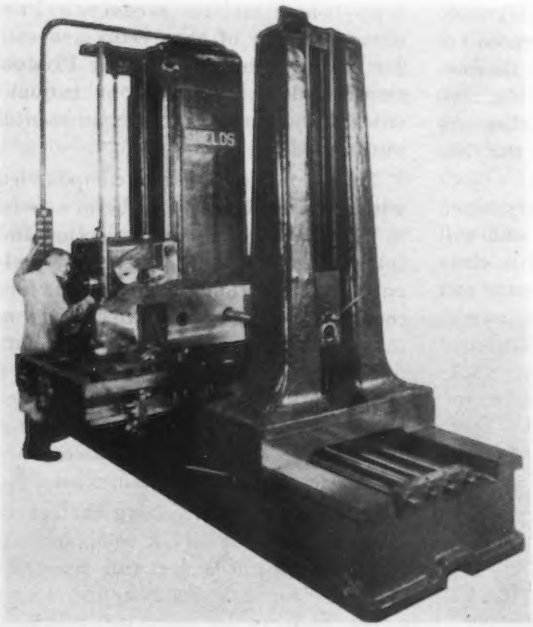
New Equipment . . .

Machine Tools

. . . Recent developments in boring mills, gear shavers, marking machines, milling machines and various kinds of sawing machines are described and illustrated in the following pages.

ON the horizontal boring mill developed by *Shields Mfg. Co.*, 3809 Twenty-fourth Street, Long Island City, N. Y., infinite variations of all speeds and feeds are provided. Spindle speed on a large facing head operation can be adjusted without stopping the cut. Use of three Reeves variable speed drives, one motor driven unit directly on the head for the spindle speeds, one Moto-Drive for the spindle feeds and another for all other feeds almost halves the number of gears, shafts and operating levers. All feed and rapid traverse control is directional. All control levers are provided with slotted portions so that it is impossible to engage a hand crank and apply the specific feed or rapid traverse at the same time. The traverse of the head is 72 in., that of the saddle is 60 in., and that of the table 72 in.



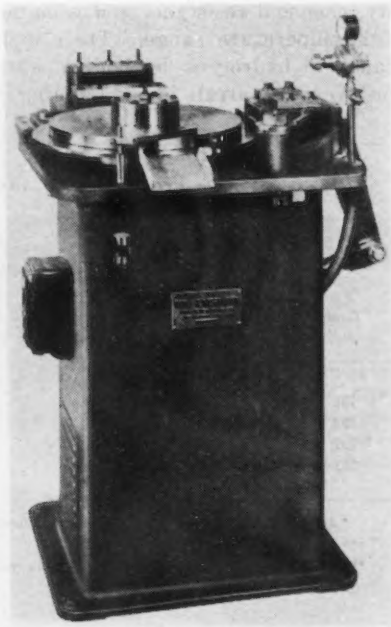


Gear Shaving Machine

A 75,000 lb. Red Ring gear shaving machine is announced by *National Broach & Machine Co.*, 5600 St. Jean Avenue, Detroit, and is said to be the largest of its kind ever built. It has a base of 20 x 20 ft. 11 in. and stands nearly 11 ft. above the floor line. It will shave gears from 24 to 96 in. pitch diameter. It is designed for rotary crossed axes shaving, the cutting tool being free to rotate. The cutter head is equipped with vernier scale and sine bar so that angle settings can be accurately duplicated. By means of a checking head, characteristics of the work gear may be checked while in the machine. Such checking includes the size of the work gear, the amount of shaving stock on it, its linear pitch, wobble, eccentricity and pitch diameter. The headstock is a self-contained unit with its own motor drive. The cutter head and checking head are mounted on a saddle and this saddle assembly is also a self-contained unit with its own motor drive. The slide is reciprocated across the face of the work gear during the cutting cycle, which can be either manually or automatically controlled. Pressure lubrication is used throughout.

Marking Machine

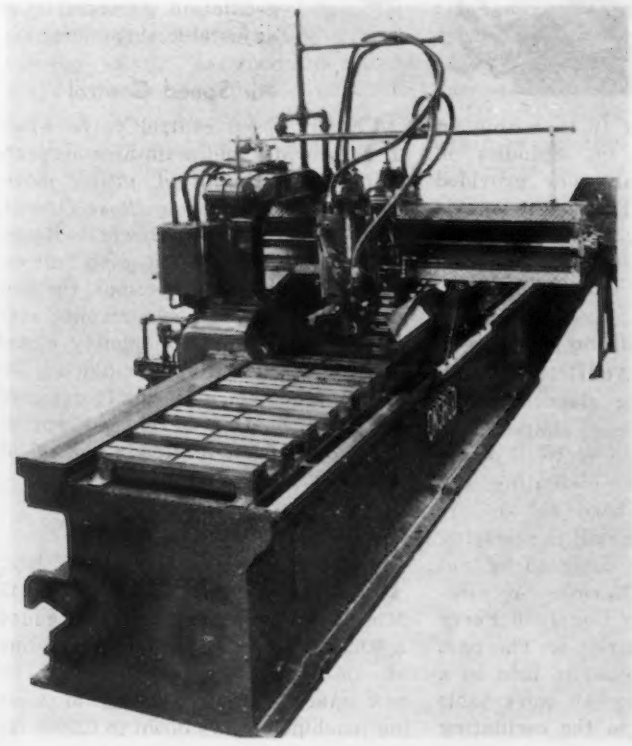
A COMBINATION high speed precision marking and knurling machine has been placed on the market by the *Noble & Westbrook Mfg. Co.*, Westbrook Street, East Hartford,



Conn., which may be used to impress the knurling, customer's name, part number and other identification data into socket wrench parts. The pieces are loaded on a continuously revolving carrier dial and then carried along to the point where they are knurled, marked and unloaded automatically. Although this particular machine is tooled up for socket wrench parts, it can be used in the marking or knurling of other similar parts. The knurling is accomplished with concave knurls under pressure to produce either angular or vertical crossline scores.

Aircraft Milling Machine

A HIGH speed milling machine has been designed by the *Onsrud Machine Works, Inc.*, 3945 Palmer Street, Chicago 47, for milling long, flat, bevel surfaces on aluminum-alloy aircraft wing and fuselage sheet stock. Basically the machine consists of a long bed and T-slot table on which the work is held, while a carriage travels over the bed to move the two vertical cutter heads along the work. The cutter heads may be tilted up to 15 deg. off perpendicular. For a constant or straight line bevel, work is set up on the table so that the bevel milled will be parallel to the length of the bed and the cutter heads are set at the required angle. End mill or fly type cutters are directly driven at 3600 r.p.m. by 15-hp. motors. A bevel up to 110 in. in length may be milled using one cutter motor, and a bevel up to 78 in. long may be milled using two cutter motors. Bed sections may be added for longer work. For a bevel on a taper or crosswise edge, the work is milled by moving the cutter head in a vertical or untilted position across the bridge arm screw. Work is held in a fixture in a tilted plane to the angle of the bevel required. A centrifugal bearing preloader on the motors helps maintain the 0.0001 in. accuracy of the milling operation. A specially designed vacuum chuck is employed to hold work.



Form Miller

TO form mill the radii and angle on the inside of propeller barrels, a special milling machine has been designed by *Sundstrand Machine Tool Co.*, 2555 11th Street, Rockford, Ill. An angular H.S.S. milling cutter with a radius on the bottom is mounted directly to the spindle, which is driven by a 10 hp. motor through V-belts with pick-off gears provided to furnish spindle speed changes in a ratio of 30:1. The workpiece is held in a special fixture mounted on a 22 in. diameter rotary table, which is supported on widely suspended bearings. The automatic cycle provides cross feed to the column, vertical feed to the head or rotary feed to the table, all timed and interlocked with the starting and stopping of the spindle and coolant flow. Similar machines can be provided for profile milling operations. Sundstrand hydraulic feed actuation is provided and the rotary table is driven by a fluid motor.

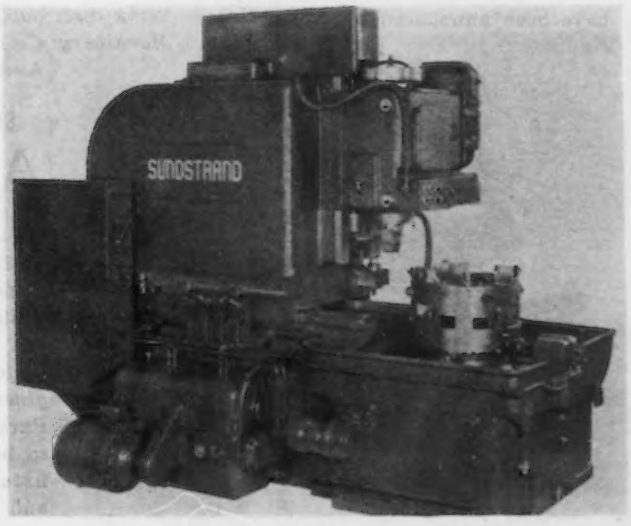
Index Base for Millers

AUTOMATIC index bases have been designed in 8 and 12 in. diameter tables for mounting in horizontal and vertical positions by *Sundstrand Machine Tool Co.*, 2555 11th Street, Rockford, Ill. Mounted in the vertical position, the base can be used

with a tailstock for milling splines, keyways, slots and similar operations. In the horizontal position, it can be used with station type indexing which makes it possible to load one part while another part is being machined. They are manufactured for use on Sundstrand hydraulic Rigidmils and Electromils.

Plain Milling Machine

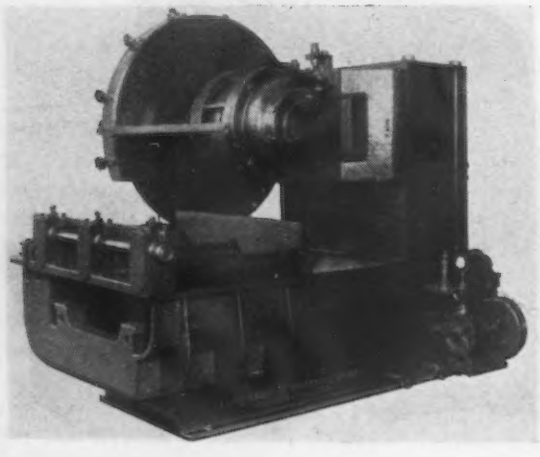
A PLAIN milling machine has been added to the line of surface grinding machines made by *Abrasive Machine Tool Co.*, East Providence, R. I. The B-11 is a man-



ufacturing-type unit with complete electrical control for table and spindle power movements. A built-in backlash eliminator on the table screw is released automatically during fast travel. This permits climb milling in either direction. Other features include automatic reverse, fast table travel of 300 in. per min. and a wide selection of feeds and speeds. Additional sets of dogs and extra table motor controls may be used to widen still further the choice of milling cycles provided.

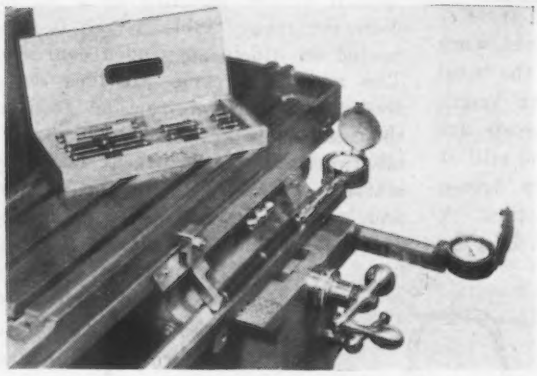
Friction Saws

NINE different models of high speed friction saws in downstroke and horizontal stroke styles have been announced by *Kling Bros. Engineering Works*, 1320 North Kostner Avenue, Chicago 51. The saws are designed for cutting steel rails, structural shapes, tubes, round and square bars and for removing risers from steel castings. The standard friction saws have a horizontal blade stroke which presents the cutting portion of the blade to structural shapes in such a manner that they may be cut square while resting on the work table against the front barrier without clamping. Saw contact is held to a minimum. The saws are equipped with adequate water heads for use in all cases.



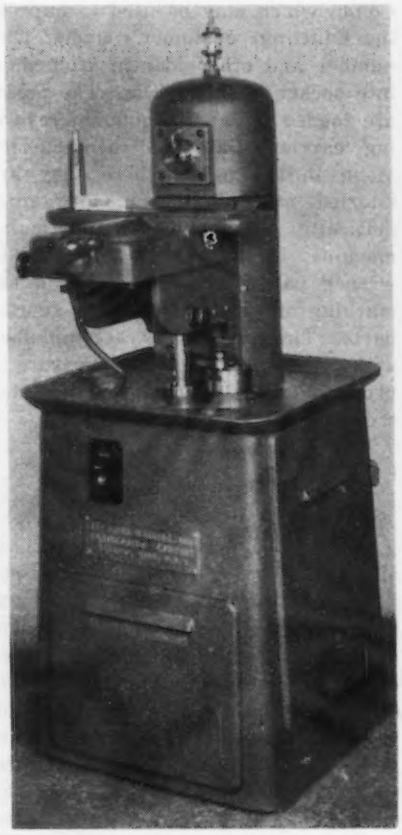
Precision Vertical Miller

FOR doing precision work on Index mills, the *Index Machine & Tool Co.* is prepared to furnish measuring rods, indicators and micrometer heads. With this equipment it will be possible to locate and bore holes in an area 8 x 16 in. within an accuracy of 0.0001 in. Spindles on these hand mills are now provided with power feed. The equipment is being distributed by *Blank & Buxton Machinery Co.*, 3100 East Michigan Avenue, Jackson, Mich.



Slot Milling Machine

A MACHINE for milling slots in pieces of various shapes and sizes with a two-lip end until by oscillating the spindle head in an arc while the mill is revolving has been designed by *Superior Machine & Engineering Co.*, 1930 Ferry Park, Detroit 8. The part to be slotted is held in a fixture on the work table and fed to the oscillating spindle at each end of the stroke. The amount of feed to the table is adjustable and the operation is automatic. The width of slot is determined by the diameter of the cutter and the length of sloth by the chord of the arc of oscillation, governed by an adjustable throw crank.

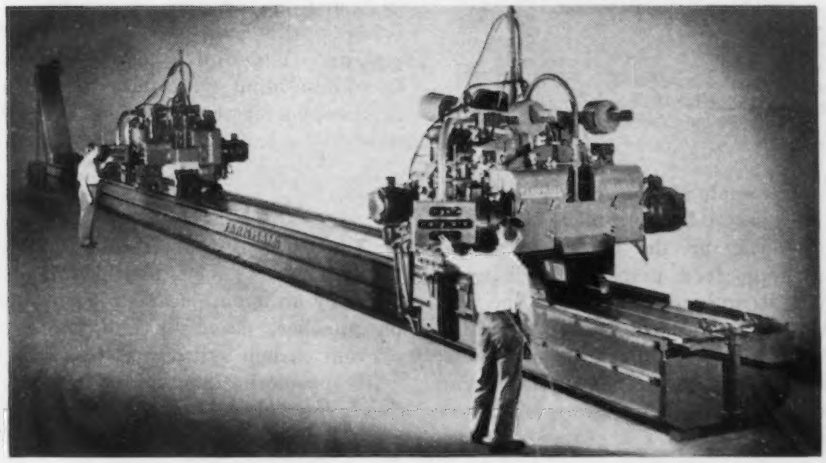


Air Speed Control

AN air speed control valve which provides and maintains accurate split-second timing of piston movements is announced by *Ross Operating Valve Co.*, 6459 Epworth Boulevard, Detroit. Starting with full capacity flow in both directions, the flow in one direction can be controlled over a wide range to a completely closed position through a vernier-like adjustment mechanism. A specially designed stem and floating bevel seat poppet maintain a positive steady control at any selected speed.

Arbor Spacer

FOR close tolerance milling jobs, the *Detroit Stamping Co.*, 345 Midland Avenue, Detroit, has added a 0.0015-in. metal spacer to their line of De-Sta-Co. arbor spacers. The new spacer permits setting of milling machine cutters down to 0.0005 in.



Large Spar Miller

THE *Farnham Mfg. Co.*, Seneca and Elk Streets, Buffalo, announces the delivery of the largest spar miller ever made to a well-known aircraft manufacturer. Overall length is 91 ft. with a table length of 80 ft. Two carriages, having a total of six milling spindles, travel the length of the bed during the milling operation. The two carriages operate independently of each other. They are used simultaneously when milling long spars, performing as many as six operations at a time, or independently on short spars. Horsepower for the spindles ranges in three figures. The machine was designed for Farnham by *Paragon Research, Inc.*

Large Hacksaw Machine

TO meet the need for a saw to cut off or trim large billets, blocks and forgings, *Armstrong Blum Mfg. Co.*, 5700 West Bloomingdale Avenue, Chicago 39, has designed the No. 24 Marvel universal hydraulic roll-stroke hacksaw machine. Nominal capacity is 24 x 24 in. and maximum is 25 x 26 in. The machine weighs 16,000 lb. and covers a floor space of 56 x 122 in. The extreme height is 151 in. It employs low pressure feed and roll-stroke cuting action. All moving and essential machine parts are fully enclosed and protected against abrasive dust and dirt, as well as rough usage incidental to large work. The machine takes a special blade 36 in. long, 4½ in. wide and ⅛ in. thick, with 2½ teeth per in. The blade is of the unbreakable composite type, employing high speed steel teeth and a tough alloy body.

Hand Miller

A NEW development in the form of a lever, rack and pinion transverse feed arrangement for the Nichols milling machine is announced *by the Nichols-Morris Corp.*, 50 Church Street, New York. It can be substituted for the regular transverse feed screw to give to the milling machine table and saddle the same flexibility of movement found in the conventional lathe carriage and cross slide. Work can be chucked lathe-fashion on the spindle with tools mounted on the table or vice versa. This feature of rapid transverse motion, combined with high spindle speeds and carbide tipped tools, makes it possible to use the miller for boring, facing, counterboring, turning, profiling and recessing. Close tolerances can be held on repetitive operations by means of adjustable stops.

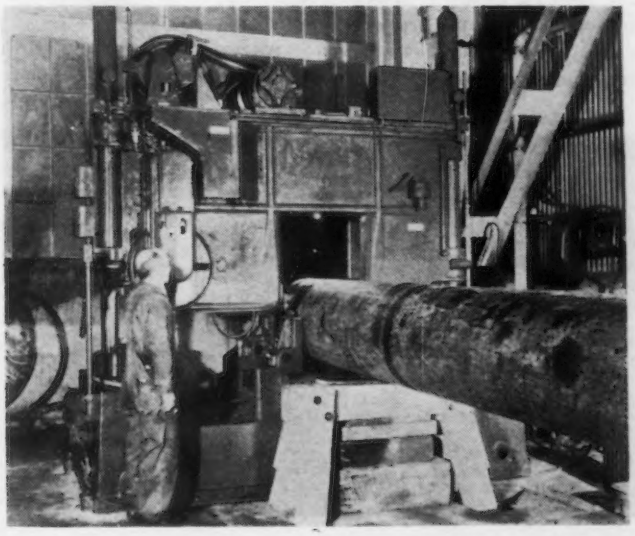
Sleeve Stamp Holder

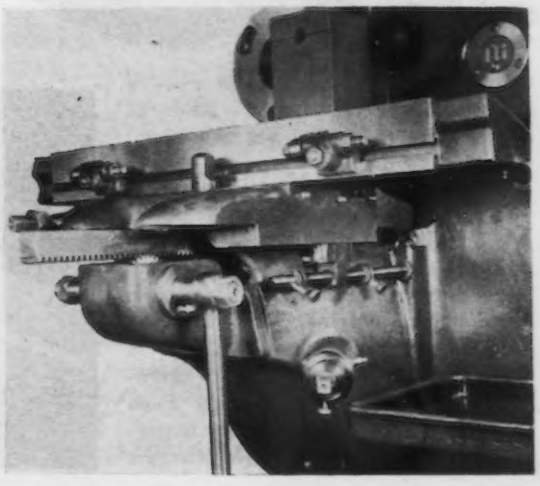
THE M. E. CUNNINGHAM CO., 115 East Carson Street, Pittsburgh, is marketing a safety sleeve holder designed to assure a clear, even impression in marking on small, round, and square pieces, such as gun barrels and small tubes. The top section is knurled for positive grip, and a special pin, easily

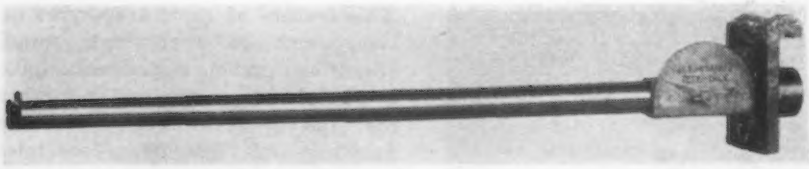
removed for quick change of steel type inserts, holds the holder in place. The device can be made with any size or number of characters.

Deep Hole Indicator

TELL-TALE indicators from 58 to 100 in. long, for holes of 2½ in. diameter or larger have been brought out by *Lehmann Machine Co.*, Chouteau and Grand Boulevard, St. Louis 3. The unit shown is adapted to mount on a hexagon turret face but other mounts can be furnished.



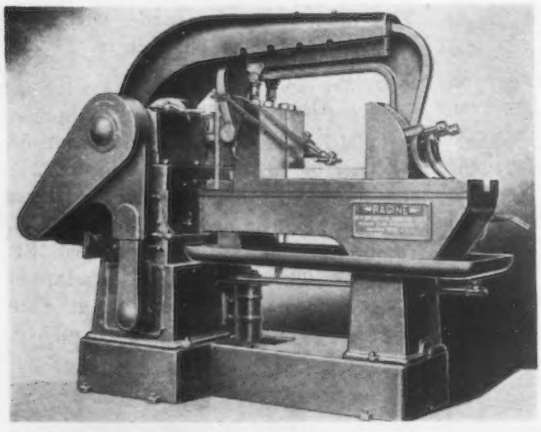




The Tell-Tale is introduced into the hole in the work, the roller on the end contacting the upper wall of the hole. The work is revolved slowly and the runout is indicated in thousandths of an inch on the dial. Two indicators are provided, both adjustably mounted; one may be set for a plus and minus reading, the other for total runout.

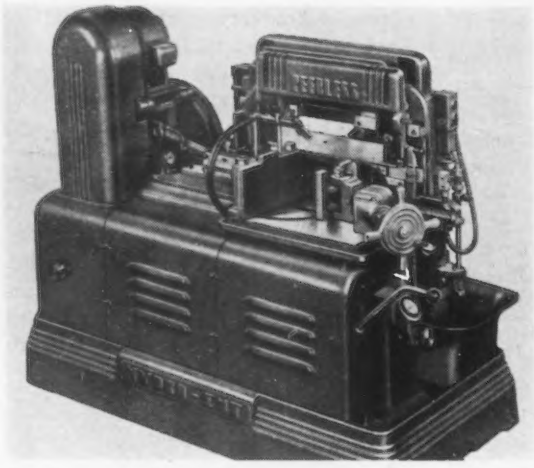
Metal Cutting Machine

THE development of a 20 x 20 in. capacity metal cutting machine has been announced by the *Racine Tool & Machine Co., Racine, Wis.* Designed primarily to provide low cost cutting with a thin cutting tool in large size materials, it is claimed that the machine is particularly adaptable to use on die block steel. The comparatively light-weight blade removes only a small amount of metal in the form of chips. The unit is hydraulically operated. A special dual type feed is used which provides a fast-cutting speed in light materials and yet is arranged for a positive predetermined rate of cutting in die blocks, alloys and tool steel. A three-speed transmission gives cutting speeds of 55, 85 and 115 strokes per min.



Metal Sawing Machine

A NEW hydraulic unit is incorporated in the metal cutting power saws offered by *The Peerless Machine Co.*, Racine, Wis. The hydraulic micro-set length gage is mounted on the conveyor to accurately gage the length of cut. Feed pressure is adjusted by vernier finger-tip screw control. A four-sided saw frame completely surrounds the blade and work. A backing-plate blade support backs up the blades to permit maximum feed pressure with minimum strain on the blade. The saw frame is balanced in its reciprocating travel by dual hydraulic cylinders. The 7 and 11-in. automatic models can be converted for handling a single bar or a nest of bars or tubes.



Blind-spot Rivet Gun

THE riveting machine gun put on the market by *R. Decat*, 78-21 Queens Boulevard, Elmhurst, Long Island, N. Y., is made out of a light weight aluminum casting. Composed principally of a barrel, it contains the rivets in a mandrel with an upset head working as a magazine feed by means of a crank-operated cam. The rivets, threaded on piano wire mandrels, are insterted in the gun as required, it being possible to upset 1200 rivets per hr. The unit weighs only 3¾ lb. These blind rivets may be driven in unsupported sheets and have a positive side expansion of 0.030 in.

Hot Forging Agent

HOT forging processes, particularly in shell production, are aided by an agent swabbed or sprayed on punches, mandrels and rings to prevent carbon build-up and scratches while promoting speed and die life. *E. F. Houghton & Co.*, 303 West Lehigh Avenue, Philadelphia, has developed a series of hot forging agents which are meeting the demands of munitions production schedules. To meet these requirements, the necessary graphite content, high flash point and wetting action are combined in an agent which is said not to build up on the ram or cause scoring.

Seal-less Coolant Pump

A SMALL-SIZED seal-less coolant pump, designed for providing coolant flow to hand mills, surface grinders, internal grinders, drill presses and tapping machines, has been put on the market by *Pioneer Pump & Mfg. Co.*, 19650 John R Street, Detroit. Less than 16 in. high, Model MVBD has three outlets, which permit a choice of piping arrangements—to the right, left or back into coolant sump through intake bracket. It can be mounted on outside of coolant tank or machine pedestal and is said to function efficiently with an extremely low water level.

is it possible to build a rat?

IN the answer to this extraordinary question is a curious story. For two scientists once posed that very question to themselves . . . and the answer was Yes!

They actually built a machine with the power to "learn" by experience and "remember" what it had learned—a mechanism capable of simulating the rudimentary behavior of a rat. Comprised of solenoids, gears and relays, it traveled a grooved track forked by 12 dead-end side-tracks—equivalent to the blind alleys which a living rat encounters. Set to take the dead-end forks, as if by an inner compulsion, this robot rat literally learned by experience to avoid the frustrating blind alleys, in a perfect mechanical analogue to the conditioned reflexes of the brain.*

To build a machine that would reproduce *all* the behavior of a rat "would require a mechanism probably as large as the Capitol at Washington"—*but it could be done!*

For we're at the beginning of an amazing new technological age. Already there are many kinds of thinking machines in our incredibly mechanized world, helping to speed production, cut costs and build better products. And intimately a part of this whole story is the science of machine tool engineering.

Today, Jones & Lamson engineers are working with the leading manufacturers in virtually every industry, helping them to plan production *now* for the machines and the products of tomorrow.

They are at your service, too.

* *In "The Advancing Front of Science" by George W. Gray, a memorable chapter on thinking machines reports this story in full.*

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Manufacturers of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

Profit-producing Machine Tools

Assembly Line . . . STANLEY H. BRAMS

• Charles E. Sorensen resigns from Ford. His duties will likely be assumed by Ray Rausch, with Harry Bennett still more active in company's administration.

DETROIT—Once again the direction of the destinies of the Ford Motor Co. have undergone a profound change. Last weekend saw confirmed the resignation of Charles E. Sorensen as vice-president and manufacturing head of the company. The effect of the resignation, so far as company operations are concerned, parallels the significance of the death of Edsel Ford last May.

Ill health was the reason attributed to the resignation of Mr. Sorensen, who was by far the best known manufacturing man in the auto industry since William S. Knudsen left General Motors to go into government service. Undoubtedly the physical condition of Mr. Sorensen largely dictated his withdrawal, and it must be recorded that recent events at River Rouge growing out of his illnesses pointed to the likelihood of such an event.

Practically the entire career of Mr. Sorensen has been spent with Ford. He went to work as an apprentice patternmaker in Buffalo, in 1895, and joined Ford in 1904, second year of existence of the then-infant company. He moved up from a foundry post to take a share in administrative operations at Highland Park. His thoughts on mass production by assembly line methods ran parallel to those of Henry Ford. His experiment of testing the idea by towing a chassis on a rope along a hypothetical chain of production stations proved the plan to the satisfaction of Mr. Ford, and won for him the confidence of the company founder. When the plant moved to River Rouge, starting in 1918, Mr. Sorensen rose quickly to the topmost rungs of authority.

In recent years, particularly since the war began, the center of gravity of Ford operations has been shifting from Mr. Sorensen to Harry H. Bennett, one-time personnel head, who is certainly closer today to Henry Ford than anyone else in the company administration. Public recognition of the increasing stature of Mr. Bennett in the Ford scheme of things first came last June, when he was made a director of the company (THE IRON AGE, June 3, 1943, page 70). Subsequently he was designated an assistant on administration to Mr. Sorensen, and at the same time this move was made, R. R. Rausch was designated a manufacturing assistant to Mr. Sorensen. These two moves were generally interpreted as evidences of a movement of administrative responsibility away from Mr. Sorensen.

The poor health of Mr. Sorensen certainly was a major factor in these administrative revisions. The job of building Willow Run and making it function was directly in Mr. Sorensen's hands from the start, and obviously was a terrific job for any one man. He suffered an attack of pneumonia last year and several times was forced to take enforced rests, some of them of months' duration, at his home in Miami Beach where he was staying when word of the resignation finally became public.

AS a result of the inability of Mr. Sorensen to devote constant attention to operational problems, Mr. Bennett quite logically moved closer into the center of the Ford stage, and changes began to ensue in lower tiers of management which naturally reflected the turn of events at the top. Shifts were not uncommon through the latter half of 1943 among executives of a number of departments, manufacturing, and administration alike, and the indications were fairly definite that these changes reflected the desires of Mr. Bennett.

With no public announcement, forthcoming as yet, it was assumed that Mr. Rausch would take over the functions of Mr. Sorensen in major degree. It could be assumed that the operating head of Willow Run, M. L. Bricker, who was also designated a director last June, would likely broaden his operations.

At the same time, general belief existed that Henry Ford would continue to place more reliance on Mr. Bennett as an actual general operating head of the Ford works and its outlying activities as well. In this chain of development must also be considered young Henry Ford II, 26-year-old grandson of the company founder, whose direction toward the higher "front offices" was indicated a few months ago when he was named vice-president in charge of sales and started down a course of grooming in the administrative offices.

ON the score of postwar thinking, Timken-Detroit Axle Co. is attracting attention with a new booklet, "Super Transport on Super Highways," intended to open up horizons of imagination for postwar commercial vehicles. There is less "airbrush engineering" in the designs by Lurelle Guild presented in this book than there is in most such conceptions. Some of the ideas have positive advantages.

There is, for example, the intercity truck with power plant space placed in the center and the front end split vertically into two areas whose top sections slide into the roof, and whose lower sections drop down to form a step. The right half can thereby be used for loading in addition to conventional facilities in the rear.

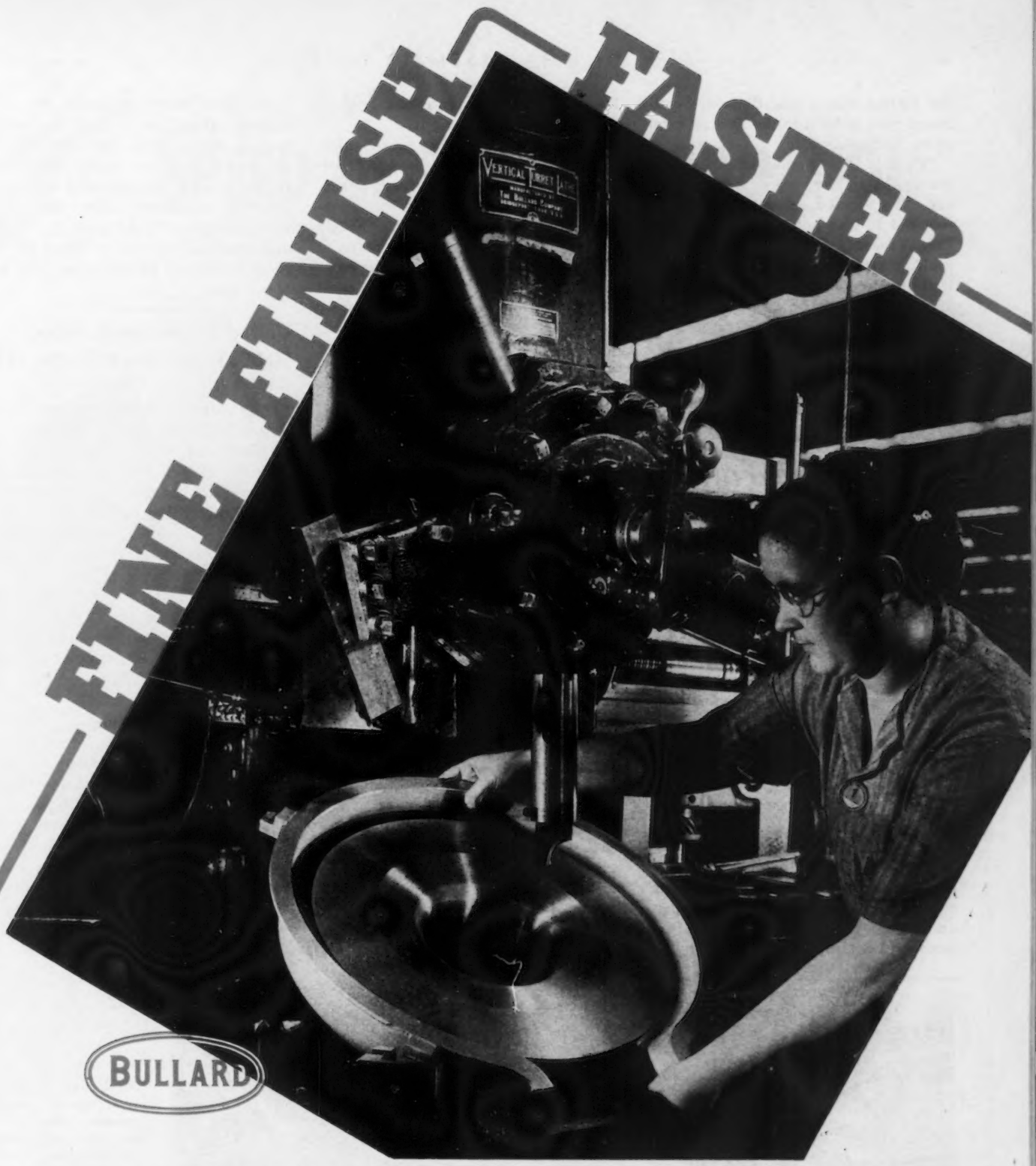
One of the most revolutionary ideas is that for a highly specialized dump truck with cab mounted on the side. The objective is visibility in either direction, utilizing a steering-driving axle at each end which permits driving in either direction and load dumping fore or aft. Presentation of this idea is used by Timken to emphasize the Army finding that specialized vehicles work faster, better, and at lower cost.

Supplemental material in the booklet reveals that Timken now has four plants: The headquarters at Detroit and subsidiary operations at Melvindale, Mich.; Oshkosh, Wis., and Waukegan, Ill. The Melvindale plant, newest of the Timken-Detroit units, is now in process of completion.

A BOUQUET was laid at the door of Packard Motor Co. by Hubert Scott-Paine, the English boat builder, in a recent speech before the Detroit section of the Society of Automotive Engineers.

Discussing the developments leading up to the torpedo boat fleets of

FINE FINISH FASTER



Do the products you make have to be held to fine limits? The rigid vertical design of the Bullard Vertical Turret Lathe is assuring fine limits in scores of vital industries. Are you striving to exceed quotas already high, with a dwindling supply of skilled labor? The V.T.L. saves time by cutting with two heads at once . . . saves time between cuts. Today, as America's production rises to incredible heights, the Vertical Turret Lathes play their part in bringing this war to the "finish" we all desire. Tomorrow, these same advantages will weigh heavily in their owners' favor in the battles of peace-time competition.

BULLARD VERTICAL TURRET LATHES

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

the United States and Britain, Scott-Paine paid tribute to the Detroit company in these words:

"I would like to stand off for a minute and say a few words about Packard. We started off with a 1300-hp. job, but it was not what we wanted. Col. Vincent, his engineers, and I really started work somewhere around October-December of 1939. In April of 1940, the engine was finished and did its first hundred hours' testing without any trouble.

"We have been building aero engines since 1909 anyway. That is the most rapid construction I know of. There is no other place but Detroit, of course, that could do it.

"We never had any mechanical trouble at all—it has been a first-class job. It has grown from 80 engines in the original order into thousands, and it is running pretty nearly every PT, MTB and rescue vessel. I cannot help feeling that it will come through this war as one of the most outstanding engines. I do sincerely hope that the Packard and the men connected with it get some kind of recognition, because if they had not done this there would be no engine to run these boats."

o o o

Liberty Ship Failures Debated at Senate Committee Hearing in New York

• • • **After hearing** a witness estimate that about 60 of the nation's fleet of almost 2000 Liberty ships developed major structural failures after they were put in war service, Senator Mon C. Wallgren, Democrat of Washington, advocated on March 2 immediate abandonment of a program to convert some of these vessels into hospital and troop ships. He added that the entire Liberty ship construction program should be given up in favor of construction of speedier vessels.

Senator Wallgren expressed his opinion at the ending of a public hearing by the Truman investigating committee, of which he is a member, on causes of structural faults that have caused some Liberty ships to break up and sink. The hearing was held in the United States Courthouse on Foley Square in New York.

J. Lyell Wilson, assistant chief surveyor of the American Bureau of Shipping, minimized the importance of the amount of fractures developed. A thousandfold of trouble was expected in such quantity production by companies using many inexperienced men, he added. He said some of the fracture trouble already had been overcome; that only 3 per cent of the Libertys built had developed serious cracks or fractures, and that this figure had dropped to 2 per cent last Summer. After repairs ships that developed cracks were better than new because the stresses had been relieved, he added.

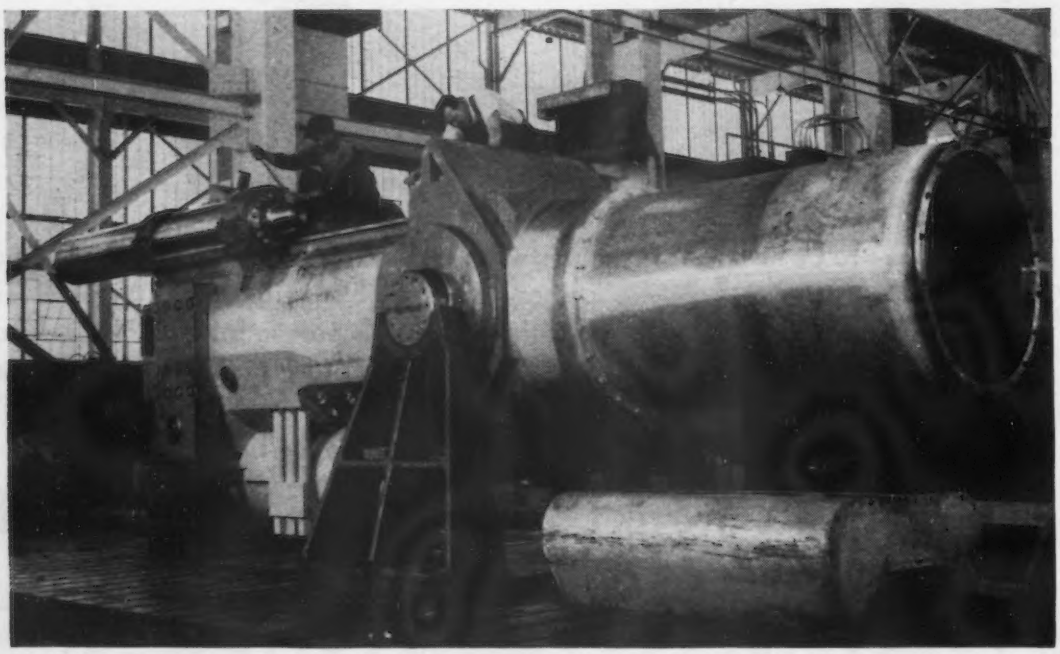
The testimony brought out that Liberty ships in ballast, or partly loaded, operating in cold water routes developed fractures sooner than fully loaded vessels. The majority of cracks reported occurred when the ships were returning to this country "light" and ran into storms. Most of the cracks occurred in the vicinity of the No. 3 hold.

United States Sends Allies 28,000 Planes Since March, 1941

Washington

• • • **Almost 28,000** airplanes have been sent by the United States to the air forces of allied nations, together with $1,600,000,000 worth of aircraft engines and parts since Lend-Lease started, according to Leo T. Crowley, Foreign Economic Administrator. Since March, 1941, 150,000 aircraft have been produced in this country, of which 122,000 were retained for American use. Of the 22,000 shipped abroad, 21,000 were sent under Lend-Lease provisions and the other 7000 were paid for in cash, principally by the British.

A total of 7800 planes went to Russia, 4000 to Allied forces in the Pacific and Far East, and more than 16,000 to all other combat and training areas abroad. About 75 per cent of the planes have been combat types and the balance trainer and transport planes. There have been 9800 four-engine, two-engine, and single engine bombers and 10,700 single and two-engine fighter craft shipped abroad.



NAVY GUN MOUNT — *Resembling a giant cannon, this 25-ton mass of precision-finished steel is the stationary housing for the recoil mechanism of a 16-in. Navy gun. Nearly ready for sea duty on one of Uncle Sam's battleships, the housing gets a final check at the Naval Ordnance Plant operated by the Westinghouse Electric & Mfg. Co., at Louisville, Ky.*

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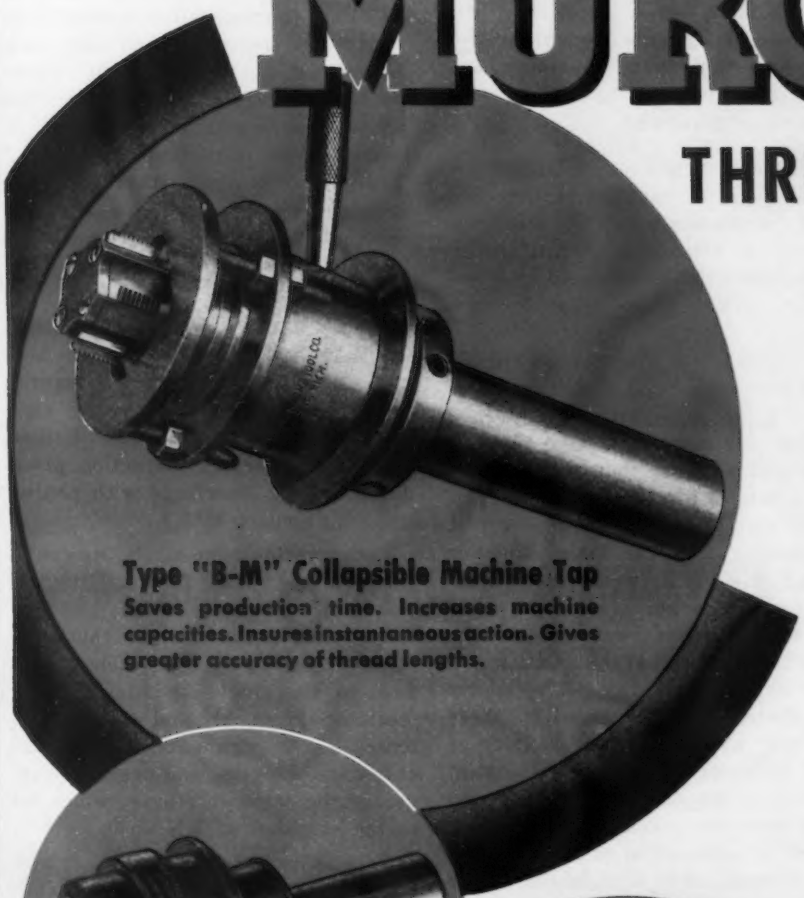
THREADING TOOLS



Type "B-M" Collapsible Machine Tap
Saves production time. Increases machine capacities. Insures instantaneous action. Gives greater accuracy of thread lengths.

Type "C-O" (rotating) Self Opening Die Head
A companion to Type "G" for use on machines where the die head revolves. Takes the same chasers as well as many parts of Type "G".

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MURCHEY

Washington . . . L. W. MOFFETT

• Annual Truman report gives public facts and figures . . . May result in WPB order of limited production of civilian goods . . . Advises relaxed controls on smaller steel companies with idle capacity . . . Urges gradual peacetime changeover from NE steels.

WASHINGTON — As swivel-hipped as a great broken field runner, the latest annual Truman Committee report skirts most of the artificial censorship set up by the Executive Branch of the government to keep facts from the public for political reasons.

The result is a straightforward reporting job on war production and demobilization which favors few sacred cows. The committee and its staff deserve congratulations.

The report crashes through the War Department's objections to resuming civilian production and through making public the facts on cancellations, cutbacks, manpower, materials and plant capacity which will result in forcing the War Department to change its attitude, it is predicted.

Hence, with the Truman report as a springboard, it can be expected that WPB will soon order limited production of civilian goods to utilize surplus materials in areas where manpower demands are slack enough to permit the resumption without interfering with war production.

The conclusion of the Baruch report that competitive position of companies returning to peace production should be maintained so far as possible in plans by the government is met head on with the sound logic that such selection and control is not only impractical, but un-American.

Consequently, it is assumed that no more than 20 major industries will be placed on a quota basis in their readjustment to civilian needs. Heading the list are household electrical goods and automobiles where manufacture is relatively complicated and components and materials will have to be rationed among the various competing companies.

Other subjects the report covers are: Surplus plants and commodities, renegotiation, steel, aluminum, copper, lead, zinc, lumber, mica, aircraft, transportation, farm machinery, tank lighters, and Army and Navy hotel acquisition programs.

IN steel, whenever a substantial drop in operations comes, the report recommends that the strict war controls be relaxed to permit smaller companies with idle capacity to seek "some civilian non-essential business."

In answering the objections of those who would not permit the steel industry to move into civilian production, the committee says that the burden of showing that such permission would injure the war program should rest upon those who assert it.

Asserting that the main objection is that small mills would draw manpower from larger ones who would still be producing war orders, the committee says that this argument is of doubtful validity. The report says that the labor utilized by these mills will not move to the vicinity of other mills engaged in more essential work if it has not already done so in the past two years.

Steel in substantial quantities could be produced today and is not being produced because the finishing facilities available could not make products needed for essential programs. Some of these facilities, however, could make a limited quantity of products suitable for civilian uses, the report states.

THE committee said:

"Pig iron also can be produced in excess of present requirements. This product should be produced and should be made available to small foundries that are located in non-critical manpower areas. Such foundries could produce a large variety of civilian goods without any impairment to war industry. Such small beginnings at this time will serve to take up the slack of employment in many areas and at the same time to produce useful articles."

Hailing the cooperation of the steel industry, and praising it for its 1943 output of 88,838,043 tons, the committee declared that much credit for this achievement should go to the Steel Division, "for a fine job of administration."

CALLING attention to the plate inspection problem at the Irvin Works of Carnegie-Illinois Steel Corp., which the committee had previously condemned as "fake," the report pointed out that the company "had placed exceptionally able men in charge of its inspection department." The committee noted that inspection procedures have been "completely revamped," and that the company is "now producing good steel."

The report commends that WPB has also assured the committee that the steel industry as a whole has been and is now shipping plates in quantity and of a quality to meet the rigid requirements of the services. Utilization of satisfactory inspection procedures has not interfered with production, the report said.

Conservation-minded, the committee plugged the peace-time melting of National Emergency steels, and contended that despite the fact that these steels "cost more" any wholesale return to the single and double alloy steels would quickly and substantially increase the drain on nickel and chromium supplies and create a danger of the same shortages, which led to the adoption of NE steels.

Despite its setbacks, the report says that the expansion program in steel has been entirely successful. "No vital war program has failed, or has been retarded very seriously for lack of steel," and all essential requirements were met in 1943.

OF course, it could be said that the committee has been rather slow in reaching the conclusion that steel output is adequate. In its report of one year ago, the committee still insisted that there had been a steel shortage. The net increase in steel production in the two-year period has only amounted to a few million tons. Production in 1941 was about 83,000,000 tons and in 1942 was 86,000,000 tons. The effect of the expansion program has only made itself felt in the latter months of 1943.

As no Congressional steel report

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CENTERTYPE GRINDING MACHINES CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES

would be complete without mentioning sponge iron, it is again appraised by the Truman Committee.

Says the report: "However, as insurance for the future, the Bureau of Mines should continue its experiments with sponge iron and other forms of melting stock which can be used in place of scrap. Only one commercial scale plant of this type *(Editor's Note:* Republic Steel at Warren, Ohio) was authorized. It took almost twice as long to erect as had been expected and is almost twice as costly. Nevertheless, it may prove to be successful. But the committee is of the opinion . . . that several other proposed projects utilizing different methods should have been more carefully considered. Had the need for melting stock become acute it would not be satisfied today. By experimenting with several processes the Steel Division might by now have proven at least one."

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Dodge Heads Price Adjustment Board

• • • **The War Department** announced Feb. 28 that Joseph M. Dodge, chairman of the War Department Price Adjustment Board, has been named to head the new War Contracts Price Adjustment Board provided for in the Revenue Act of 1943. Function of this board is to fix policies and procedures for contract renegotiation.

Members of the board serving with Dodge are Laird Bell, chairman of the Navy Price Adjustment Board, vice chairman; Commander Arthur G. Rydstrom, Maritime Commission Price Adjustment Board, who is also representing the War Shipping Administration Price Adjustment Board; Capt. Harry C. Maull, Jr., chairman of the Treasury Department Price Adjustment Board; Charles T. Fisher, Jr., chairman of the RFC Price Adjustment Board, and Carman G. Blough, WPB. W. James MacIntosh has been appointed general counsel to the War Contracts Board.

The authority of the board applies to renegotiation for war contractors' fiscal years ended after June 30, 1943, while authority of the Joint Price Adjustment Board — established last October by voluntary action of the various individual departmental boards —applies to war contractors' fiscal years ended before July 1, 1943.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Portable Tool Orders Fall Slightly

Washington

• • • **The WPB Tools** Division recently indicated that portable electric and pneumatic tools unfilled order backlogs, which increased quite sharply during the early months of 1943, have been slightly but consistently decreased to a level of about $43,000,000. Shipments are high, but slightly under the 1943 peak months.

Such tools include all portable metal working tools powered by compressed air or by a self-contained electric motor which in the course of normal use are lifted, held, and operated by not more than two persons. The data included in the tables are based on returns made by about 65 companies which account for about 95 per cent of all production.

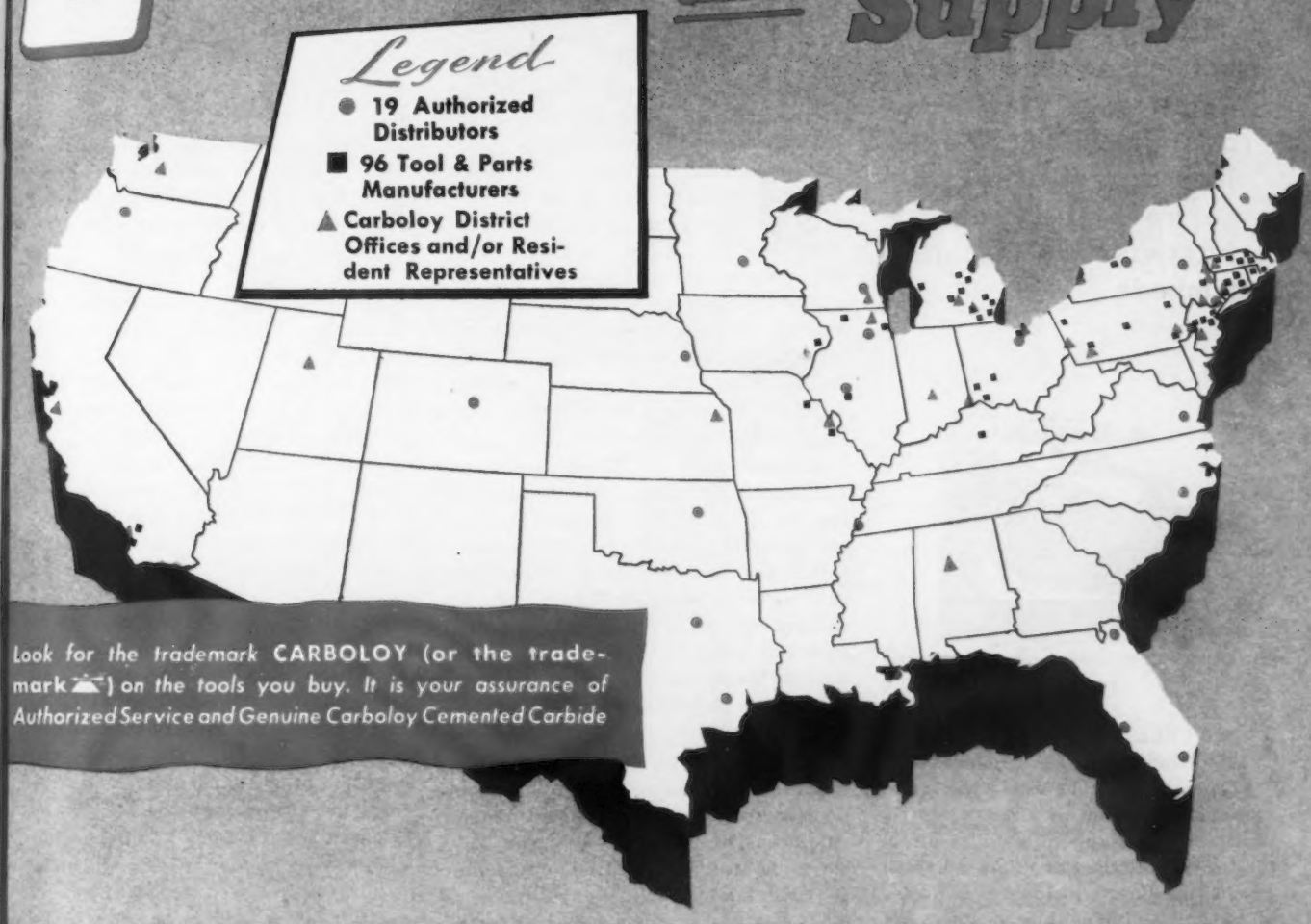
Portable Pneumatic Tools ($000)

	Shipments	New Orders	Unfilled Orders
1942			
January	3,721	4,606	9,996
February	3,490	4,320	11,326
March	4,054	4,292	18,929
April	4,457	4,175	19,846
May	4,253	5,641	21,625
June	4,651	3,469	17,542
July	5,036	4,473	22,612
August	5,062	5,964	23,147
September	4,879	5,479	24,969
October	5,119	6,521	20,672
November	5,057	7,150	27,740
December	5,284	5,239	26,674
1943			
January	4,942	5,145	28,150
February	4,940	10,964	33,862
March	6,250	6,997	34,630
April	6,089	6,378	34,874
May	5,891	5,645	34,319
June	5,300	4,167	32,802
July	5,198	5,125	32,615
August	4,911	3,877	31,390
September	4,966	4,457	30,720
October	6,072	6,488	30,891
November	5,743	4,537	29,479
December	5,793	4,840	28,370

Portable Electric Tools ($000)

	Shipments	New Orders	Unfilled Orders
1942			
January	2,103	2,222	3,089
February	2,239	2,616	3,790
March	2,626	3,335	5,642
April	2,559	3,343	6,521
May	2,704	3,536	7,457
June	3,121	3,899	8,629
July	3,073	3,163	8,859
August	2,873	3,599	9,673
September	3,398	3,526	9,968
October	2,997	3,432	10,509
November	2,817	2,930	10,087
December	3,237	3,737	11,731
1943			
January	3,031	2,622	13,431
February	3,298	4,924	15,317
March	3,400	4,417	15,780
April	3,549	3,339	15,196
May	3,590	3,076	14,630
June	3,453	3,924	15,356
July	3,434	4,186	16,089
August	3,378	3,330	15,973
September	3,630	3,743	15,805
October	3,426	3,380	15,611
November	3,657	3,559	15,272
December	3,454	3,187	14,895

Coast to Coast Service and Supply



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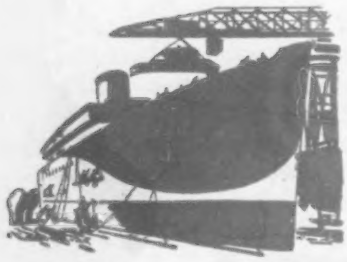
PITTSBURGH 19 SEATTLE 4, WASH. THOMASTON, CONN.

WEST COAST . . . OSGOOD MURDOCK

• Manpower really is short in the volatile Pacific Northwest . . . New wage rates for 6000 Boeing office and engineering workers may cause coastwise white collar stampede.



SEATTLE — When Kenneth B. Colman, Seattle industrialist and ex-president of the local vigorous Chamber of Commerce, recently accepted appointment as director for difficult Region 13 of the War Production Board, including the states of Oregon and Washington with part of northern Idaho and western Montana and most of Alaska, he took on a man-sized task that makes up in complexity what it lacks in statistics and that is geographical and psychological, rather than ponderous and numerical. He must guide the solution of a problem in civilian logistics involving communications and priority urgencies, manpower and industrial relations that is probably more delicate and far-flung and less understood than any in the nation.

Mr. Colman's predecessor, George K. Comstock, also a Seattle business man and a fellow ex-president of the same Chamber of Commerce who had served for a year. Before that time, Oregon. and Washington had been included in Region 10 with headquarters at San Francisco, but pressure for autonomy and freedom from the "yoke of subservience" to California became great enough in the fall of '42 to obtain authorization for the separate WPB region. The War Labor Board has also established a separate Pacific Northwest region, although OPA and •WMC continue to recognize the entire Pacific Coast as the single economic and commercial region which it is, rather than yielding to political, provincial, and home industry rivalries that divide it.

In his furthering of Pacific Northwest war production, regional director Colman is confronted with an actual shortage of some 45,000 good he-men to man nationally essential logging and lumber activities, fishing, shipbuilding and repair, essential agriculture, Boeing aircraft and miscellaneous manufacturing.

Selective Service officials announce that quotas for the state of Washington for the next four months call for the induction of 18,000 men, necessitating the call of 25,000. There are said to be between 30,000 and 40,000 fathers of service age in "not too essential jobs" and the pressure is now on them either to accept military service or directly essential production employment.

Meanwhile the Bremerton Navy Yard is still in need of 6000 workers, largely for repair and maintenance. An intensive campaign over the last three months has secured only 2000 of 8000 needed workers. Moreover, many now manning the yard are farm hands who will be leaving for their equally essential field jobs as Spring comes. Railroads in the Pacific Northwest desperately need some 3000 workers to maintain schedules and handle augmented traffic expected. Major shipyard schedules are being stepped up, as are Boeing's.

VOLATILE, unpredictable strikes are not uncommon in this lusty, uninhibited, still pioneer region. One day last week, for instance, some 600 workers at the Tacoma coppersmelter took a "work holiday" for a strike vote, because nine plant employees were said to be entitled to dust differential pay and there was some question by the management whether these particular men came under this classification which WLB's non-ferrous metal commission has set up. The vote was 518 for a strike to 122 for continued negotiations. Next day everyone went back to work to await the strike.

When the management of a Lake Washington shipyard was unwilling to restore one transferred employee to his former job, a wild-cat walk-out of some 175 machinists slowed up ship construction. The union business agent stated that "we didn't order these men off the job but we won't order them back to work until the matter is settled."

TO 6000 Boeing general office and engineering workers, the regional War Labor Board has granted pay raises supposed to bring office help up to parity with production laborers. The plan adopted is based on the evaluation plan that recently went through for factory workers and sets up 14 different labor brackets. Employees are assigned to each grade on a point basis that takes into consideration the type of work each does, responsibility, and other considerations. The lowest grade for office help has a rate range from 66 to 72c. an hour and the highest from $1.77 to $1.94. Unlike the factory plan which has a flat rate for each group, the new office plan has a range of nearly $15 in each group. The plan will be retroactive to Sept. 1, 1943, and should go into effect within the next three weeks. The plan is subject to approval by the National WLB since there were two dissenting votes by labor members of the regional board.

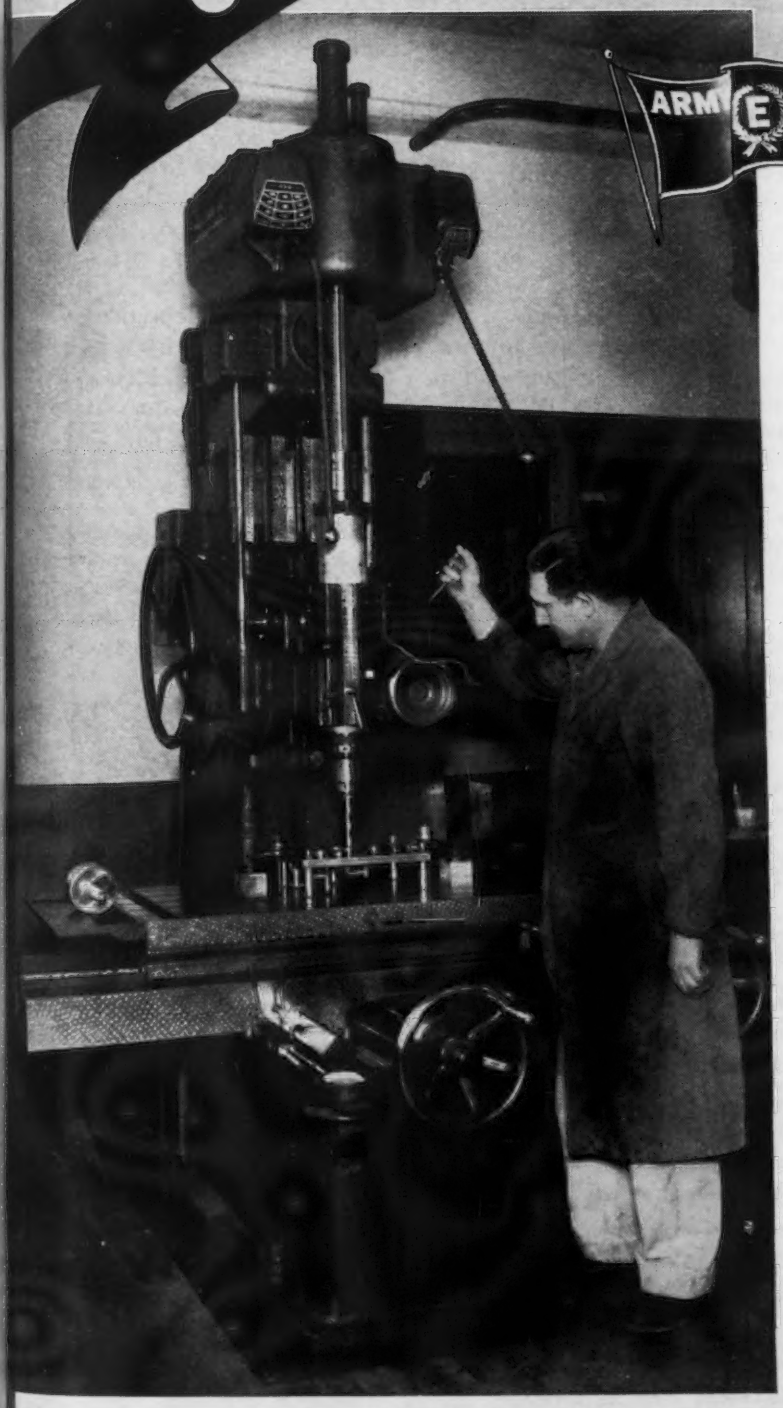
Adoption of this classification and adjustment for office workers on so large a scale is bound to affect similar workers in other plants and industries, particularly shipbuilding and those supplying aircraft. Moreover the eager and well organized aircraft workers in southern California in four or five times Boeing's volume may be expected to press more vigorously their already clamorous appeals for higher pay, better working conditions, more transportation and housing and new contracts.

WHILE Boeing and Bremerton, Kaiser and Sea-Tac vie for their thousands, other comparatively small but crucially important mills, foundries, and fabricators are hard pressed to maintain their hundreds. Although Northwest Steel Rolling Mills, Inc., needs only 50 more workers added to its present payroll of 250, the lack of these workers has closed down the second electric furnace and has cut down the reserve

FOSDICK

FOR TOOL ROOM ACCURACY ON ALL DRILLING OPERATIONS

JIG BORER



● Here is a typical tool room job being done on a FOSDICK JIG BORER. The piece is a cast iron drill fixture base to be used for locating holes in a motorcycle cam case cover.

Accuracy that will permit interchange of these cam case covers is essential. That's why the locating holes are being drilled and finish bored to size on this Fosdick Jig Borer. The hole size is 1.250 inch and tolerances are plus or minus .0005 inch.

The Fosdick Jig Borer is also rigid enough to do light milling operations. On jobs where several operations are to be performed such as milling—drilling—reaming—and tapping—they can all be completed on a Fosdick Jig Borer at one setting. This not only saves valuable time but fixture and tool costs.

Thus versatility—accuracy—and ease of operation makes the Fosdick Jig Borer an ideal machine for a wide variety of close tolerance work both in small lots and in large quantities.

The Fosdick Jig Borer Bulletin J.B.I. gives complete details. Write for one.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI · · · OHI

supply of ingots so that sometimes the rolls have been forced to stop entirely.

LOS ANGELES—Termination of Army training plane contracts with Consolidated-Vultee has been announced, affecting plants at Nashville, Tenn., as well as at Downey (Vultee Field). This reduction in the total number of basic trainers scheduled will cause only a gradual tapering off of production. At the same time there will be an expansion in combat class projects. Both personnel and facilities at Vultee Field are being switched over to work on components for combat types of aircraft.

That transport planes are even more crucially needed than bombers is evidenced by a plea directly from General Arnold, chief of the Army Air Forces to Douglas employees at Long Beach and Oklahoma City, urging on an emergency basis an increase of at least 400 extra C-47 "Sky Train" transports. One of the company's plants just turned out its 3000th transport. Some 10,000 employees working directly or indirectly on this one model are following president Donald W. Douglas' personal leadership in an earnest attempt to exceed this previous schedule. Priorities and preference ratings for the C-47 now exceed all other production models even including bombers, also built at the same plant.

Surplus steel and aluminum inventories are coming into the open for official recording faster than they move. A rough check shows 25,000 tons on hand in southern California owned by contractors and 15,000 tons additional controlled by the Air Corps, of which some is government owned. Since the first of the year some 5000 tons of iron and steel surplus have been sold.

OVER 100,000 tons of contaminated, low grade, orphan scrap may be converted into ship ballast within the next nine months on the West Coast if present pretty tangible plans and prospects mature. In normal times pig iron was frequently used. More recently concrete fortified by heavier ore has been substituted. Surplus turnings and borings have also been bricketted and remelted in cupolas on a small scale. Each Navy Yard has maintained 1000 tons of metal ballast as a pool.

Now comes a demand for over 100,000 tons for new merchant ships to be converted for military purposes within the next nine months. Deliveries would be at Portland, San Francisco and Los Angeles, from 15,000 to 20,000 tons a month. Metal is to be in blocks 4 x 4 x 24 in. It is presently proposed to divert for this purpose all galvanized and contaminated scrap, all tin cans, No. 3 bundles, turnings, borings, and miscellaneous low grade scrap, now dormant or selling below ceiling. What cannot be handled in cupolas may be put through open hearths, rolled, and sheared into bars which are found most practical in that they fit between the ribs of a ship, form a level floor and can be placed with a maximum weight at the lowest point to be ideal for navigating and utilization. A pool is being formed to supply this big prospective market, combining Naval and Maritime requirements.

Steel Casting Inspection Ceiling Prices Established

Washington

• • • **Ceiling prices for** radiographic and magnaflux examination of steel castings were announced by OPA. The extra charges that may be applied for these types of inspections are roughly the same as those currently being charged in industry practice.

For producing castings subject to inspection, regardless of whether the producer performs the inspection or not, he may add to his maximum base prices the following:

1—For radiographic inspection—12.5 to 30 per cent of the base price according to examination specifications.

2—For magnaflux inspection—15 to 30 per cent of the base price according to amperage required.

Where castings are subject to rejection on the basis of both radiographic and magnaflux inspection, however, only the radiographic or the magnaflux extra may be charged, whichever is higher. The production cost extra is added because of the additional expense involved in producing castings subject to these types of examinations.

If the producer of the casting performs the inspection himself, in addition to the foregoing production cost extras he may add:

1—For radiographic inspection—$17 per hr. with a 200,000 to 300,000 volt capacity machine; $21 per hr. with a 300,000 to 500,000 volt capacity machine; $25 per hr. with a 1,000,000 and over volt capacity machine.

2—For radium inspection—$5 per hr. for capacity of 10 to 500 milligrams.

Where the producer lets out inspection to an independent laboratory, he may add to his maximum base price the actual inspection cost to him plus 10 per cent. Where the producer performs the inspection himself, the cost extra needs in no case be less than $10 for a single order.

OPA also announced that steel casting producers who perform special services not specifically provided with ceiling prices, such as galvanizing may submit proposed prices for such services for approval.

. . . Cited for Awards . . .

• • • **The following** companies have been awarded the Army-Navy E for excellence in war production:

Silent Hoist & Crane Co., Brooklyn (second star).
Handy & Harman, Bridgeport, Conn. (third star).
Bryant Electric Co., Bridgeport, Conn.
Cochrane Corp., Philadelphia.
P. R. Mallory & Co., Inc., Indianapolis (fourth star).
American Chain & Cable Co., Inc., Hazard Wire Rope and American Cable Divisions, Wilkes-Barre, Pa.
Air Control Products Corp., Coopersville, Mich.
American Radiator & Standard Sanitary Corp., Pacific Enamel Works, Richmond, Cal.
American Red Cross, Blood Donor Center, Hartford, Conn.
Clarke Aero-Hydraulics, Inc., Pasadena, Cal.
Detroit Stamping Co., Highland Park, Mich.
Allen B. Dumont Laboratories, Inc., Passaic, N. J.
Eastern Etching & Mfg. Co., Chicopee, Mass.
Fayette Mfg. Co., Fayette, Ohio.
Firestone Tire & Rubber Co., Firestone Cotton Mills, Inc., Gastonia Plant, Gastonia, N. C.
George A. Fuller Co., Rockwood Alabama Stone Co., Rockwood Plant, Russellville, Ala.
General Chemical Co., Detroit Works, River Rouge, Mich.
General Motors Corp., Brown-Lipe-Chapin Division, Syracuse, N. Y.
Gibson, Inc., Kalamazoo, Mich.
Hammond Instrument Co., Plants No. 1 and No. 4, Chicago.
Heyden Chemical Corp., Fords Plant, Fords, N. J., and Garfield Plant, Garfield, N. J.
Kya-Fries Chemicals, Inc., West Haverstraw, N. Y.
Madison-Kipp Corp., Madison, Wis.
Muehlhausen Spring Co., Logansport, Ind.
Nineteen Hundred Corp., St. Joseph, Mich.
Southern Mfg. Co., Plant 1A and Plant 2B, Nashville, Tenn.
Tung-Sol Lamp Works, Inc., Newark, N. J.

Maritime M

Youngstown Sheet & Tube Co., Youngstown.
J. A. Jones Construction Co., Inc., Wainwright Yard, Panama City, Fla.
Barrett & Hilp, Belair Yard, San Francisco.
St. Johns River Shipbuilding Co., Jacksonville, Fla. (star).
J. A. Jones Construction Co., Brunswick Shipyard, Brunswick, Ga. (star).
Southeastern Shipbuilding Corp., Savannah, Ga. (third star).
New England Shipbuilding Corp., South Portland, Me. (fourth and fifth stars).
Delta Shipbuilding Co., Inc., New Orleans (eighth star).
Houston Shipbuilding Corp., Houston, Tex. (ninth star).

He's straining every nerve to give you SHEET STEEL SERVICE

THE ARMCO DISTRIBUTOR is in the same predicament as others or us. He has just so much sheet steel (his quota limitation); he's up against the same manpower shortage that no doubt plagues you; and he can't provide ARMCO *sheets plus service* with that pre-war speed you liked.

But don't hesitate to call the Armco Distributor, because he'll make every effort to handle your order or give you helpful suggestions.

A STRONGER POST-WAR SERVICE

While "the going is tough" now, the Armco Distributor is planning better things for you. After the war he not only will offer you the most complete line of special-purpose and commodity sheets, but a broader, swifter and closer service.

SHEETS FOR EVERY PURPOSE

Here are some of the possibilities in sheet metals: Galvanized ARMCO Ingot Iron; galvanized PAINTGRIP; ZINCGRIP; ZINCGRIP-PAINTGRIP; Stainless Steels; Aluminized Sheets; Enameling Sheets; copper-bearing and regular steel sheets.

So whether it's now or after the war, remember that the Armco Distributor wants to serve you to the limit of his ability. Every day brings him nearer the time when he can give you the ALL that he wants to give you—in special steels, application service, deliveries, or all three. The American Rolling Mill Company, 1011 Curtis Street, Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

SPECIAL PURPOSE ARMCO SHEET METALS

ARMCO *DISTRIBUTOR SERVICE*

PERSONALS

• **Ralph O. Smith** has been appointed general sales manager of the Vulcan Iron Works, Wilkes-Barre, Pa. Mr. Smith has been with the company since 1918.

• **Joseph F. O'Brien** has been made an assistant to the president of Vulcan Iron Works. Mr. O'Brien, who started as an apprentice in the Vulcan shops more than 30 years ago, will have charge of all matters relating to operation and production.

• **Jack J. Chernyk,** on leave from the United States Army, now is managing the Chicago Alloy Products Co., Chicago, succeeding **Ben Chernyk,** founder and president, who died Feb. 15.

• **Donald Rae,** chief mechanical engineer, Package Machinery Co., Springfield, has been made assistant superintendent.

• **N. M. Barnett** has been made manager of the Chicago branch office of the Bailey Meter Co., Cleveland. He succeeds **M. Greenberg.**

• **W. H. Feldmann,** vice-president and general manager since 1940, has been elected president and general manager of Electric Machinery Mfg. Co., Minneapolis. He has been associated with the company for 22 years. **Silas McClure,** president since 1921, was elected to the chairmanship of the board of directors.

• **Roy C. Markle** has been appointed assistant comptroller, and **Richard G. Jones** assistant statistical supervisor, of U. S. Steel Corp. of Delaware, Pittsburgh. Mr. Markle was previously comptroller and assistant secretary for Carnegie-Illinois Steel Corp., a subsidiary. **Murrow D. Wells,** formerly assistant comptroller, succeeds Mr. Markle and **Ralph C. Grimm** has been appointed supervisor of financial statistics staff succeeding Mr. Jones.

• **William A. Kiley** has resigned as president of Thos. W. Kiley & Co., Inc., Brooklyn. **Mrs. K. Kiley Murphy** was elected president to fill the vacancy and **Edward J. Smith** has been made executive vice-president.

• **William A. Irvin,** former president of the U. S. Steel Corp., was elected a director of Willys-Overland Motors, Inc. Mr. Irving is still a director of the steel company and was its vice-chairman in 1938 and 1939.

• **Harold J. Siekmann** has been advanced to the position of chief engineer of the R. K. LeBlond Machine Tool Co., Cincinnati, to succeed **Wm. F. Groene,** who has retired as vice-president and chief engineer. Mr. Siekmann joined the LeBlond organization in 1910 and has been closely associated with Mr. Groene in the development of LeBlond products.

• **J. W. Frasche** has been named plant manager of the new tire factory in Miami, Oklahoma, of the B. F. Goodrich Co.

• **Larry F. Hardy** has been elected vice-president in charge of the home radio division of Philco Corp., Philadelphia. Mr. Hardy will be in charge of radio-phonographs, consoles, table models and small sets.

• **Frank J. Stanley** has been appointed plant manager of the Lebanon Steel Foundry, Lebanon, Pa., succeeding **Henry D. Phillips** who has resigned. For the past four years, Mr. Stanley has been plant superintendent. **L. G. Miller** assumes Mr. Stanley's former position.

• **George Ingersoll,** who was a sales representative for several years has been appointed district sales manager for the National Screw & Mfg. Co. in Cleveland and adjacent territory; **S. M. Washabaugh,** in the Philadelphia territory and **E. A. Derby** in the New York territory and the New England states.

• **Richard F. V. Stanton** has been appointed assistant manager of the machinery sales department of Niles-Bement-Pond Co., West Hartford, Conn. Mr. Stanton has been with Niles continuously since 1917 except for active war service in 1918. During the present war emergency he has been in charge of the company's outside contracting.

W. H. FELDMANN, president and general manager, Electric Machinery Mfg. Co.

HAROLD J. SIEKMANN, chief engineer, R. K. LeBlond Machine Tool Co.

RICHARD F. V. STANTON, assistant manager of the machinery sales department, Niles-Bement-Pond Co.

PAUL M. SNYDER, sales manager, Climax Molybdenum Co.

• **Paul M. Snyder** has been appointed sales manager of the Climax Molybdenum Co. His headquarters will be in Canton, Ohio. He joined the Climax Co. as a metallurgical engineer in March 1932 and has been in charge of the company's sales and development work in the Canton area since that time.

• **H. S. Gier** has returned to his post as Detroit district manager of Sharon Steel Corp. after 16 months' service in Army Ordnance. Mr. Gier has been with Sharon Steel for 23 years.

• **Arthur J. O'Leary** has been appointed assistant manager of sales of Lukens Steel Co., Coatesville, Pa., and **George W. Eshleman** has been made assistant to the manager of sales.

• **George L. Stewart,** who recently served as president of Steel Recovery Corp., has been appointed executive vice-president and member of the executive committee of Edgar T. Ward's Sons Co., Carnegie, Pa.

• **W. G. McFadden,** formerly assistant district sales manager of Allegheny Ludlum Steel Corp.'s Chicago office, has been appointed district manager of that territory.

• **William D. Turnbull,** who has been vice-president and sales manager of the Pomona Pump Co. of Cal., has been appointed manager of the Westinghouse Electric & Mfg. Co.'s agency and specialties department. He was formerly manager of the Westinghouse machinery electrification section.

• **William E. Miller** has been made general attorney in charge of Westinghouse Electric & Mfg. Co.'s law and patent department, Pittsburgh, Pa.

• **Charles W. France** has been appointed general manager of the Buffalo plants of Curtiss-Wright Corp. and **Burton H. Witherspoon** has been named general manager at St. Louis. Mr. France has been general manager at St. Louis for eight years, and Mr. Witherspoon has been executive assistant to Burdette S. Wright, vice-president in charge of the Curtiss-Wright Airplane Division.

• **Lloyd C. Smith,** whose career in the file industry dates back to 1912, has become associated with Heller Brothers Co., Newark, N. J., in a sales capacity. Mr. Smith resigned as sales representative in the New York area of the Nicholson File Co., Providence, R. I. He had held this post for the last seven years.

• **Nelson Bauer,** Newark district manager since 1929 of the Pyrene Mfg. Co. has been made assistant general sales manager; **Raymond F. Poole,** moves to Newark as district manager; **Frank R. Kachel,** succeeds Mr. Poole and **Truman Young** assumes the responsibilities of advertising manager.

• **Herbert A. Reece** has been elected first vice-president in charge of operations for the Meehanite Metal Corp., Pittsburgh. Mr. Reece joined the Meehanite Metal Corp. in 1929, and has served successively with this company as metallurgist, chief metallurgist, assistant to the president and manager of the corporation.

HERBERT A. REECE, first vice-president in charge of operations for the Meehanite Metal Corp.

• **H. C. Allington** has been appointed sales research engineer of Wickwire Spencer Steel Co., New York.

OBITUARY...

• **Fred W. Lemke,** 68, vice-president and superintendent of the Quality Aluminum Casting Co., Waukesha, Wis., died Feb. 16.

• **Frank E. Doherty,** former Wisconsin divisional sales manager for the Toledo Steel Co. at Milwaukee, died Feb. 17, after a year's illness.

• **Ellis J. Gittins,** 77 years of age, chairman of the board of the J. I. Case Co., Racine, Wis., from 1920 to 1935; director of the Young Radiator Co. and the Racine Tool & Machine Co., died Feb. 18 at his home in Racine.

• **William J. Davis, Jr.,** 75, retired General Electric consulting transportation engineer, died Feb. 21 at Schenectady, N. Y., after a long illness.

• **James S. Edinburg,** president and treasurer of James S. Edinburg Co., Inc., Worcester, Mass., died recently.

• **Frank W. Iredell,** who until his retirement 20 years ago was New York manager of the C. & G. Cooper Co., now Cooper-Bessemer Co., Mount Vernon, Ohio, died Feb. 17. He was 87 years of age.

• **Walter S. Reed,** president of American Ore Reclamation Co., American Sintering Co. and Buffalo Sintering Corp., died Feb. 4 at his home in Chicago. He was previously associated with Carnegie Steel Co., Pittsburgh and U. S. Steel Corp., New York, where he served as assistant to James Gayley, first vice-president.

• **John F. Conroy, Jr.,** founder and president of National Magnesium Corp., died Feb. 16 in Wilmington, Del. He was 49 years old.

• **James E. McDonald,** 53, general sales manager of the Edward Valve & Mfg. Co., Inc., East Chicago, Ind., died Feb. 25, after an illness of several months. Mr. McDonald first joined the Edward organization in 1917 and served as chief engineer and plant superintendent before becoming sales manager.

Fatigue Cracks . . . BY A. H. DIX

Soot-Seer

Page 80 of your Jan. 27 issue reads:

On Feb. 11 at Carbon City, capital of Nevada, Senator McCarran will preside. . . .

Are you trying to blacken the name of Nevada's capital city?

—Howard E. Long, Specification Engineer, Harrison Radiator Div., GM, Lockport, N. Y.

Our copy to the printer read "Carson City." As there is a subconscious urge at the root of every error, we had our print shop psychiatrist get busy. He finds that buried in the mind of the lino operator who set the "West Coast" Section that week was a fear that the success of the Senator's efforts to balkanize the steel industry would befoul Nevada's pure air.

Portside Drill

• • • If the lady operator in the now famous left hand drill cartoon had been standing beside a screw machine instead of a drill press the reverse flutes would have been grounds for no raised eyebrows. For left hand twist drills are being made, and in large quantities. Some of the older type multiple spindle screw machines, resurrected for war work, have half the number of spindles going counterclockwise, calling for left hand drills.

Even in the case of modern screw machines, where a left hand thread is to be tapped, the hole must necessarily be drilled with a left hand drill.

Paying Politeness

• • • Bob Blair, who is our business ambassador in most of Ohio, informs us of a gracious gesture made by the Cooper-Bessemer people, of Mount Vernon. Every visitor is handed a folder headed "Glad to see you, Mr. ....." It follows up with:

If this is your first visit, we hope it will be a pleasant one . . . and want you to feel right at home . . .

No matter how busy we are . . . we are glad to have you call and you will be interviewed as promptly and as courteously as possible.

In the folder is a list of Cooper-Bessemer key executives, who are committed by the folder to extend salesmen "the same courteous treatment we should like our own representatives to receive in other places of business."

The Golden Rule seems to be an ingredient of corporate longevity. Cooper-Bessemer was of voting age even when No. 1, Vol. 1, of your favorite family journal was printed, back in '55, and is now 111 years old.

It has always seemed to us to be good business to be nice to salesmen, not only because you get the benefit of it in a sellers' market like this one, but because every salesman is a traveling billboard not only for his own company but for all those on his beat. As salesmen are occupationally unreticent, a growing fund of goodwill is built up by having an army of them going around saying, "Even if I didn't sell the Blanks a nickel's worth of business I would still say they are nice people."

Good for One Gripe

• • • A highly successful executive of our acquaintance makes it known that instead of resenting criticisms he welcomes them. He thanks the critic and then says, "Your ability to see the faults in this implies that you have in the back of your mind a superior method. I want you to work on this and give me your recommendations."

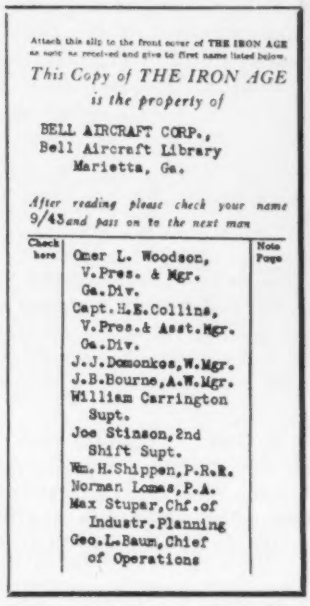
This sieves out gripes that have no visible means of support. It would be salutary if the idea of demanding a suggested cure as payment for the privilege of criticizing could be put on a national basis. Father of this thought is a poem by W. N. M., of the R. K. LeBlond Machine Tool Co., Cincinnati, in the current issue of that company's employees' magazine. We lift a few verses:

We criticize from dawn to dark . . .
A man from Mars would wonder
If everything our leaders do
Is one colossal blunder.

'Most any critic can tear down
A plan made by another,
But ask him for a better one
And lo, he has no other.

Wheelchair on Path of Knowledge

• • • The librarian of a large aircraft plant (not Bell Aircraft) boasted to us that he had on file THE IRON AGE and every other important technical journal bearing on aircraft manufacture. The information in them is, he said, available to all thirsters after knowledge in his plant.



Attach this slip to the front cover of THE IRON AGE as soon as received and give to first name listed below.

This Copy of THE IRON AGE is the property of

BELL AIRCRAFT CORP.,
Bell Aircraft Library
Marietta, Ga.

After reading please check your name 9/43 and pass on to the next man

Check here		Note Page
	Omer L. Woodson, V.Pres. & Mgr. Ga.Div.	
	Capt.H.E.Collins, V.Pres.& Asst.Mgr. Ga.Div.	
	J.J.Domonkos,W.Mgr.	
	J.B.Bourne,A.W.Mgr.	
	William Carrington Supt.	
	Joe Stinson,2nd Shift Supt.	
	Wm.H.Shippen,P.R.R.	
	Norman Lomas,P.A.	
	Max Stupar,Chf.of Industr.Planning	
	Geo.L.Baum,Chief of Operations	

We remarked to him that, while all thirst, many are able to endure the pain if the means for assuagement are not placed directly in their path. He should provide, we told him, a means of quenching thirst without requiring the thirster to detour, on the theory that the saloon on the direct route home from the shop sells the most beer. Being a discerning person, he agreed with us, and is now using the routing forms we sent him.

Resistance to the introduction of knowledge is reduced to the lowest possible point by the installation of a magazine routing system. About all the machinery such a system requires is a routing slip. And if you will send us a list of your readers we will send you a year's supply of slips free of charge.

Names That Sound Like the Job

Speaking of aptronymic doctors, how about your neighbor at 71 Park Ave., Dr. F. W. Splint, M.D.?

—T. V. Busk, Advertising Manager, Farrel-Birmingham Co., Ansonia, Conn.

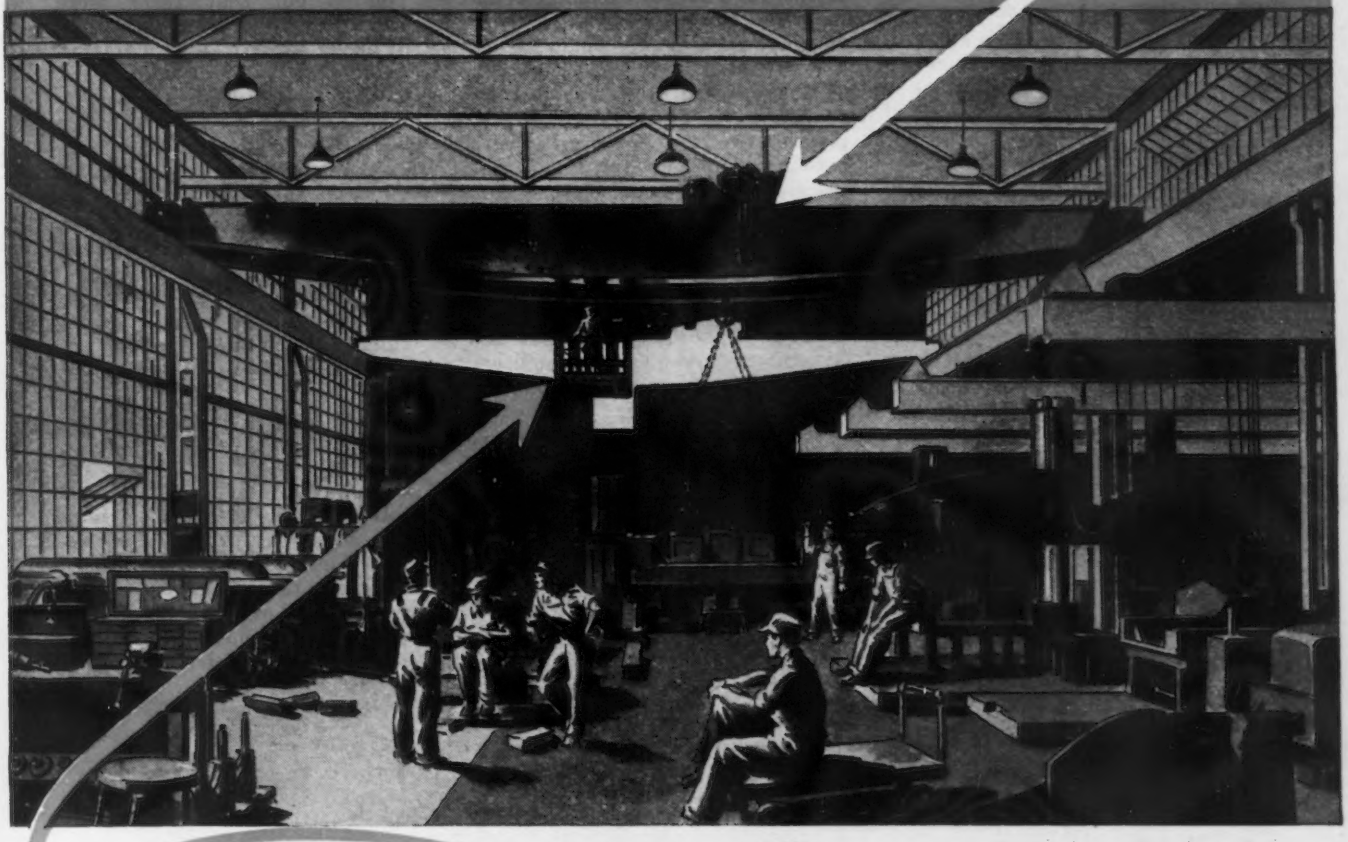
Not aptronymic but highly rhythmic is the name of our across-the-street neighbor, Klein, Hinds & Finke, accountants.

Puzzles

Last week's fly flew 300 miles.
Three minutes is all you get for this:

A butcher with a balance scale has occasion to weigh sales from one-half pound to sixty pounds. He must do this with five weights. What weights shall he use?

WAITING FOR THIS CRANE LOSES LOTS OF MAN HOURS



AN EXTRA Northern CRANE Would Save Them

Maybe they wait only a few minutes—but if they do it many times a day, plenty of man hours are lost—and you pay for them.

Moreover, the whole production schedule is slowed—time is lost everywhere—costing money and impeding your part of the war effort.

An extra Northern Crane on the runway will save all these countless minutes now being lost. Also, if you have an extra crane you need not fear breakdown—it won't tie up your shop.

Investigate the time saving possibilities of an extra crane.

Northern Cranes are fast, powerful, strong, have fine control. They are the fine machine tools of material handling.

Northern ENGINEERING WORKS

General Office: 2607 Atwater St., DETROIT 7, MICH.

NORTHERN CRANE & HOIST WORKS Limited • WINDSOR, CANADA

OFFICES IN PRINCIPAL CITIES

Dear Editor:

COLORED STEEL SHEETS

Sir:

Sometime ago there was an article written, although the source of information is not available at the moment, to the effect that a steel company in the U. S. had experimented with putting colored pigment into steel and then rolling steel sheets of that color. Any information you may be able to give on this will be appreciated.

Our company has been receiving the "favorite family journal" for a number of years and the writer finds your articles quite interesting and educational, especially your editorials and "This Industrial Week."

J. S. WILKINSON,
Purchasing Agent
Western Steel Products Corp., Ltd.,
Winnipeg, Canada

● We know of no method of impregnating steel with color. The only way steel sheets can be colored is by painting, lacquering, electroplating, heat tinting or treating chemically.—Ed.

INEXPENSIVE PATENTS

Sir:

Not so many months from now the war-powered gears of our industrial machinery will suddenly cease grinding and peace and calm will reign again. The word "priorities" will disappear from the dictionary and perhaps rationing will be a short-lived necessity. The buying and spending urge will overtake most of us in order to obtain the many items denied us due to the allocation of critical materials to war-production needs. Billions of dollars will be spent after the war, provided, of course, that a critical unemployment condition does not develop, which can be averted if every industrial facility plans to produce something or engage in some sort of consumer service.

Many organizations have completed definite plans for post-war activities and know exactly what will be done at the "Go" signal. Many of these organizations will undertake even greater expansion programs after the war. But what about the typical "war-baby" and the "drop-in-the-bucket" size plants that enjoyed rapid, expansive growth but have not formulated post-war plans? Will they close down completely and go back to the "hole-in-the-wall" status or will they endeavor to retain their expansion and success by creating new products, materials or services?

Many of these organizations could carry on but perhaps they have no ideas for post-war activities. An idea contributed by some obscure inventor may tend to solve their problems.

That brings us to patents and and patent-procurement procedure.... If I were a Congressman, I would propose an amendment to the present patent laws which would make provisions for an easy, efficient, inexpensive but safe method whereby an inventor could place his ideas on the market immediately and be assured of proper protection. A federal agency could be set up for a period of years to operate a sort of exchange or meeting place for inventors and manufacturers. The service would be available for a moderate fee and the bulk of the operating costs could be defrayed by the manufacturers who make use of the service. The full patent procurement fees could be paid the Government in the event and at such time when an inventor were successful in selling his invention.

Industry depends to a great extent on the little ideas of insignificant individuals who will carry their precious ideas to their graves if the Government doesn't offer a solution to their problems. And the time to do it is right now.

WALTER G. TIEDEMANN
44 Stuart St.,
Lynbrook, N. Y.

CONTINUOUS CASTING

Sir:

Referring to the review of continuous casting presented by your Managing Editor, T. W. Lippert, on Feb. 23 at the 1944 annual meeting of the American Institute of Mining and Metallurgical Engineers, do you expect to reprint this paper or any of the other five related papers presented at the same session?

HUGH L. THOMPSON
Scovill Manufacturing Co.,
P.O. Box 1820,
Waterbury 91, Conn.

● The paper presented by Mr. Lippert was an abstract of the extensive article on direct casting appearing in The Iron Age of Feb. 24. This article is not a review of the papers presented at the Institute symposium, but rather is based on information independently obtained. Reprints of this article will soon be available. Doubtless the A.I.M.E., 29 West 39th St., New York, will reprint all the papers presented at the meeting.—Ed.

DYNAMIC HARDNESS TESTS

Sir:

The researches of Martel[1], Edwards and Willis[2], Herbert[3] and more recently that of Roudie[4] have demonstrated that the dynamic method for testing hardness offers a rich field for research.

It is pleasing, therefore, in these days of paper shortage to find you offering your readers such an extensive and illuminating paper as the one you recently published by E. Fetz on "Dynamic Hardness Tests at Elevated Temperatures." It is particularly gratifying to see research work being done with the dynamic or rebound tester, because as I have said elsewhere "the rebound principle has a great deal of merit when used in connection with the measurement of hardness. There is, however, a need for further investigation of the underlying principle."[5]

In a discussion following a symposium on hardness held by the A.S.T.M. at their last meeting, I pointed out that there were two classes of investigations on hardness, 1. those which took the instruments available and extended their applications. To this class belongs Mr. Fetz, who has applied the rebound principle to the measurement of hardness of a large variety of materials at elevated temperatures. It is just the sort of research which was asked for at the symposium discussion just mentioned. 2. The other class of investigator is interested in going back to the underlying principle or principles and asking whether they are being used properly. For instance, should the hardness be measured by the height of rebound of the hammer, depth of indentation made by the hammer, volume of the indentation, or what have you? So far as I can see both classes are equally important and merely depend upon our inclinations for research.

I wish to commend Mr. Fetz not only for his own contributions in the way of research, but for bringing together a lot of material which needed coordination. His review of Brenner and Kostron's work was particularly interesting and indicates one of the ways by which research on the underlying principles may be made.

I congratulate IRON AGE for publishing this fine article.

S. R. WILLIAMS,
Chief of Dept.
Amherst College,
Department of Physics,
Amherst, Mass.

[1] R. Martel, "Impact Testing of Hardness," Commission des Méthodes d'Essai des Matériaux de Construction, Paris. Vol. 3, 1895, Sec. A, Métaux, page 261.
[2] C. A. Edwards and F. W. Willis, "A Law Governing the Resistance to Penetration of Metals When Tested By Impact With a 10-mm. Steel Ball; and a New Hardness Scale in Energy Units," Proceedings, Institution of Mechanical Engineers, Vol. 82, 1918, pages 335-369.
[3] E. G. Herbert, "Cloudburst Process of Hardness Testing and Hardening," Transactions, American Society for Steel Treating, Vol. 16, 1929, pages 77-96.
[4] P. Roudie, "Le Contrôle de la Dureté des Métaux dans l'Industrie," Dunod, Paris, 1930, 114 pages.
[5] S. R. Williams, "Hardness and Hardness Measurements." Pub. by A.S.M., 1942, 558 pages. See pp. 245-6.

FONTANA MILL COST

Sir:

Can you tell me what is the cost to date of the Henry J. Kaiser steel mill at Fontana, Calif.?

K. C. PHELPS
307 Pacific Ave.,
Alameda, Cal.

● The total Reconstruction Finance Corp. loan to Kaiser for the Fontana plant is $109,805,000. Of this sum 90 per cent has been disbursed.—Ed.

THE FIRST 4 STAR FLAG IN OHIO

Monarch men and women accepted proudly the 4th Star for their Army-Navy "E" Flag, recently awarded them.

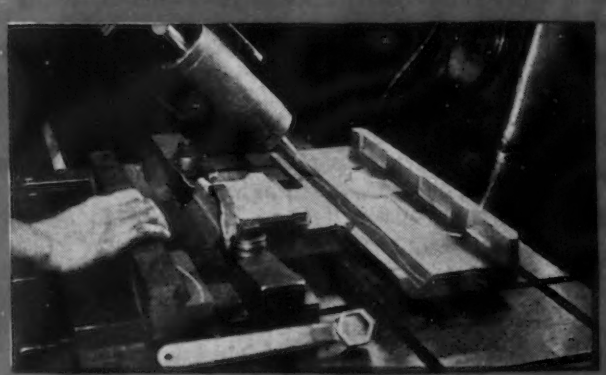
They have earned this recognition by their fidelity to the trust placed in them, when their first Navy "E" was awarded, November 11, 1941. They pledge "on time" deliveries of the lathes to which we are committed and of the other vital war material on which about 50% of our capacity is now engaged. They look forward to the day when their effort and our facilities (some of which are pictured here) may be put to full peacetime use, to help make more goods for more people, at lower cost.

THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO

MONARCH LATHES
Save Time

Motion pictures of operations, studied in detail, show where even slight savings can be made in time or material.

Utilization of floor space to the best advantage is reflected in our increased production per square foot of plant area.



When tools were hard to get, we designed and built our own, such as this device to mill oil groove in carriage.

Final assembly floor, from which we shipped a mile of lathes a month during our greatest production periods.

This Industrial Week . . .

- **Uniform Escalator Clause for Steel Contracts Effective**
- **CIO Proposal Would Put Government into Steel Business**
- **Production of Civilian Goods Problem in the Air Again**

TWO unusual developments affecting steel makers came to light this week as the industry pushed ahead full tilt against a mounting volume of orders created by invasion needs and other programs.

The establishment of a new Uniform Steel Contract Escalator Clause approved by the WPB and made effective March 1 on long-term and open-end contracts with procurement agencies has aroused much comment. The clause provides that when OPA ceilings are raised, contract prices also shall be raised but shall be subject to negotiation within a 60-day period. In some quarters it is said the clause may be a possible hurdle for the War Labor Board in trying to make a steel wage award.

More spectacular is a proposal by the CIO to put the government into the steel business through the operation of five blast furnaces which DPC has scheduled to close, and through subsidy of 20 small steel companies by means of below-ceiling prices on pig iron and scrap. This plan was reported proposed to WPB Chairman Donald M. Nelson last week by Philip Murray, head of the CIO.

Under Murray's plan, a commission of three persons, one from CIO, one from government, and one from industry, would direct the small steel operations. Companies participating would agree to regulation of executive salaries and dividend payments, among other things. Pig iron produced by the five furnaces would be sold to the small producers.

DESPITE the fact that steel operations have been strong (the national ingot rate this week is estimated at 97 per cent compared to last week's revised rate of 95.5 per cent), order backlogs still are on the increase. Sheets, plates, alloy steel, bars, and stainless are in particularly heavy demand, and even in the nail market a large inquiry for around 30,000 tons is current. Flat rolled steel demand remains intense.

Because orders are so greatly extended in certain lines, not too much credence is being placed in the far distant commitments, which may ultimately be revised if not wiped out entirely. Where quick deliveries are desired in heavily sought products, government officials obviously must decide which needs are most important.

WPB directives against the current month's sheet production are reported to have complicated schedules at certain flat rolled mills. Top urgency directives are being issued for 12 and 13 gage hot rolled, pickled and oiled material as a part of the new Ordnance packaging program, forcing current delivery promises back. Around 4.5 million tons of sheet and strip, much of which will go into special welded tubing, is understood to be required by the Ordnance program between now and June 30.

Alloy steel orders and inquiries are heavier. A very large tonnage of alloy strip was being quoted upon in the East last week in connection with a new military requirement.

Contrasted with probable first quarter production of 630,000 tons of tin mill products, output in the second quarter of this year is scheduled to reach 825,000 tons. It is expected electrolytic tin plate output in 1944 will be from 20 to 25 per cent of total tin mill production. Heavy production schedules for electrolytic are expected for the second and third quarters. Sometime before the year is out, a greater degree of standardization probably will materialize with respect to the tin coatings on electrolytic plate, using a minimum coating consistent with available supplies.

That insistent question—whether it is time to produce more civilian goods—seems to be in the air again apparently prompted by contract cutbacks, the run-down condition of civilian stocks, and the assistance given the railroads, farm equipment, container, and oil industries.

THE third annual report of the Truman committee points out that materials soon will have to be made available for further civilian production. Essential needs, says the report, are much greater than they were a year ago and continued curtailment of civilian output increases the threat of inflation.

"Once the requirements of the needs of the fighting forces are met, the Army and Navy can best be supported by strengthening the home economy," the Truman committee asserts. "The military has had trouble understanding this proposition."

Even before the Truman report came out recommending that wartime controls be lifted as rapidly as feasible, WPB had been strengthening its determination to give the green light to civilian production at the earliest possible opportunity, even at the risk of another controversy with military officials. Probably WPB will try to assign quotas and maintain some competitive position in such industries as the auto industry and household electrical goods fields.

Meanwhile, a survey of relaxations in WPB orders shows that while there have been more than 40 modifications of L and M orders since Jan. 1, the majority

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Steel Market Briefs

• GENERAL—Production at, and in some cases above, former peaks. When some new slabbing and plate mills come in, more ingots will be used, and the ingot rate upped. Repairs may offset part of this expected increase. Despite heavy cancellations, orders still are somewhat ahead of shipments. Backlogs are still heavy. There may be minute signs of order volume having reached a peak recently. Changes abroad can affect this overnight.

• PRICES—Final word on OPA's decisions may not come as soon as expected. Too much optimism in some quarters. Adjustments on ingots, semi-finished, and rails seem certain. Other items expected to be adjusted but amount not now definitely known by either OPA or the industry. Labor will jump on any increases at all, and make hay even though adjustments cover cost accumulations since 1941.

• FLAT ROLLED—Plates still pushing out sheets on wide strip mills. Sheet deliveries are far extended, with companies making plates on wide strip mills. Tin plate going up to 825,000 tons in second quarter. Same or more for third quarter. Some of this increase to be at expense of sheet tonnage.

• COLD FINISHED BARS—Orders heavy. Army cutbacks more than offset by Navy increases. Army expected back in market in big way by July.

• ALLOYS—Total orders not spectacular, but flat rolled picking up. Latter offset by carbon flat rolled tonnage. Residual alloys in carbon steels substantial worry to carbon steel makers, whose carbon steels, especially bars, are relatively free from residuals.

• DELIVERIES — Mixed on all products. Tentative average deliveries—plates, August to October. Structurals, May to June. Sheets, third quarter and later. Bars, June and later. All of these promises could be changed substantially later in the year, depending on course of the war.

• MISCELLANEOUS—Shell steel demand to continue in second quarter on same basis as first quarter. Stainless steel demand increasing from food processing, dairy, oil refinery, and warehouse trade. Farm demand for wire products expected to increase 50 per cent this year over last year. Nail inquiries from Ordnance heavy. One reported at 30,000 tons, probably for packaging.

of these were granted for purposes other than to expedite civilian production.

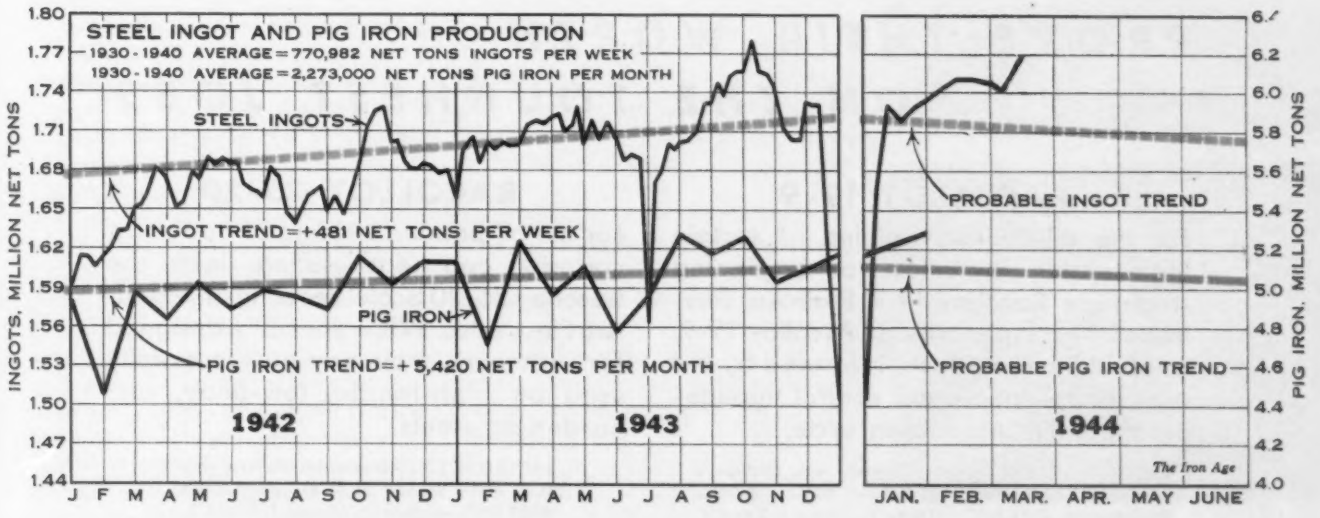
John T. Whiting says the steel division is seriously concerned about the NE steel program. In December, 1943, 46 per cent of the alloy steel production was in the triple alloy NE grades, he said. In January, 1944, this proportion dropped to 40 per cent. It is the Steel Division's aim to see that 60 per cent of alloy steel output goes into the three-way alloys.

Increasingly, the problem of residuals in carbon steels is a matter of concern to certain steel makers, who discern potential competitive angles which might become important. As pointed out several weeks ago, the residuals are undesirable under certain circumstances. But under other conditions they might result in better performance of the carbon steel, hence giving the producer a sales advantage.

Republic Steel Corp. will begin this month and Carnegie-Illinois Steel Corp. will begin in April the production of landing craft armor plate. Great Lakes Steel Corp. has been turning out 95 per cent of the product up until the first of this month.

Simplification of procedures for disposing of idle or excess supplies has been effected. The expansion of Priority Regulation 13 also enables it to cover finished articles as well as industrial materials.

In this week's steel operations, output gains were made this week in Pittsburgh where operations rose one and a half points to 95.5 per cent; in Philadelphia, up half a point to 91.5 per cent; Cleveland, up half a point to 99.5; Wheeling, up one to 99; Detroit, up 13½ points to 99.5 per cent; and the Eastern District, up nine and a half to 101.5 per cent. Chicago operations declined half a point to 101.5 per cent and at St. Louis ingot output dropped two points to 92.5 per cent. Continuing unchanged are Youngstown at 98, Buffalo at 104.5, Birmingham at 99 and Cincinnati at 94.

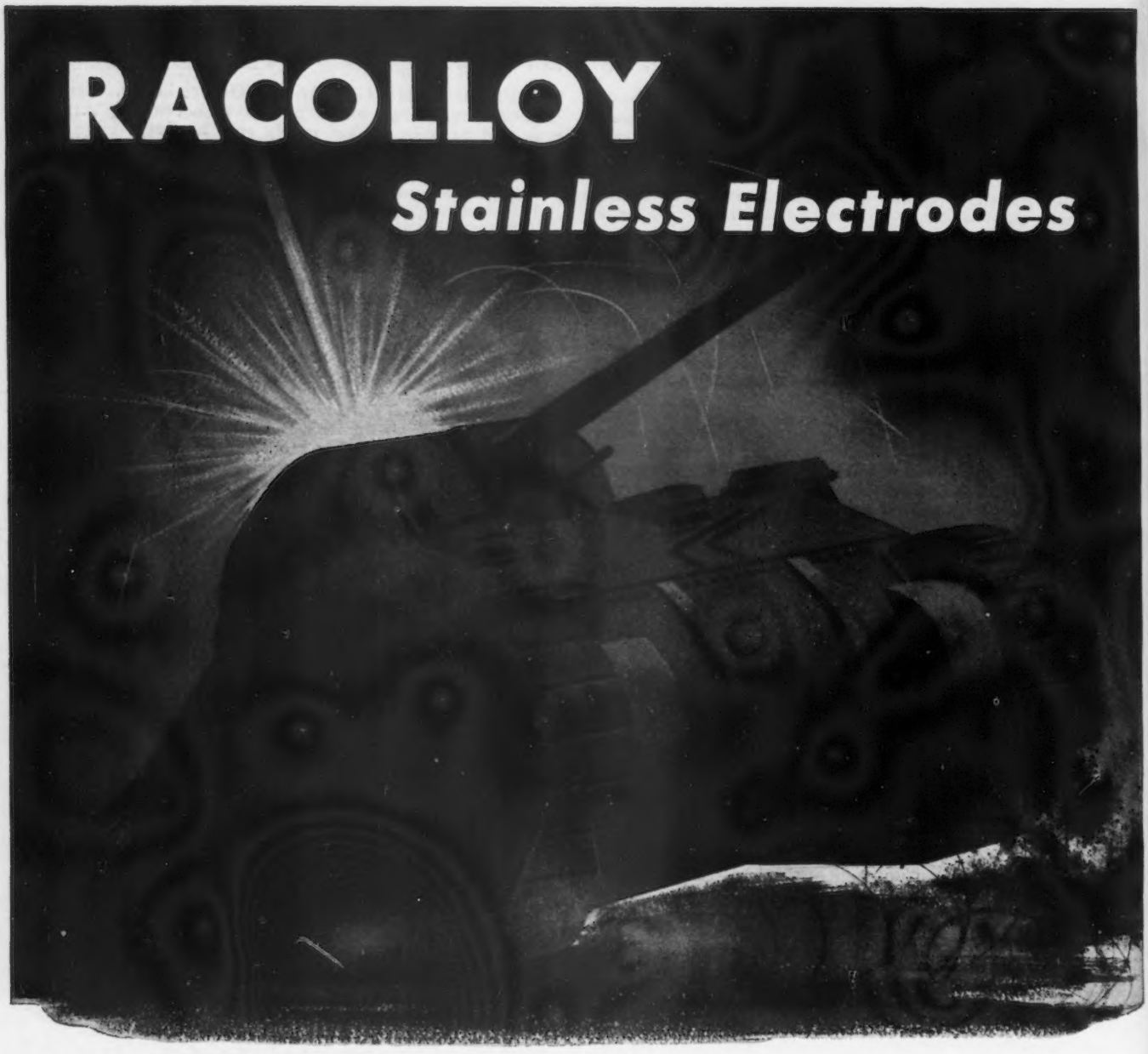


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 2	94.0	102.0	98.0	91.0*	99.0	104.5	98.0	99.0	86.0*	95.0	94.0*	94.5*	92.0*	95.5*
March 9	95.5	101.5	98.0	91.5	99.5	104.5	99.0	99.0	99.5	95.0	94.0	92.5	101.5	97.0

* Revised
† Based on revised capacity

RACOLLOY
Stainless Electrodes



PROVE THEIR WORTH ON THE TOUGHEST JOBS

RACOLLOY 19-9

For the all-position welding of certain high-tensile, low-alloy, air-hardening steels, use Racolloy 19-9 Stainless Electrodes. The superiority of Racolloy 19-9, as of all Raco products, is assured by the most minute laboratory control throughout the entire production cycle.

RACOLLOY 19-9 Electrodes conform with Ordnance Specification AXS-886 . . . U. S. Navy Bureau of Ships Specification 46E4 (INT)—Grade V, Classes 1, 2 and 3

RACOLLOY 25-20

For the all-position welding of austenitic, corrosion and heat-resisting steels, use Racolloy 25-20 Scale-Resisting Shielded-Arc Electrodes. While specially designed for such work, they may be successfully used on high-tensile, low-alloy, air-hardening steels.

RACOLLOY 25-20 Electrodes conform with U. S. Navy Bureau of Ships Specification 46E4 (INT)—Grade IV, Classes 1, 2 and 3.

The REID-AVERY COMPANY

DUNDALK BALTIMORE 22 MARYLAND

New Steel Contract Escalator Clause May Be Obstacle for Wage Decision

Washington

• • • In the way of any wage award the War Labor Board may tie to the possibility of steel price increases, is the new uniform steel contract escalator clause approved by the WPB Procurement Policy Board recently. The clause became effective March 1 on all long-term and open-end contracts with procurement agencies, excluding contracts to be completed within three months.

The reason the new clause is said to be an insurmountable obstacle to such a WLB order, even if approved by Economic Stabilizer Vinson, is that such wage raises would in the end depend upon the result of negotiations between contracting officers and the mills and consequently would be fraught with uncertainty for both management and labor.

The new esclator clause provides that whenever OPA ceilings are raised, contract prices shall be raised, but shall be subject to negotiation within a 60-day period. The negotiation shall arrive at prices justified by the costs of the particular order of an individual mill and prices shall become effective on the date agreed upon.

In the event OPA lowers ceilings, contract prices must be lowered if higher than the ceiling. If contract prices are lower than the OPA price dip, or the same, then the original contract prices prevail until a new price is agreed upon by the mill and the contracting officer.

The text of the new clause follows:

"The contractor represents and warrants that the prices shown herein are not in excess of the maximum prices established by OPA or other authorized government agency, and in effect upon the date thereof for the supplies to be furnished hereunder. In the event such maximum price applicable to any item is increased, the price payable for any subsequent delivery of such item, made in accordance with the provisions of the contract, shall be increased by the same number of cents or fractions thereof, per unit, that such maximum price may be increased up to and including the date of delivery unless such price is redetermined as hereinafter provided. In the event such maximum price is decreased, the price payable for any deliveries made subsequent to the reduction shall not be changed (except that if such maximum price shall be below the contract price, the contract price shall be reduced to the maximum price) unless such price is redetermined as hereinafter provided. Within 60 days after the date of any change in such maximum price, the contractor, if required by the contracting officer so to do, shall furnish the contracting officer with such pertinent data as he may reasonably require showing the extent to which the factors causing such change are applicable to the supplies to be furnished. Any accounting data shall be that resulting from customary accounting practice in the industry. Upon the basis of such information the parties, by negotiation, shall redetermine the price applicable to such items, which redetermined price shall be effective from the date of the change in such maximum price until another change occurs in said maximum price. In the event of the failure of the parties to agree upon a redetermined price the contracting officer may terminate at the end of said 60-day period (and within 15 days thereafter) the right of the contractor to proceed with further deliveries of such item without liability upon either party except liability incurred with respect to items shipped or materials in process of manufacture prior to the date of termination. As used in this paragraph the expression 'material in process of manufacture'" shall be deemed to include only material which the contractor and the contracting officer shall agree has been fabricated or processed by the contractor of this contract to an extent which makes it unsuitable for the contractor's commercial inventory, and the government's liability with respect to such material in the event of termination pursuant to this paragraph shall include only an amount to be negotiated by the parties as reasonable compensation to the contractor for his expenses incurred prior to termination in acquiring, fabricating and processing such material and shall not include any allowance for profit or any compensation for commitments made or orders placed by the contractor.

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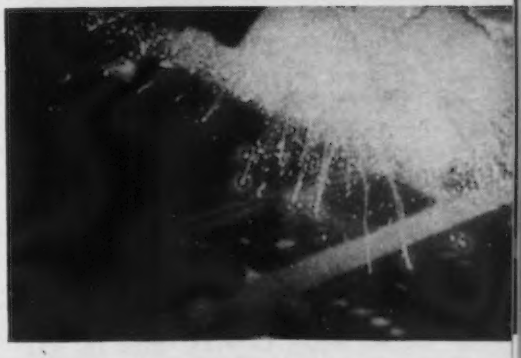

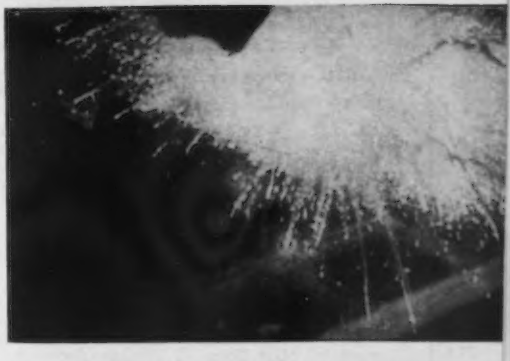

TARGET ILLUMINATION: *This photo sequence shows the progressive stages of a marker bomb illuminating an aircraft engine plant near Paris.*

CIO Offers Plan for Government to Operate Steel Plant Facilities

o o o

By DONALD BROWNE
Washington Staff

o o o

• • • **A new CIO plan** to put the government into the steel business through the operation of five blast furnaces DPC has scheduled to close down, and "subsidize" 20 small steel companies through below—OPA-pricing of pig-iron and scrap, was presented to WPB Chairman Donald M. Nelson by USW President Philip Murray last week.

The plan euphemistically called "Save Small Steel" insures CIO members jobs during the war and post-war period and would create a second steel division ("Small Steel Division") in WPB for the 20 small producers. The Commission would have three members—one from CIO, one from government, and another from the industry.

To participate, the 20 companies named would have to agree to: (1) submit entire cost of production figures; (2) that no executive officer shall receive total compensation that after taxes exceeds $25,000; (3) dividend payments to stockholders should not be above a reasonable level and (4) all outstanding federal laws and regulations affecting labor shall be obeyed.

The blast furnaces with location, management and annual capacity which would be run by their DPC agents according to the plan follow:

South Chicago, Ill.	
Republic Steel Corp...	**450,250**
Indiana Harbor, Ind.	
Inland Steel Co.....	**450,250**
Monessen, Pa.	
Pittsburgh Steel Co...	**432,100**
Daingerfield, Tex.	
Lone Star Steel Co...	**399,850**
Geneva, Utah	
United States Steel Corp.	**383,050**
Total	**2,115,500 Net Tons**

Under the plan the pig iron produced by these five furnaces would be sold to the small producers "who otherwise would not be competitive with the huge steel corporations." Murray reasoned that pig iron should be sold at that discount below the current OPA ceiling of $23 to $25 a ton as is found necessary to enable the small producers to be competitive but not less than the cost of production to DPC.

Battlefield scrap would also be sold by DPC to the small companies "which are not made competitive through the purchase of pig iron at below OPA ceiling prices."

Murray describes the plan as a "practical" one to keep 20 small steel firms in business, "preserve the livelihood of 27,175 steelworkers, prevent the deterioration of a dozen thriving communities into ghost steel towns, stop the further concentration of steel production in the huge steel corporations, and to save more than 5,678,000 tons of steel producing capacity for the continued prosecution of the war and for postwar use."

Pointing out that the war economy has pushed the price of scrap up to OPA ceiling prices (Now averaging $19) with a consequence that the small producers are unable to buy low cost scrap as they did in peacetime at $10 to $14 a ton, Murray said that the companies have had to

ESSENTIAL FACTS ABOUT THE 20 SMALL STEEL PRODUCERS AS REPORTED BY CIO

Name of Company	Annual Steel Ingot Capacity	Number of Wage-Earners Jan. 1, 1944	Straight-time Hourly Earnings Jan. 1, 1944	OPA Steel Ceiling Price Exemptions	Status with USWA. Feb. 1, 1944
Andrews Steel Co.	633,000	2,320	$.94	Carbon forging billets, $50.00 gross ton; Carbon slabs, $41 gross ton; Hot rolled sheets; Galvanized sheets, $75.00 net ton.	Under Contract
Atlantic Steel Co.	154,000	1,125	.83	Carbon shell steel, R.C.S.; Lend-Lease relief for all products;	Under Contract
Central Iron & Steel Co.	336,000	1,200	.96	Carbon Steel Plates, $44.00 net ton	Under Contract
Connors Steel Co.	60,000	285	.73	Alloy steel bars; Carbon rerolling billets, $50.69 gross ton;	Under Contract
Continental Steel Corp.	364,000	1,980	1.010 1.100	Carbon rerolling billets up to $40.50 gross ton; galvanized sheets;	Under Contract
Empire Sheet & Tin Plate Co.	378,000	990	1.000	Carbon sheet bars, $39.00 gross ton; Carbon ingots, up to $39.00 gross ton;	Under Contract
Follansbee Steel Corp.	141,000	1,900	.900 .900	Carbon forging billets, $49.50 gross ton;	Under Contract
Granite City Steel Co.	705,000	1,500	1.000	Ship plates, $53.00 net ton; Carbon sheet mill slabs, $47.50 gross ton;	Under Contract
Judson Steel Corp.	86,000	250	1.350	Lend-Lease relief for carbon rerolling billets; Carbon rerolling billets, $36.40;	Under Contract Not Organized
Keystone Steel & Wire Co.	302,000	1,500	.780	None;	Under Contract
Kilby Steel Co.	63,000	800	.600	Carbon bars, $46.00 net ton; Carbon shapes, $46.00 net ton; Carbon Plates, $45.00 net ton; Carbon strip (HR), $45.00 net ton;	Not Organized
Knoxville Iron Co.	32,000	325	.900	Lend-Lease relief on semi-finished steel products;	Not Organized
Laclede Steel Co.	349,000	1,300	.960	Hot rolled carbon bars;	
Lukens Steel Co.	714,000	5,500	.970	None;	Organized—Contract being negotiated
Northwestern Steel & Wire Co.	321,000	1,300	.920	Rerolling carbon billets, $41.00 gross ton;	Under Contract
Pacific States Steel Corp.	86,000	250		None;	Not Organized
Phoenix Iron Co.	240,000	975	.930	Carbon bars, $48.00; Structural shapes, $47.00; Ingots, $38.75 gross ton; Rerolling billets, blooms and slabs, $41.50 gross ton; Forging ingots, $43.00 gross ton; Forgings, blooms, billets and slabs, $47.00 gross ton.	Under Contract
Wickwire Brothers, Inc.	47,000	875	.720	None;	Under Contract
Wickwire Spencer Steel Co.	224,000	1,400	1.040	None;	Under Contract
Worth Steel Co.	443,000	1,100	.970	None;	Organized—Contract being negotiated
Total	5,678,000 (5.8% of Industry)	27,175 (5.3% of Steelworkers)	.94(1)	14 of 20 have OPA Price Relief, or 72 per cent of tonnage.	19 of 23 plants organized, or 88 per cent of wage-earners.

(1) Average weighted by number of wage-earners.
(2) Source: USW Research Dept.

buy more pig iron at prices $5 to $6 higher than scrap.

Murray found precedent for "subsidizing" the small semi-integrated producers' raw materials in the price exemptions OPA has granted 14 of the 20 companies. These price exemptions amount to a $5,754,000 "subsidy" based on a finished steel capacity of 2,877,000 tons with "the average price relief" of $2 a ton.

Also, the USW executive found that the workers of the small producers have "subsidized" the companies because geographical wage differentials produce a difference of 8c. an hour in the hourly wage of small companies and the rest of the industry—a straight time hourly earning of 94c. instead of $1.02.

The companies are confronted with "disaster and bankruptcy" as a result of wartime distortions of the economy, Mr. Murray said. He made the following contentions:

1. The price subsidy has been paid by the government through Lend-Lease and the several steel-consuming war contractors who have had to purchase the products of these firms at above OPA ceiling prices.

2. During the period of acute shortage of steel products of all kinds this form of government subsidy (price relief) served to keep these small producers in business. The steel buyers having no other source for steel products were compelled to pay above OPA ceiling prices to the semi-integrated steel producers.

3. Beginning in December, 1943, these conditions ceased to prevail. Acute shortage came to an end, and in several products a definite surplus developed, and as consequence consumers were no longer compelled to pay above OPA ceiling prices to semi-integrated producers.

4. The result has been that small producers have had to reduce prices to OPA ceilings, or lose business to "huge" steel corporations who can sell for ceiling prices.

5. Only the government can give assistance to these producers and as price relief is no longer effective in an easier steel market, must continue to give some assistance. (Save Small Steel Plan.)

6. Even the Treasury has turned from these small producers from whom it bought considerable lend-lease steel and is instead buying steel for lend-lease from the "huge" steel corporations who can sell at OPA ceilings.

Steel Enough for Millions of Pen Points On Long List of Excess Lend-Lease Material

Pittsburgh

• • • **Music wire** and pen point steel, both among the most expensive steel items made, are included in a 240-page list of lend-lease material available for sale by the Procurement Division of the United States Treasury Department. Practically all the material on this long list, which approximates 74,000 tons, is scattered throughout the United States. It is understood that this particular list is only one of several which have been circularized to possible buyers.

Of interest, possibly, to bus transportation systems, would be the listing of 49 carloads of bus bodies and one carload of bus body spare parts. The Treasury list does not go into detail on the type of bus mentioned.

Most of the steel bars and billets, which add up to about 30,000 tons, represent chrome silicon manganese shell steel of various sizes, most of which probably are not feasible for current shell requirements. The 400 tons of pen point steel, included in the listing of 24,612 tons of strip steel, seems, in the opinion of some steel people here, to be a substantial amount of such material and capable of producing "quite a few pen points." This material, which goes down to 0.01378-in. in thickness, and about 1.575-in. in width, running between 0.85—1.00 carbon, is available in coils, although some rumors in the trade have it that it may, in some quantities, have become rusted due to storage. The pen point steel may, in the opinion of some, have been ordered originally for military uses.

Of interest to wire drawers and piano manufacturers will be the 4,786 tons of music wire which is available.

On the particular treasury list in question are 237,600 gallons of various types of oil packed in steel drums. This includes such oil as crankcase, tank oil, lubricating oil, etc.

A summary of all the items in this single mailing of the Treasury Department is as follows: Steel bars and billets, 30,225 tons; chrome moly tubing, 17 tons; chrome moly sheets, 223 tons; strip steel (a large portion high carbon), 24,612 tons; music wire, 4786 tons; rope wire (the majority galvanized high tensile wire), 8220 tons; spring steel and high resistance wire, 3554 tons; galvanized staples, 1422 tons, or about 28,000 kegs; oil, 935 tons or 237,060 gal.; total, 73,994 tons of material.

This list, it is understood, which also included the 49 carloads of bus bodies, was circularized several weeks ago, and it is believed that further information desired by prospective buyers, who can fulfill the proper qualifications under the various WPB restrictions, can be obtained from R. J. Widmann, assistant to the director, Procurement Division, United States Treasury Department, Washington, D. C.

Examples of Steel Offered by WPB Offices

• • • Study of recent lists issued by WPB regional offices shows the following items, which are only a few of a great many offerings listed as being available in each of the 13 districts. These are the larger tonnages. Most of the individual items are in small quantities.

Colorado, Utah, Wyoming, New Mexico
(Regl. Office, Denver)

Flat bars—22,800 lb. 0.500 in. x 1¾ in. x 20 ft. (P-2001)
(List dated Feb. 26)

Eastern Pa., Va., Md., Del., So. N. J.
(Regl. Office, Philadelphia)

Cold rolled bars — 200,000 lb. 15/16 in. rd. WDX-1112 12/14 ft. (M-10-1)
Cold rolled bars — 434,000 lb. 1½ in. rd. EDX-1335 (M-10-3)
Hot rolled bars — 158,380 lb. 1 5/32 in. rd. spring gun quality (M-10-30)
Hot rolled strip — 149,667 lb. 0.083 x 6¾ in.; 22 ft. 11 in. (M-10-34)
(List dated Feb. 26)

New England States
(Regl. Office, Boston)

Steel plate—100,000 lb. 5/16 in. x 48 in. x 120 in. (EW-158)
Alloy strip, cold rolled—191,570 lb., 0.0897 x 5 5/16 x 46 13/16 in. (EX-1262)
Carbon steel flats — 400,000 lb. 3½ in. x 1¼ in. WD-1010 (MCX-1704)
(List dated Feb. 26)

Shipbuilders, Railroads, Jobbers Get More Steel in '43, Institute Reports

• • • **Increased shipments** of steel last year to the shipbuilding industry, the leading wartime consumer of steel, are shown in a preliminary consumption report by the American Iron and Steel Institute. The report covers shipments of 59,760,000 tons of semi-finished and finished products, based upon data received from about 125 companies accounting for about 95 per cent of total production.

Almost 11,433,000 tons of steel products were shipped in 1943 to naval and merchant vessel shipbuilders. That tonnage, which represented 19.1 per cent of total steel shipments in 1943, compares with 9,440,000 tons of steel delivered to the shipbuilding industry in 1942.

Contrasted with the increased deliveries to shipbuilders last year was a slight decline in the total tonnage going for such other war uses as ordnance, projectiles and tanks and for export to allied and friendly nations. The decline resulted chiefly from reductions in the Lend-Lease steel export program, which is covered under the heading "Miscellaneous industries and export." Nearly 14,158,000 tons, 23.7 per cent of the total, were shipped under that classification in 1943, against 14,848,000 tons in the preceding year.

A sharp decline appeared in shipments to construction industries. About 4,561,000 tons, 7.6 per cent of the total, were shipped to this field, compared with 8,660,000 tons in 1942.

Railroads received more steel in 1943 than in 1942. In 1943, more than 4,526,000 tons, 7.6 per cent of the total, went to railroads and car and locomotive builders, as against 4,318,000 tons in 1942.

The machinery and tool industries were shipped approximately the same tonnage in both years, 2,528,000 tons in 1943 and 2,540,000 tons in 1942. Nearly 3,574,000 tons were shipped to container manufacturers in 1943, compared with 3,666,000 tons in 1942.

Together the automotive and aircraft industries received 2,486,000 tons of steel in 1943 as against 2,122,000 tons in 1942. For both years, those tonnages exclude shipments of steel to manufacturers of forged and pressed, formed and stamped parts for the automotive and aircraft industries.

Steel jobbers, dealers and distributors were shipped 6,810,000 tons in 1943, compared with 5,962,000 tons in 1942. The tonnages going to other principal industrial classifications in 1943 were:

Steel converting and processing industries, 5,111,000 tons; pressing, forming and stamping industries, 2,484,000 tons; agricultural industry including equipment and implement manufacturers, 713,000 tons; oil, gas and mining industries, 1,378,000 tons.

Classification of Billings by Consuming Industries

	Net Tons
1. Steel Converting and Processing Industries	
(a) Wire drawers and wire product mfrs.	695,628
(b) Bolt, nut, and rivet manufacturers	1,096,801
(c) Forging manufacturers	
(1) Automotive and aircraft	605,588
(2) All other	900,454
(d) All other steel plants and foundries	1,812,209
Total	5,110,680
2. Jobbers, Dealers and Distributors	
(a) Oil and natural gas industry	358,166
(b) All other	6,451,372
Total	6,809,538
3. Construction Industry	
(a) Public (municipal, state, national)	84,020
(b) Highways	135,629
(c) Railways	71,717
(d) Automotive and aircraft	215,577
(e) Utilities	223,465
(f) Bldg. trim, accessories and builders' hdwe.	297,689
(g) All other	3,533,223
Total	4,561,320
4. Shipbuilding Industry	11,432,813
5. Pressing, Forming and Stamping Industry	
(a) Metal furniture and office equipment	128,001
(b) Hardware and household equipment	294,726
(c) Automotive	1,222,539
(d) All other	838,857
Total	2,484,123
6. Container Industry	
(a) Oil and natural gas industry	501,116
(b) All other	3,072,460
Total	3,573,576
7. Agricultural, Incl. Impl. & Equip. Mfrs.	713,028
8. Machinery and Tools	
(a) Machinery and tools, not incl. elect. equip.	1,742,802
(b) Electrical machinery and equipment	784,740
Total	2,527,542
9. Automotive and Aircraft Industry	2,485,643
10. Railroad Industry	
(a) All railroads	3,189,875
(b) Car and loco. builders and parts mfrs.	1,336,131
Total	4,526,006
11. Oil, Natural Gas and Mining Industry	
(a) Oil and natural gas, incl pipe lines	1,178,450
(b) Mining, quarrying and lumbering	204,772
Total	1,378,222
12. Miscellaneous Industries and Export	14,157,987
13. Total (Items 1 to 12)	59,760,453

WPB and OPA Form Two New Advisory Committees

• • • **The Office of** Industry Advisory Committees of WPB on March 3 announced the formation of the Metal Cutting Hack and Band Saw Industry Advisory Committee. William C. Teare, Tools Division, has been appointed the government presiding officer. Members of the committee are:

H. G. Aldridge, Huther Bros., Rochester, N. Y.; Jacob S. Disston, Henry Disston & Sons Co., Philadelphia; R. F. Ellis, E. C. Atkins & Co., Indianapolis; J. H. Flavell, W. O. Barnes Co., Inc., Detroit; William J. Greene, L. S. Starrett Co., Athol, Mass.; Ralph K. Lawrence, Simonds Saw & Steel Co., Fitchburg, Mass.; Donald McQuillan, Spartan Saw Works, Springfield, Mass.; Daniel K. Northup, Henry G. Thompson & Son Co., New Haven, Conn.; Verne Olson, Contour Saws, Inc., Des Plaines, Ill.; Phillip Rogers, Millers Falls Co., Greenfield, Mass.

The appointment of an industry committee of 12 representatives of firms engaged in the production of prefabricated farm structures was announced by the OPA. Those appointed to the committee are:

R. D. Hunting, Green Gable Builders, Cedar Rapids, Iowa; Ivon R. Ford, Ivon R. Ford Lumber Co., McDonough, N. Y.; W. L. Krapp, National Ideal Co., Toledo; John Alexander, Jr., Alexander Lumber Co., Aurora, Ill.; C. W. Gamble, Boise Payette Lumber Co., Boise, Idaho; Homer F. Prakel, George H. Wortch Lumber Co., Versailles, Ohio; Clifford M. Hill, GBH Way Homes, Inc., Walnut, Ill.; Tom Godwin, G. F. Mfg. Co., Exira, Iowa; Myron K. Pederson, Super-Structures, Inc., Albert Lea, Minn.; S. Lamar Forrest, Forrest Lumber Co., Lamesa, Tex.; Glen R. Newton, Glen Newton Lumber Co., Nevada, Idaho; Frederick L. Dill, Dain and Dill, Inc., Lake Mahopac, N. Y.

The newly appointed OPA advisory committee for makers of cast iron soil pipe and fittings includes:

Charles Hamilton, president, Alabama Pipe Co., Anniston, Ala.; William H. Deyo, president, Anniston Foundry Co., Anniston, Ala.; J. J. Crotty, vice-president, Central Foundry Co., New York; B. W. Frederick, vice-president, Eastern Foundry Co., Boyertown, Pa.; George H. Clay, president, Clay and Bailey Mfg. Co., Kansas City, Mo.; and Deems W. Hallman, production manager, Hajoca Corp., Lansdale, Pa.

Part of Cleveland-Cliffs ore fleet upbound in Whitefish Bay night of April 5, 1941.

Early Opening of Navigation and Enlarged Fleet Expected to Permit 90,000,000 Ton Ore Movement

Cleveland

• • • **Great Lakes** vessel operators whose responsibility it is to move 90,000,000 gross tons of iron ore this season, predict that a possible opening for full fleet movement this season may be as early as April 1. Such an opening would start the season off with a 19-day lead over last year's beginning.

In addition to moving 90,000,000 gross tons of ore the shippers also anticipate a movement of about 53,500,000 net tons of coal as contrasted with about 52,000,000 tons last year. Of this about 47,500,000 tons will move on Lake Erie, an increase of 1,500,000 tons over last year, 4,000,000 tons on Lake Ontario, about the same as last year, and 2,000,000 tons on Lake Michigan, an anticipated increase of 500,000 tons over last season's haul.

The movement of limestone usually parallels that of ore but is not expected to increase greatly over the 16,580,400 net tons moved last season.

Last season's haul of 84,404,852 gross tons of iron ore will be increased easily if the season opens earlier. It is likely, depending upon the grain trade, that more Canadian vessels will be utilized in the ore trade this season. Also, all vessels built by the Maritime Commission will be in service for the entire season. Some were completed only a short time before shipping stopped last season.

After a late opening last year heavy fogs and inclement weather held up shipments to such an extent that ore tonnage was nearly 8,500,000 tons behind schedule by the first of May. Cumulatively, two months later on July 1, the lag had piled up to 9,158,000 tons behind schedule. Improved weather in July and August brought on the movement of 27,500,000 gross tons in the two-month period, breaking the shipping record for all times for the same period by 1,000,000 tons. In the 123 days from July through October of 1943, a total of 52,000,000 gross tons of ore was moved, showing that the bulk of the movement was concentrated at the end of the season. Excessive steaming of ore is reported to have caused an average unloading delay of 4½ hr. for the season. The 1943 season totalled only 248 days as compared with 261 days for 1942.

Ice conditions which are the real criterion of the season's opening are reported generally as being much improved over the same time last year. Ice thicknesses are reported not more than one half to one third that of previous seasons and many parts of the lakes are considered open.

The United States Coast Guard Station here reports ice in the Duluth harbor of from 12 to 19 in. with the waters outside clear almost to Whitefish Bay. Last year at this time the ice outside the harbor was about two feet thick.

Earliest movements in past years show that ore from Escanaba came through the Straits of Mackinac on the following dates: April 20, 1940; April 3, 1941; March 23, 1942; and April 9, 1943. However, only a very small part of total ore shipments comes from this port.

•

Buffalo

• • • **Unmistakable** signs of an early opening of Lake Erie navigation have appeared along the Buffalo harbor front. Some owners already have placed engineers aboard ore carriers and fitting-out crews are expected aboard several other vessels next weekend.

Ice outside the harbor breakwall is about 8 in. thick compared with 15 in. on March 1 last year. There is virtually no ice inside the breakwall.

Navigation started at Buffalo last year on April 21. There are good prospects it will get under way 30 days earlier this year.

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Washington

• • • **To permit** the unrestricted movement of coal on the Great Lakes until the iron ore traffic reaches its full stride for the 1944 season, ODT has temporarily suspended certain restrictions intended to give preferential treatment to ore cargoes. Suspension Order ODT 9A-1 suspends until May 15 all restrictions on coal movements on the Lakes.

"Steel Shortage" Committee Urges Western "Alloy Steel Pilot Plant"

Washington

• • • **The two-year-old Boykin** (House) "Steel Shortage" Committee continued on March 3 its sectionalistic hobby of wasting public funds in further hearings in search of voters' support for appropriations to finance metallurgical "will-o-the-wisps" as contrasted with sound economic development of resources of the country, regardless of geographical sections.

Indications are that if the committee were given its way, OPA couldn't furnish enough brown ration stamps to purchase the political pork with which the South and the West would be flooded, nor would the new surplus property administrator, William L. Clayton, ever be able to quit his job.

Completely insulated against the fact that the end of the war will find this country with perhaps as much as 40 per cent excess steel capacity and 20,000,000 tons of unfabricated inventory, the committee listened to proposals for utilization of West Coast ores and the construction of a "$750,000 alloy steel pilot plant."

Totally ignoring the fact that WPB has declared nearly all ferro-alloys to be allocation free, the committee has fostered the spending of $1,000,000 in the past year on mineralogical surveys in low-grade, high-cost chromium and in manganese. The committee is inferentially urging the spending of more money on metal producing facilities in face of the fact that WPB has within the last three months cut the steel expansion program back $140,476,000, mainly in alloy steel companies.

Director of the Bureau of Mines, R. R. Sayers, testified that the "direct" or sponge iron development financed by the government early in 1943 at the Warren, Ohio, works of the Republic Steel Corp. would cost $1,000,000.

This experiment sponsored by the committee and approved by WPB will be finished on April 15, according to chairman Boykin, or more than nine months later than WPB said the project would be completed. Moreover, the original estimate submitted to WPB by the committee as to cost of the project was for only $500,000.

The extinct "Pittsburgh plus" system was keel-hauled by committee members and Bureau of Mines witnesses. Leading the hackneyed political tirade against this system which no longer exists, was Representative Welch, Democrat of California.

A Bureau of Mines metallurgist said that deposits of chromium, manganese, and magnetite had been uncovered in many California counties, including Shasta, San Bernardino and Lassen. The work in Shasta county is still going on. One of the deposits is believed to hold 1,600,000 tons of concentrated magnetite.

This witness criticized eastern metallurgical processes, which he contended were being used in other parts of the country with little success. He advocated using procedures which have been tried experimentally in the Bureau to fit the needs of ores in whatever locality they might be unearthed.

Objections Raised to Foreign Allocations of Farming Equipment

Washington

• • • **Representative Calvin D. Johnson** (R. of Ill.) who thinks the American people are "being taken for the damnedest financial sled ride the world has ever known," on March 3 vigorously attacked the U.N.R.R.A. program calling for the distribution of some 500,000 items of farm machinery among 12 European countries that are wholly or in part Axis-controlled. Each of these items, he said, represents an essential and necessary piece of machinery for which American farmers have been pleading ever since Pearl Harbor. Mr. Johnson said that the nation's Capital "had become the headquarters for the 'Order of the Empty Satchel' where delegates assembled in answer to urging of starry-eyed globats who coursed the world, making lush and ridiculous promises of American goods and American dollars."

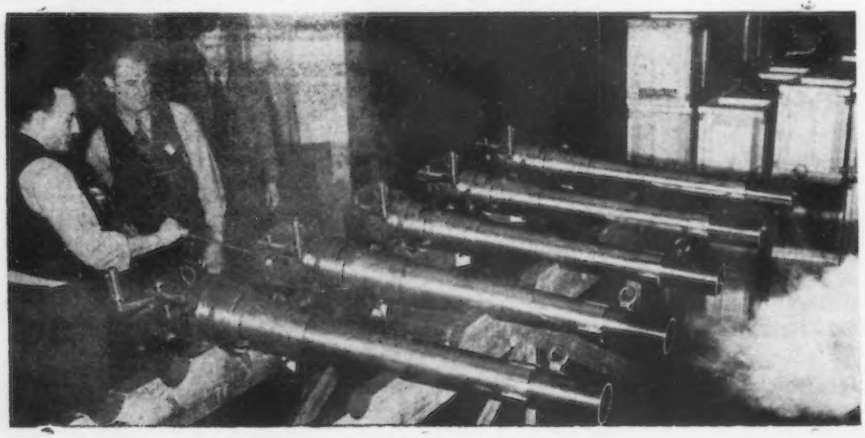
Representative Johnson said that there was no objection to the allocation of war materials to any nation that is actually engaged in war, but he did protest against this country playing "the role of Santa Claus to the entire world, forgetful of the American taxpayers who, for generations to come, will pay with sweat and sacrifice for this folly."

U.N.R.R.A. was referred to as the brain child of crystal gazers "whose heads are in the clouds and whose hands are in our pockets." Mr. Johnson inquired how much longer are the American people to follow, "as gullible children, these crystal-gazing Pied Pipers who lead us onward toward bankruptcy?"

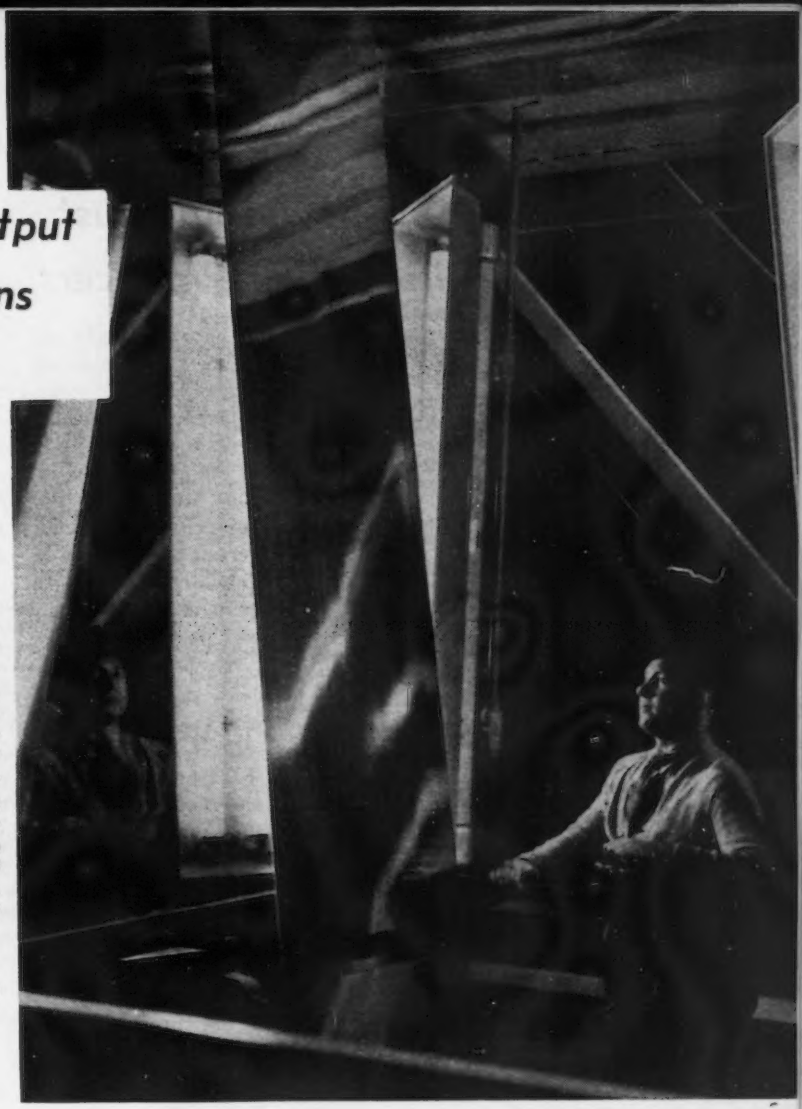
The Illinois representative submitted a detailed table showing the U.N.R.R.A. program for shipping farm equipment to European countries.

"Thirty thousand separators, 50,000 mowers, 17,000 reapers, 22,900 horse-drawn hay rakes, 40,000 harrows and harrow-sections, and 12,000 binders, every item of which members of Congress have endeavored to obtain for needy farmers.

FIRE TESTER: *Fisher Body Div. of General Motors Corp. is producing a 5-in. naval gun test mechanism which checks the kick, rammer and firing of the cannon without actually firing the weapon. The apparatus substitutes compressed air to simulate conditions resulting from actual discharge of the gun. Four Fisher plants in Michigan are doing the job.*



Second Quarter Tin Mill Output Likely to Be 200,000 Tons Above First Quarter



SHINY NEW PLATE: *The mirror-like finish on electrolytically coated tin plate reflects the image of an inspector as it emerges from a line at the Irvin Works of Carnegie-Illinois Steel Corp.*

Pittsburgh

• • • **Expanded** Lend-Lease Requirements, revisions in Order M-81, and permission to again produce crown caps from new tin mill products, will make possible a production of 825,000 tons of tin mill products in the second quarter of this year. Previous estimates, which included expanded production because of beer cans for export, had been set at 750,000 tons. First quarter production of tin mill products will approximate 630,000 tons.

While some sources feel that third quarter production of tin mill items may fall below the second quarter estimate, chances are that it may actually exceed this figure, although it is understood that third quarter production has been tentatively set at the same figure, namely, 825,000 tons. If the plate load decreases substantially by the third quarter, or even in the latter part of second quarter, as many believe it will, the competition on available rolling space on wide strip mills will be between sheet orders and tin mill products, where a choice has to be made. If past experience is any criterion, and if potential sheet orders are not on the very urgent list, with respect to direct war needs, tin plate and black plate probably will be favored.

An analysis of tin mill production during the period 1939 to and including 1943, statistically shows that tinplate, which had averaged about 90.5 per cent of total tin mill production in 1939, constituted 85.5 per cent in 1943. The participation of black plate, which was about 9.5 per cent in 1939, started to increase in 1941 when it constituted 11.5 per cent of tin mill production, to the point where in 1943 it represented 14.5 per cent. According to tin mill experts, however, the increase in 1941 was due to heavy shipments of black plate for tinning to Canada. In 1942 and 1943, black plate to Canada for tinning was also a factor, but the greatest item responsible for the increase in the percentage of black plate to total tin mill production was the restriction on the manufacture of tin plate.

On the basis of these qualifications, it appears that tin plate production is relatively stronger than ever, with respect to black plate, and with the further increase in electrolytic tin plate output, with much greater expansion looked for in the near future, tin plate output this year will regain its statistical position, and probably go beyond the 90.5 per cent of the total shown for 1939. The actual net cost difference between lacquered black plate and electrolytic tin plate for containers, in sanitary cans, is said to be so slight that the price advantage for using black plate is not great enough to hold down electrolytic tin plate uses.

It is expected electrolytic tin plate output in 1944 will be from 20 to 25 per cent of total tin mill production. Heavy production schedules for electrolytic are expected for the second and third quarters. Sometime before the year is out, a greater degree of standardization probably will materialize with respect to the tin coatings on electrolytic plate, using a minimum coating consistent with available supplies.

TIN MILL PRODUCTION TRENDS—1939-1943
Black Plate and Tin Plate

Source Material—Amer. Iron & Steel Inst.—Compilations—The Iron Age

IN NET TONS—(000 Omitted)

Year	Black Plate (N. T.)	% Total	Tin Plate (N. T.)	% Total	Total (N. T.)
1939	269	9.5	2562	90.5	2831
1940	283	9.5	2690	90.5	2973
1941	475	11.5*	3566	88.5	4040
1942	419	13.5*	2658	86.5	3077
1943	355	14.5*	2105	85.5	2460

*NOTE: Percentage figure may be misleading. Increase in 1941-42-43 due to (1) Black Plate exported for tinning, (2) restriction on Tin Plate. See story for detail, etc.

Triple Alloy Steel Output Must Increase, Whiting Tells Producers

Washington

• • • **In a letter** to all steel producers this week, John T. Whiting, director of the WPB Steel Division, pointed out that despite the easing in the steel supply situation, WPB will continue the economy program in the steel industry. The letter pertained directly to the NE steel production program, advising the industry to continue these melting schedules for the present. Reasons for this were explained in the letter to all steel producers which read:

"The NE steels were developed by industry and government metallurgists as a means of stretching available supplies of alloying elements to cover the enormous quantities of alloy steel needed in the war program. They have accomplished this purpose; whereas a year ago there were serious doubts as to whether the industry could meet the requirements of the Armed Services for alloy steel, these demands are now being satisfactorily met with the alloying elements available, and the situation is reasonably well in balance.

"We are seriously concerned, however, by the present apparent feeling of both producers and consumers that, in view of the easier alloy steel situation, the NE steel program can be relaxed. In December, 1943, 46 per cent of the alloy steel production was in the triple alloy grade. In January, 1944, this proportion dropped to 40 per cent. This tendency must be reversed to prevent the recurrence of an unbalanced condition of supply and demand that will interfere with the war program.

"It is our aim to see that 60 per cent of alloy steel production goes into the three-way alloys. This is essential for two reasons. The first is that the present supply-demand balance in alloying elements is based on the economies effected by the NE program. Any wholesale return to the single and double alloy steels would quickly and substantially increase the drain on nickel and chromium supplies and create a danger of the same shortages which led to the adoption of the three-way alloy steels.

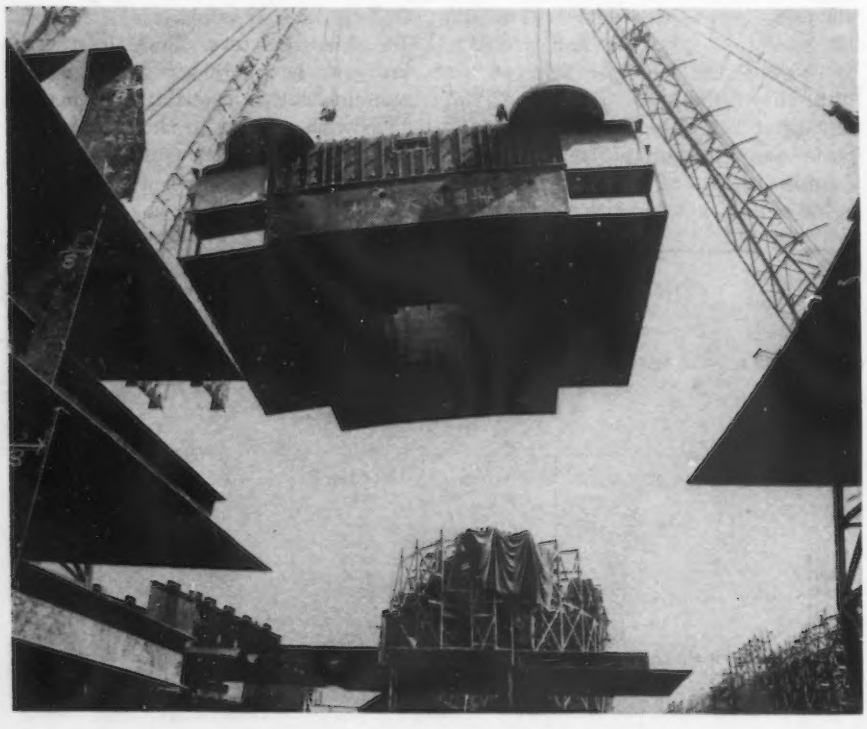
"In the second place, a substantial increase in the volume of single and double alloy steels would seriously threaten carbon steel production through shortage of carbon scrap, and possible contamination. Very considerable quantities of three-way alloy scrap, generated during the high production months of 1943, are still in the hands of manufacturers, steel producers, and scrap dealers. This scrap cannot be used in single and double alloy steel, but there must be provided an orderly channel through which it can move. To prevent immobilization for an indefinite period the logical movement is into more triple alloy steel. If some home cannot be found for it, it will unquestionably find its way into heats of carbon steel. Many of these heats would be summarily rejected and many others would cause troublesome, expensive and time-consuming difficulties to manufacturers who attempted to use them thus delaying production for essential war uses.

"Furthermore, a general return to single and double alloy steels will require, in addition to the virgin alloys, carbon steel scrap. But at the present time, supplies of carbon steel scrap are no more than adequate to support current production of carbon steel and none can be spared.

"For the above reasons, it is essential to keep the use of three-way alloy steels at a high level. In order to accomplish this, the Steel Division will, in cooperation with the agencies, review carefully all alloy steel melting schedules and will wherever possible make substitutions of three-way alloy steels for single and double alloy grades. This program has been fully discussed with the Armed Services; they are aware of the seriousness of the problem and have assured us of their cooperation. We ask the steel-producing and the steel-consuming industries to likewise cooperate to the fullest extent.

I shall appreciate it if you will send copies of this letter to your alloy steel customers, so that they too will be aware of the real importance of this program."

SUN YAT-SEN: *Here is the deck house for the 10,800-ton S.S. Sun Yat-sen named for China's famous patriot-statesman. The ship was launched by Mme. Wei Tao Ming at Marinship.*



Plans for Wooden Cargo Aircraft Given Up by WPB

• • • **Plans for** giant cargo aircraft of wood and plywood construction have been abandoned by WPB. An $18,000,000 contract awarded to the Kaiser Hughes Aircraft Corp. probably will be cancelled as a result of this decision. The contract was awarded the company in 1942, when aluminum and other metals were scarce. Today, lumber is believed in most quarters to be the most critical of the nation's materials.

Navy Adds to Armor Sources

Washington

• • • **The Republic Steel** Corp. will begin this month and the Carnegie-Illinois Steel Corp. will begin in April the production of landing craft armor plate. Announcement to this effect was made on Monday by WPB. Growing importance and expanded needs for this grade of protective steel resulted in the development of added sources, WPB said.

The special chemistry and typical heat-treating and quenching process required for this steel, it was pointed out, created a situation in which one company—the Great Lakes Steel Corp.—was turning out 95 per cent of the product up until the first of this month. Two-thirds of this total was heat-treated in the Great Lakes plant and one-third by the C. E. Atkins Co. Republic and Carnegie are among other companies that have developed such plates to meet specifications and have either acquired the proper heat-treating equipment or found plants with such facilities available to treat and quench their plate. There are also other potential producers, WPB stated.

The Navy's landing craft program which was initiated about a year ago called for special plate. But subsequent experience gained under battle conditions led to a revision of specifications on Oct. 1, 1943. Great Lakes turned out a type of armor plate that for chemistry, gage, and size best fitted into the Navy plans, so that company was given the bulk of contracts.

The WPB and the armed forces felt that it would be well to provide a margin of safety against any eventuality and not trust "all our eggs to one basket." Therefore, additional production sources have been developed.

Truman Report Examines Civilian Needs

• • • The third annual report of the Truman Committee praised industry, labor and Government for the success of the war production program (see also Washington comment, page 78). Among plants and companies singled out for commendation were the Irvin Works of Carnegie-Illinois Steel Corp. and the Aluminum Co. of America. The voluminous report contains a number of significant tables, several of which are shown below.

1944 Production and Requirements, Estimated by WPB

	War Items	Essential Civilian Items	Total War and Essential Civilian Items	Estimated Supply for 1944	Surplus or Deficit	Supply for 1938	1944 Supply Increased over 1938
Carbon Steel, tons	31,386,000	25,396,000	56,782,000	55,580,000	−1,202,000	32,402,102	1¾ times
Alloy Steel, tons	6,956,000	2,710,000	9,666,000	8,798,000	−868,000	1,653,510	5⅓ times
Copper, tons	2,864,000	3,378,000	3,236,000	3,385,000	+163,000	1,064,894	3⅛ times
Aluminum, lbs.	2,970,486,000	327,514,000	3,298,000,000	3,405,000,000	+107,000,000	286,882,000	12 times
Magnesium, lbs.	483,200,000	1,800,000	485,000,000	531,000,000	+46,000,000	5,434,000	98 times
Lead, tons			1,115,000	1,085,000	30,000	608,569	1¾ times
Zinc, tons			884,000	992,000	108,000	375,004	2¾ times

1939 Requirements Contrasted With Expected 1944 Production

Materials	Requirements for civilian use in 1939	Expected production in 1944	Excess of 1944 production over civilian use in 1939 (column 3 minus column 2)
Steel	36.5 million product tons	67 million product tons	30.5 million product tons
Copper	1,017 thousand short tons	3,590 thousand short tons	2,573 thousand short tons
Aluminum	350 million pounds	3,370 million pounds	3,020 million pounds
Magnesium	7.7 million pounds	531 million pounds	523.3 million pounds

Analysis of the Detroit Tool Sale (August, 1943)

Source and Government cost of cutting tools sold as steel material:	
Studebaker	$1,671,270.11
Nash-Kelvinator	47,598.29
Hudson	1,946.25
Chrysler	321.40
Total	$1,721,136.05
Represented purchasers and receipts:	
American Tool Supply Co., Detroit	$1,200.00
Ash Co., Detroit	2,700.00
Cadillac Surplus Co., Detroit	2,596.25
Gratiot Tool Supply Co., Detroit	26,533.00
George Maher Tool Co., Detroit	50.00
Progressive Industries, Detroit	227.24
Trylon Tool & Manufacturing Co., Detroit	50.00
United States Tool & Manufacturing Co., Detroit	125.00
Universal Aircraft, Detroit	2,533.00
Victory Machinery Exchange, Inc., New York	910.00
Total	$36,924.64
Difference	$1,684,211.41

Commercial Standards Set On Porcelain-Enameled Tanks

• • • **A commercial standard** for porcelain-enameled tanks for domestic use has been adopted, effective for new production from July 1, 1944. The standard was circulated on May 3, 1943, as a recommended standard, and sufficient numbers of manufacturers, distributors, and users to represent a satisfactory majority accepted the recommendations to establish them as Commercial Standard CS115-44 with the U. S. Department of Commerce, National Bureau of Standards.

The standard covers porcelain-enameled tanks for domestic use in sizes from 15 to 80 gal., inclusive for 300 lb. per sq. in. maximum hydrostatic test pressure. It sets general requirements on the base metal, enameling, operating conditions, types, sizes, and test pressures, as well as many other physical features of the products and methods of testing, labeling, and construction.

WPB Waives Restrictions On Tractor Repair Materials

Washington

• • • **Upon the request** of military procurement agencies, general restrictions on the annual quantity or dollar value of repair parts for track-laying tractors they may acquire have now been removed by WPB. However, the provision that limits military agencies to maximum purchases of 40 per cent by dollar volume of all shipments of critically short items made by manufacturers will remain in force.

Removal of restrictions has been accomplished by revoking that portion of L-53-b (subparagraph 3 of paragraph B) which formerly prohibited military agencies from acquiring more than 40 per cent by dollar volume of all shipments of track-laying tractor parts during the year ending June 30, 1944.

Study Shows Modifications of L and M Orders Haven't Aided Civilians Greatly

Cleveland

• • • **Through** the cooperation of the Cleveland WPB Regional Office, a survey of relaxation since the first of the year shows that while there were more than 40 modifications of L and M orders in the period the majority of these were granted for purposes other than to expedite civilian production. Rumors that some 65 orders were under consideration for an early relaxation in Washington have proved to be not entirely untrue but the same motive is seen behind the actions.

Latest information on the orders under consideration indicates that modifications are being studied and some re-drafting of the orders is underway but that these relaxations the same as those which have preceded since the first of the year are based upon eliminating substitute materials where material supply permits and conserving manpower involved in utilizing substitutes instead of the materials for which certain products were designed. Another smaller group of relaxations will be bred of urgent civilian needs which cannot be fulfilled otherwise.

The motive behind the relaxations to date and in the immediate future has been to make now non-critical materials more easily available in uses where substitutes have been required by former shortages; to aid in improving the quality and durability of products through the use of the proper material; and to conserve manpower by enabling manufacturers to use the materials and processing for which their products were designed and thus step up production with fewer man-hours. Improvement of quality and durability is also expected to increase the life of products and decrease the overall demand on a long range basis.

The modifications of restrictions are not only keyed to release additional material in limited quantities but also to control the flow of materials which may fall into excess categories. These purposes are being sought in the revisions but indications of an early return to enlarged essential civilian production are not yet present and it is pointed out that current modification moves should not be so construed.

A survey of L and M order modifications from the first of the year prepared for THE IRON AGE by the Cleveland Regional WPB Office reveals the nature of the relaxations to date and foreshadows what is to be expected in the immediate future. The following orders connected with the use of metals were considered in the survey:

L-216—(Schedule 4) **Rotary Files and Burs**—Increases manufacturers' quotas from a 10 per cent to a 25 per cent basis in relation to total file production.

L-72—**Razors and Blades**—Revocation makes amount of materials that can be obtained the only restriction on manufacture.

L-252—**Valves and Valve Parts**—Allows use of brass or bronze in making nuts for several valves.

L-30-a—**Kitchen, Household Articles (Galvanized and Non-Metal Coated Articles)**—Increase first quarter iron-steel quotas to 92½ per cent from 50 per cent of average quarterly usage in year ended June 30, 1941.

L-188—**Loose-leaf Metal Parts**—Metal allowance increased to 75 per cent of 1941 usage from 30 per cent.

L-32-b—**Metallic License Plates**—Permits manufacture of 1945 plates.

L-128—**Use of Chromium and Nickel in Automotive Valves**—Revocation allows use of prewar quantity in automotive intake and exhaust valves for civilian use.

L-152—**Baby Carriages**—Revocation permits use of prewar quantities of metal.

L-157—Schedule 7—**Wheelbarrows**—Manufacture of two more types for coal and coke handling permitted.

L-30-b—**Kitchen, Household Articles (Enameled Ware)**—Permits manufacture of three new items: drip coffee makers, teakettles and combinets.

L-126—Schedules 3 and 4—**Refrigeration Fittings**—Relaxes specifications on use of critical metals to allow these increases: copper strip, 300,000 lbs.; copper tubing, 660,000 lbs.; aluminum strip, 200,000 lbs.

M-24-c—**Iron and Steel Scrap**—Permits certain low alloy steel scrap to be used in carbon steel.

L-250—**Electric Motor Controllers**—Allows manufacturer to start production without obtaining AA-5 rating.

M-21-b-1—**Steel Warehouses and Dealers**—Relaxes restrictions on disposition of idle and excess inventories.

L-45—**Jewelry**—Allows use of 50 per cent more gold and palladium.

L-27—**Vending Machines**—Increases production to 75 per cent of prewar rate from 25 per cent.

M-24-c—**Iron and Steel Scrap**—Modifies segregation restrictions.

L-135—**Wood Upholstered Furniture**—Revocation plus amendment of L-260 allows use of quarterly use of 12½ per cent (dollar basis) as many metal springs as manufacturer used in 1941.

CMP-4—Revision eases rules for sale of copper, steel, and aluminum in controlled materials form.

L-193—**Conveying Machinery**—Permits use of some carbon steel in conveying and mechanical power transmission equipment.

Iron and Steel

M-21-h—Direction 1. Revoked.

M-21-g—Revoked.

M-21-a—Amended.

M-21-a—Direction for. Issued.

M-21-h—Amended.

These changes permit free use of alloys in tool steel.

L-211—Schedule 9—**Oil Country Tubular Goods**—Permits manufacture of lightweight tubing.

L-140-a—**Cutlery**—Removes minor restrictions on use of rivets and bolsters in cutlery.

L-30-d—**Cooking Utensils**—Authorizes production of 400,000 pressure canners by July 1.

M-126—**Iron and Steel Conservation**—Permits fabrication of certain civilian goods, including cigarette lighters, auto heaters, grease guns, hose reels, stencils, etc.

L-236—**Hardware Simplification**—Removes restrictions on use of metals in marine fittings hardware.

M-9—**Copper**—Allows users of small amounts of copper war materials to buy in any quarter materials containing up to 150 pounds of copper without authorization.

L-154—Schedule 2—**Steam Surface Condensers**—Removes restrictions on use of copper in manufacture of steam condenser tubes and tube sheets.

L-30-b—**Kitchen, Household Utensils (Enameled Ware)**—Authorized production of 500,000 cold pack canners by July 1.

L-106—**Copper**—Revocation makes available 5,000,000 pounds of copper per quarter for use in parts specified in L-158 (Automotive Replacement Parts).

M-6-b—**Nickel**—Relaxes "freeze" on nickel anodes, nickel salts and plating solutions in platers inventories.

L-190—**Scales**—Permits production of commercial scales for retail sale at 40 per cent of 1941 production.

L-42—**Radiator Supply Valves**—Removes many simplification and standardization features.

M-21—**Iron and Steel**—Cast iron soil pipe and fittings freed from all delivery restrictions.

L-318—**Spot Welding Electrodes**—Revocation removes standards for manufacture of all spot welding electrodes.

M-78—**Mercury**—Revocation removes restrictions.

M-21-d—**Corrosion and Heat-Resistant Chrome Steel**—Removes restrictions on utilization of steel mill facilities for fabrication of above steels.

Why Drive Against Japs Surges Forward

"• • • In five weeks I traveled 1200 miles through northern and eastern New Guinea and visited the Cape Gloucester area, and wherever I went I saw evidence of growing military might. . . . When you see equipment of all sorts stretched out for 1200 miles in areas that 12 months ago were tropical jungles, you get more than a little thrill. . . ."*—Lewis B. Sebring, Jr., in dispatch to New York Herald-Tribune.*

Distribution Curtailed on 22 Industrial Items by WPB Order

Washington

• • • **A new minimum preference** rating of AA-5 or better, designed to curtail distribution, has been established for 22 classes of industrial equipment. Previous requirement had been A-1-c or better. The classes of industrial equipment affected by the change in rating requirements, now covered by this amendment to L-123, include air filters, arc welding machines, baling presses, ceramic machinery and equipment, concrete products machinery, flexible metallic hose, tubing and fittings, oil filtering and re-refining machines, certain types of industrial ovens, paper shredders, pressure vessels (including air receivers), and wire working machinery, none of which was previously under this order.

The order also covers some additional sizes and kinds of compressors formerly under L-100; high pressure blowers formerly under L-163; heat exchangers formerly under L-172; pumps formerly under L-246; and fans and blowers formerly under L-280. A number of these kinds of equipment are also subject to General Scheduling Order M-293.

The amended order (L-123) no longer applies to conveying machinery and mechanical power transmission equipment, which are covered by L-193; portable (platform type) elevators and steel platforms, covered by L-287; safety switches and knife switches, covered by L-315; or circuit breakers, covered by L-300.

Deliveries of new equipment covered by the amended order cannot be made by manufacturers, distributors, dealers, or other persons except to fill orders rated AA-5 or better. The restriction also applies to deliveries from one department of an organization to another when the equipment becomes a component for incorporation into other machinery the organization may produce, or for installation and operation by such organization.

The restriction does not apply, however, when one department or branch of a company delivers equipment to another branch for eventual resale and for which a preference rating will be required. Such inter-departmental delivery would not constitute a transfer or change of ownership, but merely a physical change of position for the purpose of facilitating warehousing or delivery to eventual users.

Exceptions to the restrictions are allowed for various cases where deliveries are made in accordance with other regulations, or for certain specified transactions, such as:

Repair parts: Delivery of repair parts for any item. No complete item may be considered as a repair part and delivered under this exemption, even though it could be used as a component part of another item or of machinery not covered by this order.

Farm supplies: When items that are farm supplies under PR 19 are delivered in accordance with that regulation.

Petroleum industry item: When items used in the petroleum industry and covered by P-98-c are delivered in accordance with that order.

Items no longer needed: When an item is returned to the person from whom it was obtained, or when it can no longer be used for the purpose for which priorities assistance was given to help obtain it and the holder disposes of it in accordance with applicable provisions of PR 1 or 13.

Items ordered and put in transit before the restriction became applicable: The completion of delivery of items that had been placed in the hands of a common or contract carrier for shipment to the customer prior to the date upon which the restriction became applicable.

Certain orders rated below AA-5, but unfilled when restriction became applicable: Delivery to fill any rated order that was rated below AA-5 and could have been filled just before the date upon which the restriction became applicable without violating any WPB order, rule or regulation.

Deliveries of machinery not covered by this order: The delivery of new machinery, not covered by this order, into which an item has been incorporated as a necessary component part (or which is delivered in unassembled condition with an item which is a necessary component part, for assembly at the site of installation).

Used items: The delivery of any item that has been sold to a person acquiring it for use, and put into regular use by him.

Specific authorizations: Deliveries specifically authorized or directed by the WPB.

The replacement of a fractional horsepower electric motor or generator that is traded in when repair is needed: When a fractional horsepower electric motor or generator is delivered to a householder or other user solely for replacement of a used one that needs repair and the seller, in accordance with his regular business practice, takes the broken down or defective motor or generator in trade and repairs it or delivers it to another person who will repair it (whenever repair is practicable) so that it will be resold under similar conditions (or scraps it promptly when repair is impracticable).

No repairman or other person may deliver such an item unless he either complies with the foregoing conditions, or receives an AA-5 or better rating for the delivery for his customer, even though he has obtained the items under a regulation or order that assigns a rating for repair or maintenance purposes, such as the following: CMP Regulations 5, 5A, or 9A; or Orders L-79, P-126, or P-148.

This exemption permits a dealer not having repair facilities to deliver such a traded-in motor or generator, if it is repairable, to the manufacturer or some other supplier who will repair it or have it repaired within a reasonable time, and get one in exchange without an AA-5 or better rating. The manufacturer or other supplier who is asked to deliver a new item to a dealer in exchange for a used one is responsible for determining if the traded-in item is repairable.

Portable air compressors owned and used in a rental business: When portable air compressors owned by a person engaged in the business of renting them are leased by the owner. This exemption does not apply to the sale of a new item by such owner, or to the original purchase of the items by him.

This change of restrictions on delivery of these items is accomplished by the revocation of four Limitation Orders: L-100, L-172, L-246 and L-280 and by an amendment to L-123, which supersedes former Interpretations 1, 2 and 3 of the order, which are also revoked.

Priority Changes

L-83—Amended order removes the control over purchase and use of packaging and labeling machinery since control over this type of equipment is now covered by order L-332. (3-1-44)

L-123—Amended order establishes a new minimum preference rating of AA-5 or better for 22 classes of industrial equipment. Previous requirement had been A-1-c or better (3-4-44)

M-293—Int. 1 which clarified application of the Class Z product delivery date control procedure, has been revoked. (3-1-44)

M-293—Amended Table 8 removes all single phase power and distribution transformers having a capacity smaller than 250 kva., with a few exceptions, from scheduling and purchase order control. (2-28-44)

P-56—Amended order permits the use of a new and simplified application form under which operators of mines and smelters in the United States and foreign countries may get the materials and products they need to carry on their operations. (3-3-44)

Reg. 3, as revised, makes changes in the list of items which may be delivered without regard to preference ratings and in the list of items for the purchase of which blanket MRO preference ratings may not be used. (2-29-44)

Pig Iron Placed Under Transportation Control

• • • **When WPB** decided to discontinue allocations of pig iron it also decided to discontinue assigning priorties to purchases of this commodity. The producers have been notified, however, that pig iron will be subjected to a transportation control in order to eliminate cross hauling. Therefore, it has been added to Haulage Request TR-2. This notice has been sent all producers by J. T. Whiting, Director of the Steel Division. Whiting's letter reads:

"As you know, the total allocation of pig iron was discontinued as of Feb. 1, 1944. This was accomplished by amendment of order M-17. Under the amended order the WPB retains the right to issue special instructions with respect to production and delivery of pig iron. We hope that it will not be necessary to issue such instructions except in very unusual cases.

"The transportation savings which were brought about through the allocation procedure are as important today as they have been at any time during the last two and a half years and it is essential that these economies should not be lost. The responsibility for seeing that they are not lost now rests squarely with the individual pig iron producers. In order to assist them in maintaining these transportation savings, pig iron has recently been added to Haulage Request TR-2."

"Self-Help" Manpower Plan For Lake Carriers Approved by ODT

Washington

• • • **The ODT announced** on Monday its approval of a self-help program prepared by the Lake Vessel Committee, an organization of Great Lakes carriers transporting bulk commodities, aimed at centralization of Selective Service requests, employment stabilization, and recruitment. At the same time, in a letter sent to operators of tankers and car ferries and to interested unions, the ODT urged other branches of the industry to undertake similar self-help action.

Because of the extremely short time remaining before the opening of the season and the importance to the war effort of employment stabilization on the Lakes, the bulk carriers' plan was endorsed as an expedient, ODT officials explained. They said that attempts of the ODT, the Recruitment and Manning organization of the WSA and the WMC to bring all branches of the Great Lakes transportation together under a single industry-wide manpower stabilization program have been unsuccessful.

The ODT's letter to tanker companies, car ferry operators, and interested unions said that, while the committee's program does not include formal or informal arrangements with the RMO, the ODT would "view with equal approval" recruitment and manning arrangements which other branches of the industry might make with the RMO or, in the case of car ferries, the Railroad Retirement Board. The letter said further that, in the ODT's opinion, companies having contractual relations with labor unions should include unions in any self-help programs formulated.

The Lake Vessel Committee, acting as a central organization, plans to request deferments for seamen of member companies to avoid "confusing duplication by individual companies and to keep local boards more accurately informed of the manpower needs of the fleet." Deferments will be asked for licensed officers; seamen over 22 years of age certificated according to Federal law and employed in skilled ratings as able seamen (wheelsmen, watchmen, and deck watchmen), oilers and firemen; and pre-Pearl Harbor fathers over 26 years old with the rating of cook, tunnelman, and gateman.

Individual companies will continue recruitment through their own personnel offices, but the Lake Vessel Committee will coordinate and supplement their programs by group advertising, radio programs, and field representatives in the Great Lakes area.

According to the outlined plan, the committee will arrange with WMC regional and area officials for use of certificates of discharge or continuous discharge books as statements of availability for intra-industry job changes. For seamen seeking employment outside the Lake industries, the committee will ask that the central organization be permitted to issue statements of availability in place of the individual employers. Periodic reports on deferments, recruitments, and the general manpower situation will be made to the ODT, Selective Service and to the WMC under the plan.

Other Great Lakes carriers and the unions have been invited to meet with ODT officials in the near future to discuss plans of their own for recruitment and manning.

Marine Fittings

Washington

• • • **Restrictions on the** use of metals in the manufacture of marine fittings hardware were removed by the WPB through a revision of Schedule III to the hardware simplification order L-236.

The schedule, issued in October, 1943, covers forged, fabricated and pipe turnbuckles; forged shackles; rope thimbles; rope sockets; forged hoist, grab and slip hooks; cleats; and chocks. Simplified practices are established by restricting manufacture to the sizes and types listed in the schedule.

The principal effect of this latest action is to permit the use of alloy steel instead of carbon steel where necessary. Minor changes are also made in permitted sizes of some of the items.

Daily Plate Output Record

Washington

• • • **Setting a world record, American production of plates in the 29-day month of February was at the rate of 38,700 tons a day. Production for the month, according to the WPB Steel Division, was 1,122,219 tons. This compares with 1,072,001 tons produced in February, 1943.**

The previous record daily output was in January of this year with an average of 37,800 tons. The January total output was 1,173,000 tons.

Metals in Toys Urged

Washington

• • • **Return to use** of iron and steel in toys, in the opinion of members of the new Toy Industry Advisory Committee, would save manpower and critical materials and at the same time result in more serviceable, lower-cost products.

If iron and steel, now permitted to be employed only for joining hardware, could be used more freely, a large quantity of wood could be saved, and more serviceable toys could be manufactured.

Power Driven Tools

Washington

• • • **Because** western dealers in light power-driven tools are a greater distance from sources of supply, inventory provisions of the order governing these tools were amended by WPB. The action was taken through amendment to limitation order L-237.

The order previously provided that no supplier could accept delivery of any light power-driven tool which would increase his inventory of that size and type of tool beyond five. Under the revised order, the inventory limit is raised to eight tools of each size and type for dealers in 17 western states.

Form WPB-2752 For Welders

• • • **Applications for** the purchase of resistance welding equipment will continue to be accepted on form WPB-2752 only until March 15, 1944, WPB reported. After that date all such applications must be submitted on form WPB-1319. These forms have been valid since Feb. 16, 1944. This action is covered in an amendment to limitation order L-298.

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In the DeVlieg Jigmil, this function is automatic—by fingertip control. Operation of a push button unlocks the table and moves it by rapid traverse to the desired position for measuring. For repositioning, operation of a single push button will cause the table to return to its cutting position by rapid traverse, stopping and locking automatically. Uniformity of selected position for stopping and locking is dependable within .0002".

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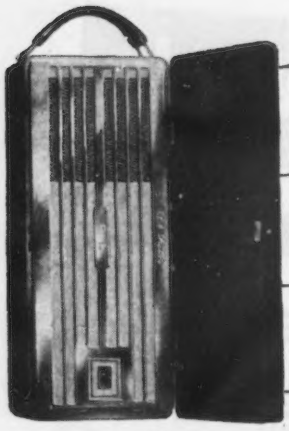

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Veterans' Employment Problems Analyzed

Pittsburgh

• • • **Management should treat** disabled veterans "as normal persons, which they always have been and will continue to be." Furthermore, irresponsible persons, discharged from the armed forces and employed in industry, must not be allowed to "cast a stigma" on all returned soldiers.

So cautions a special report on putting disabled veterans back to work, prepared by the Industrial Hygiene Foundation at Mellon Institute here. A panel of authorities who will supply practical information on "how to do it" to industry is prepared to function until the rehabilitation job is done. The panel is headed by Dr. C. D. Selby, medical consultant, General Motors Corp., Detroit. Other members are: Col. John H. Andrews, executive officer, Reemployment Division, National Selective Service System, Washington; Dr. Harley L. Krieger, medical director, Ford Motor Co., Detroit; A. A. Hendrix, personnel director, Eastern Aircraft Division, General Motors Corp., Linden, N. J., and I. Dent Jenkins, personnel manager, Harrison Radiator Division, General Motors Corp., Lockport, N. Y.

Efforts of industrial plants to meet this growing problem are discussed in the initial report of the Foundation. The Ford Motor Co., according to Dr. Krieger, has always attempted to hire 10 per cent of its employees from disabled workers, explaining "it is our impression that these men, knowing their disabilities, are less liable to accidents than normal workers because they will not take chances." Dr. Krieger says: "We are endeavoring to handle the rehabilitation of the returned soldier just as we would handle the employment and placement of any handicapped employee."

In order to carry this program out, Ford Motor Co. has divided returning soldiers with medical discharges into two groups, those who have not been overseas and those who have seen action abroad. The majority of discharges in the first group, it is said, are "for common, ordinary, every-day disabilities that do not amount to very much in industry." In the second group, however, Dr. Krieger said that jobs must be found for one armed men, one legged men, for one eyed men, and for men who have recovered from tropical diseases. The actual job placement at Ford Motor is made

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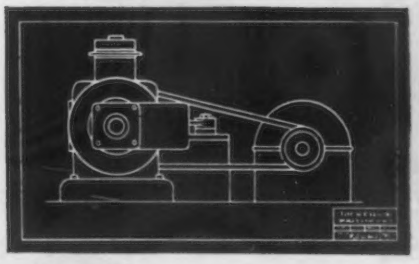

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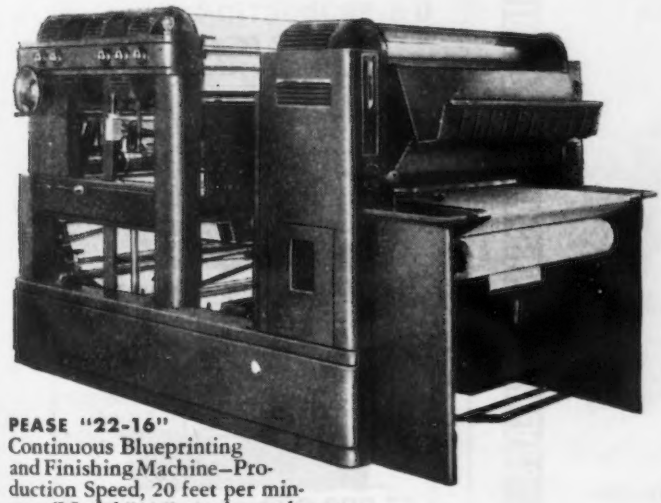

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- **Eight-inch Diameter Drying Drums,** thermostatically controlled, heated by gas or electricity, dry the prints "flat as hung wallpaper."

VERSATILITY . . .

Pease Continuous Blueprinting and Finishing Machines are not limited to making Blueprints alone. They also produce excellent Blueline prints, Brownprints and Brownline prints . . . together with a Wet Direct Process Developing Attachment they provide a splendid method of making Black and White prints continuously. . . Moreover, when used in conjunction with a dry direct process developing machine they afford a first rate system for making Whiteprints (dry direct process prints).

Ask for a Pease Tracing Reproduction Specialist to help you with your problems. No obligation of course.

THE C. F. PEASE COMPANY

2695 WEST IRVING PARK ROAD • CHICAGO 18

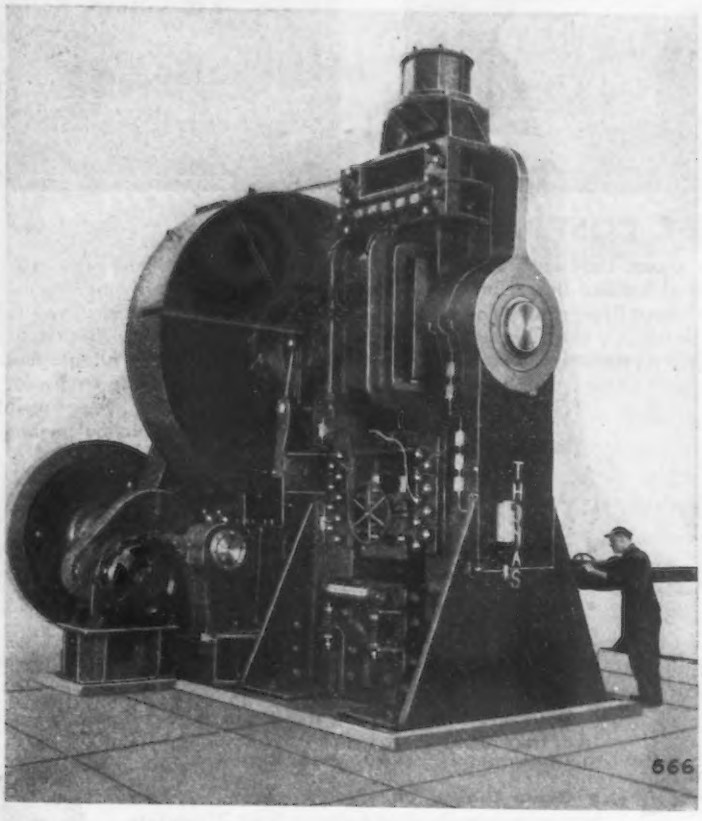
Pease Blueprinting Machines A TYPE AND SIZE FOR EVERY REQUIREMENT INCLUDING DIRECT PROCESS PRINTING AND DEVELOPING MACHINES

SPECIAL MACHINERY BUILT ON CONTRACT

PRESSES • PUNCHES • METAL-FORMING MACHINERY

BENDING AND STRAIGHTENING MACHINES • SHEARS

THOMAS BILLET-SHEARS



THOMAS Heavy Duty Billet Shears are of all steel construction, closed housing, guillotine type for strength and rigidity. If desired, a 12-foot power-operated reversing feed table is available for use in connection with these shears. Tables are of same sturdy construction as the shears, and come with cast rollers, mounted in roller bearing pillow blocks. Entire table is spring mounted, so that material can be carried through the shear clear of the blades yet depress sufficiently when cut is made.

Ask for Bulletin 311.

THOMAS MACHINE MANUFACTURING COMPANY

PITTSBURGH, PA.

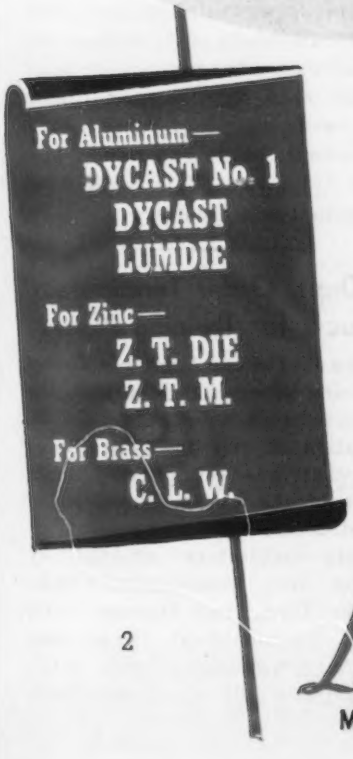
by a medical transfer department, maintained specifically to handle handicapped individuals, to locate jobs they can do, and to keep informed of their problems and progress.

I. D. Jenkins of General Motor's Harrison Radiator Division at Lockport, N. Y., explained that GM had surveyed every operation in its plant to determine the physical requirements to perform each job satisfactorily. He pointed out that a "person who can perform a job in a thoroughly normal and satisfactory manner is not a handicapped person on *that job*, even though he might otherwise be considered severely handicapped."

In the initial approach to its survey, General Motors devised a check sheet. A man capable of exercising discretion and selection was assigned to examine everyone of the jobs with the foreman, and, in many instances, with the operator on the job. This, it is said, was to determine briefly the degree of eyesight, hearing, finger, hand, and arm dexterity required;

LATROBE
DIE CASTING STEELS

We will be glad to give you, without obligation, technical advice on your die-casting steel problems. Write.



Latrobe Metallurgists and engineers are abreast of the most recent developments in the increasingly important Die Casting Industry, and their painstaking research is constantly directed toward the production of steels that will improve die performance.

Co-operation between customer and supplier is essential for real success in providing the correct steels to meet the requirements in this field... to this can be attributed the results obtained with Latrobe's Die Casting Steels for Aluminum, Magnesium, Zinc and Brass.

LESCO

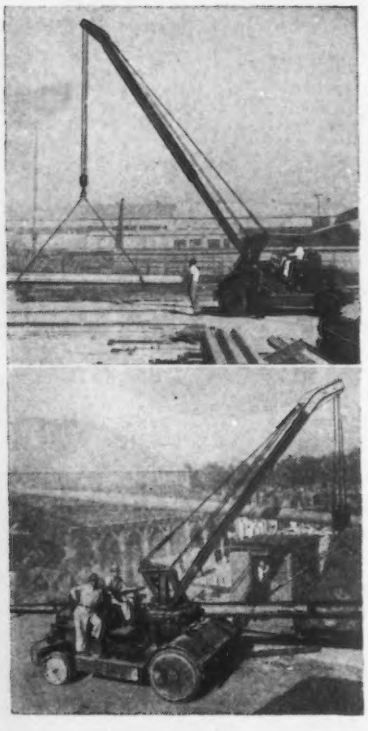
2

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT · · LATROBE · PENNSYLVANIA

goes and moves it

quickly, at low cost



● No expensive delays—Roustabout Crane picks up and moves your motor, machine, casting, crate, I-beam or whatever it is, big or small, easily, instantly. It keeps things to 5 tons moving around your factory, railroad, dock or airport. It's *where* you want it *when* you want it. On wheels or crawler tracks, it's easy to run, all tractor power, ball-bearing boom turntable, gears in oil, full boom swing—built for years of punishing work. Roustabout Crane is a highly profitable investment in post-war efficiency. Write now for the whole story.

THE HUGHES-KEENAN COMPANY
571 NEWMAN STREET • MANSFIELD, OHIO

ROUSTABOUT CRANE
Roustabout Cranes
By Hughes-Keenan
Load-Handling Specialists Since 1904

whether the operation could be performed sitting all the time, standing all the time, or whether this was optional; whether one or both feet or legs were needed; whether the height and weight of the worker was important; the amount of lifting involved and its frequency, the posture required by the job; work station conditions; work station surrounding, with reference to noise; proximity to other employees, moving machinery, etc.; operational hazards; and required safety protection for the individual's eyes, hands, feet and body.

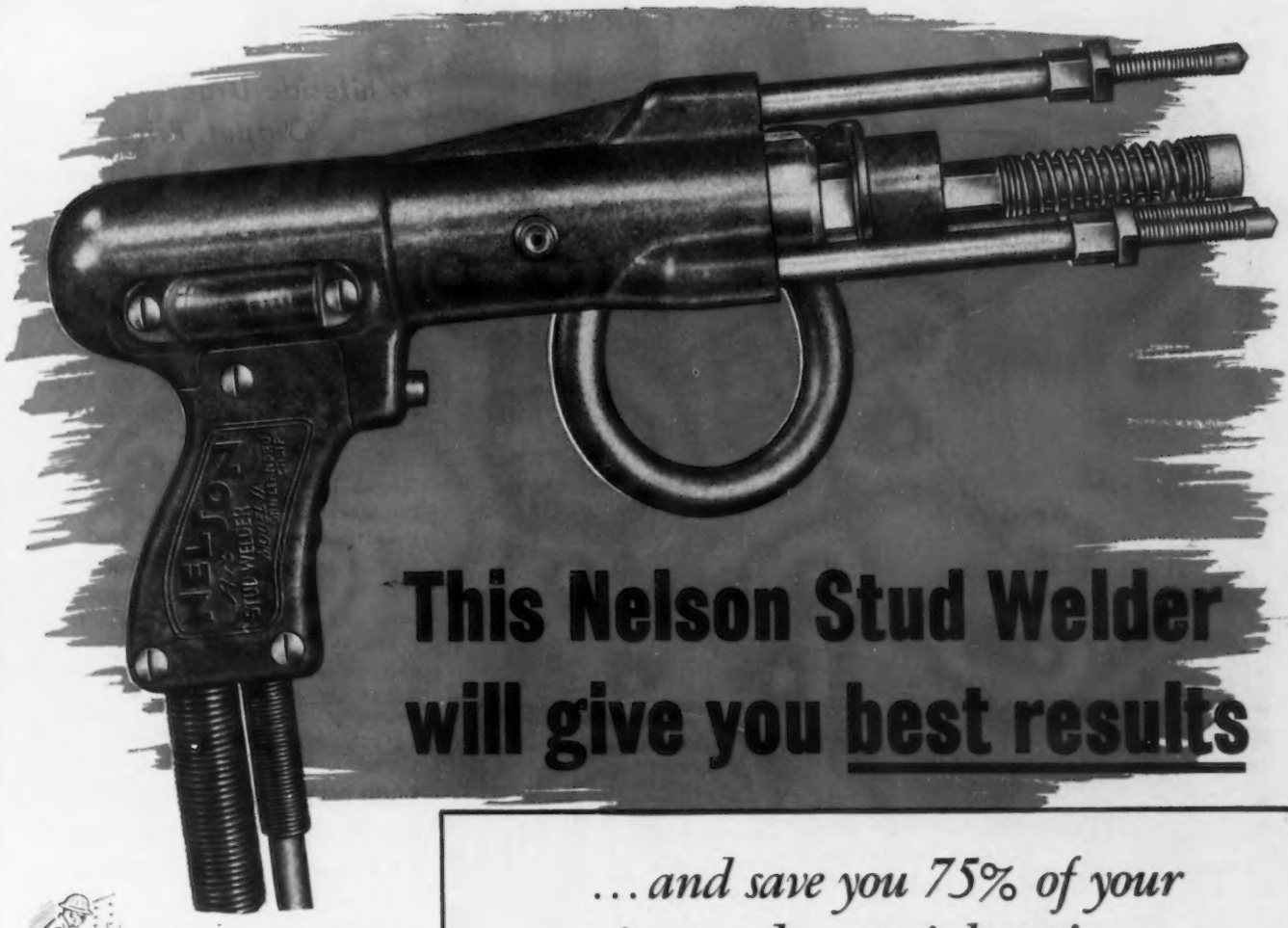
"Following the completion of this survey, tabulating cards were being punched with a view to the selection of a suitable job in the shortest possible time. To illustrate: If we have a totally blind individual to place, how many jobs do we have where vision is of no importance so far as the job itself is concerned? The tabulation run will give this information in a matter of moments. Then careful selection must be made to determine whether or not the location of the job affords any problem for the individual without vision and, if so, whether there is any practical way of meeting this difficulty," Mr. Jenkins said.

A. A. Hendrix of General Motor's, Eastern Aircraft Division, said that their job placement plan for veterans is headed by an industrial psychiatrist, assisted by the safety director, educational director, and employment manager, all of whom work with the individual supervisors on the plan. The plan starts, he said, with a survey of all ex-service men in the plant to collect such data as age, reason for discharge, length of service, military citations, battle experience, personality type, etc. This is followed by individual case studies.

War Dept. Order Terminates Contracts for Training Planes

• • • **The need of the Army Air Forces** for training planes has been met, the War Department announced Feb. 28. Termination of existing contracts of such aircraft has been ordered to insure use of the workers involved in the construction of combat craft.

Primary contractors affected by the order are: Consolidated-Vultee, Nashville, Tenn., and Downey, Cal., Aeronca, (Aeronautical Corporation of America) Middletown, Ohio; Fairchild Aviation Corp., Hagerstown, Md.



This Nelson Stud Welder will give you best results

SOME WAYS OTHERS ARE USING THE

NELSON MODEL "H"

Securing parts to steel castings of all types.

Installing and manufacturing portable steel scaffolds.

Insulating interiors of refrigerator and freight cars.

Prefabrication of houses and all types of buildings requiring insulation.

Securing electric cables, light fixtures and switch boxes.

Securing all types of wood or plastic decking.

Installations of many types in locomotive cabs.

... and save you 75% of your time and material, too!

The NEW Nelson Model "H" Stud Welder is completely automatic in operation—you get full fusion of stud to plate in less than ½ second. *A new worker can weld 500 to 1000 studs in a day.* Complete fusion of stud to steel results from automatic action of the gun, accurate controlled arc timing, and the use of flux-filled studs. A porcelain ferrule completely shields the arc.

Light in weight—easy to handle, the Nelson Model "H" has answered the stud welding and insulation problems of over 200 industries in the United States and Canada. Railroads, truck manufacturers, machine tool makers, etc., have found good results. Fit the Nelson Stud Welder into *your* operation today, or your post-war plans for tomorrow. *Write now for complete details and catalog!*

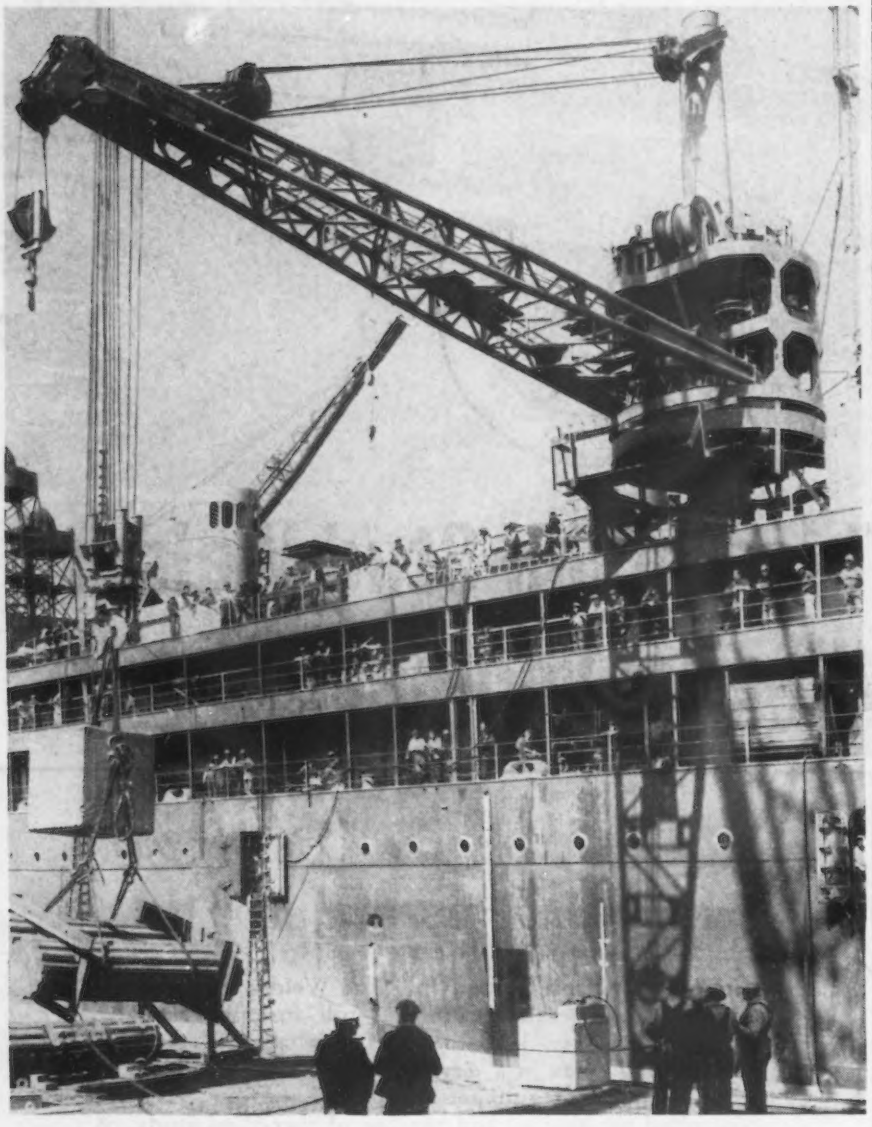
Flux-filled studs are available in many diameters and designs. Also insulation pins for applying Fiberglas and sprayed-on asbestos. Sizes and prices on request.

For complete details, samples, and catalog, write to:

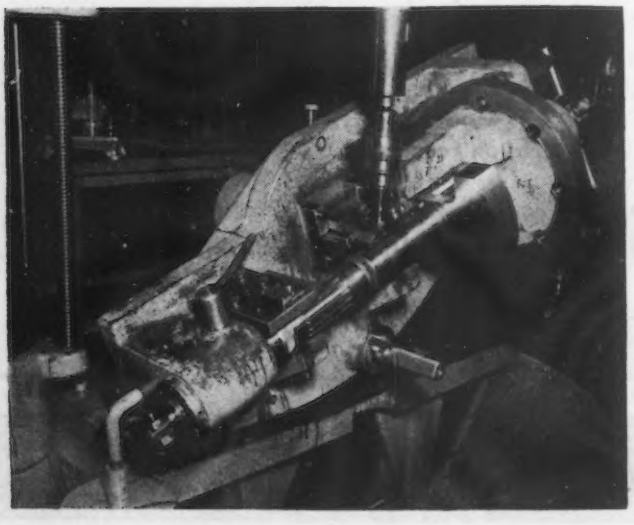
NELSON SPECIALTY WELDING EQUIPMENT CORP.
Dept. 1, 440 Peralta Ave., San Leandro, Calif.

Eastern Representative: Camden Stud Welding Corp., Camden, N.J.

NELSON STUD WELDERS & STUDS



CRANE INSTALLATION: A Western Gear boat and airplane crane undergoes testing during installation on a submarine tender at Oakland, Cal. The crane incorporates features not used on previous boats of this nature. The equipment consists of a main winch which tops and lowers the boom, a boat winch, an airplane winch and rotating machinery. It has an operating load of 45,000 lb.



SPEEDS DRILLING: The Lycoming Div. of Aviation Corp. has developed this special jig for the drilling and reaming of all small holes in crankshafts for its R-680 engine in one operation. Five separate jigs formerly were required for this operation. Set-up time is cut 80 per cent and loss of material caused by handling damages has decreased proportionately.

Whiteside Urges Output, Price Curbs

• • • **Government** control of civilian goods production for a three-year postwar period was advocated recently by Arthur D. Whiteside, former vice-chairman of WPB in charge of civilian requirements, before the American Retail Federation in New York. Mr. Whiteside believes that output of goods should be held at 1939 levels to prevent overladen markets and heavy unemployment later on.

Mr. Whiteside's views were challenged by several other speakers at the meeting. Fred Lazarus, Jr. urged that the quota system be eliminated. B. E. Puckett held that consumer and worker needs should take precedence over any vested rights to production.

Mr. Whiteside asserted some workable price control should be worked out in the postwar era.

$809,000,000 Spent in 1943 For Foreign War Commodities

• • • **Contract deliveries** of strategic commodities bought in foreign countries with government funds under the FEA public purchase program totaled $809,000,000 in the year ending Dec. 31, 1943.

Below is the approximate dollar value of deliveries by major commodity groups under the FEA public purchase program contracts. The figures do not include preclusive purchases of materials in neutral countries made under FEA direction in order to keep the enemy from obtaining supplies he needs.

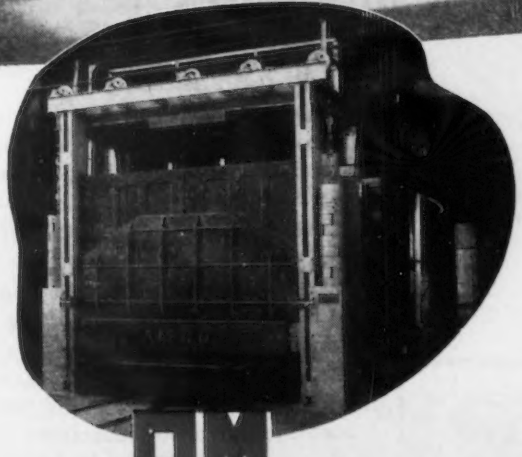
YEAR 1943 (000 Omitted)	Jan.-June	July-Dec.	Year
Metals and minerals	$232,000	$264,000	$496,000
Foodstuffs	60,000	73,000	133,000
Textiles	51,000	65,000	116,000
Misc. commodities	35,000	29,000	64,000
Total	$378,000	$431,000	$809,000

Harrison Weymouth Dies

• • • **Harrison Weymouth** formerly with the Baltimore sales office of Bethlehem Steel Co., died Feb. 5. He had also been connected with the Pennsylvania Steel Co. which was taken over by Bethlehem and is now a part of its Sparrows Point, Md. plant. His experience in the industry covers more than a quarter of a century. He was retired at the time of his death.

AMCO

CAR TYPE FURNACES

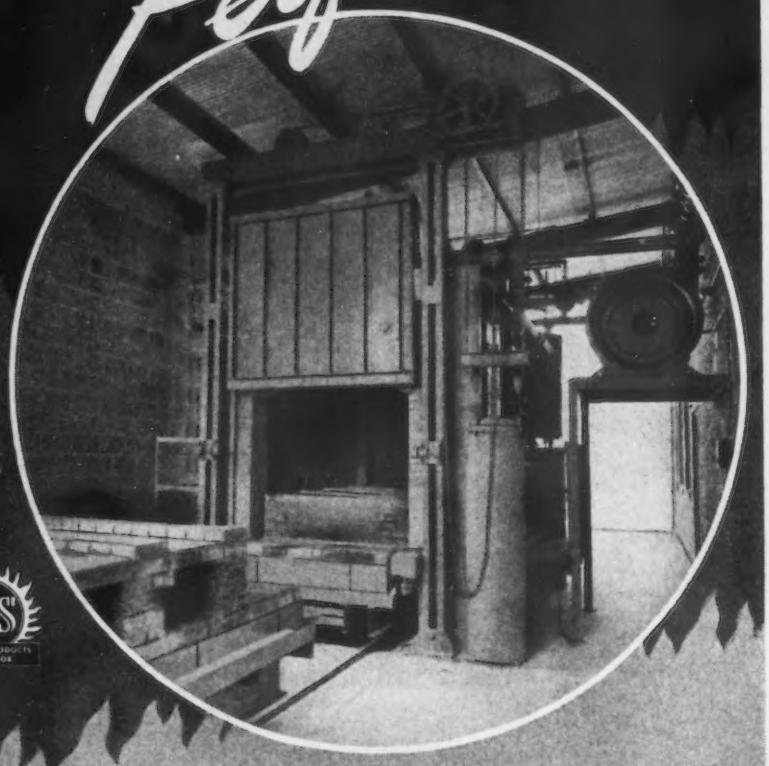


AMCO Car-Type Furnaces are built not only for the emergency, but for many years of commercial production thereafter . . . *It pays to buy the best!*

The AMSLER-MORTON Company

FULTON BUILDING · PITTSBURGH, PA.

AN "OPEN DOOR" TO HEAT-TREATING *Perfection*



The metallurgist and superintendent in the stainless steel foundry where this R-S Car Hearth Furnace was recently installed agree that "it is a fine piece of equipment and doing an exceptional job."

The uniformity and physical properties obtained are far superior to results previously secured. Gas-fired and equipped with two-zone temperature control, this furnace reflects the skill and painstaking care of R-S Engineers in adapting R-S equipment to a particular heat-treating problem.

Regardless of the scope or type of your heat-treating requirements, the door is always open for consultation with R-S Engineers. Heat-treating perfection is the watchword.

FURNACE DIVISION
R-S PRODUCTS CORPORATION
4524 Germantown Avenue • Philadelphia 44, Pa.

R-S Furnaces of Distinction

PLATE AND ANGLE HEATING
ANNEALING CONVECTION CAR HEARTH ROTARY HEARTH
CONTINUOUS CONVEYOR SALT BATH FORGING METAL MELTING

Buy War Bonds

FEA Reports on Russian Aid

Washington

• • • **Shipments of munitions** and other war supplies under Lend-Lease from the United States to the Soviet Union in 1943 were almost double 1942 shipments, according to the Foreign Economic Administrator, Leo T. Crowley. A total of 8,400,000 tons of supplies valued at $4,243,804,000 was exported to Russia from the beginning of the program in October, 1941, to Jan. 1, 1944. Shipments in 1943 totaled 5,400,000 tons, compared with 2,800,000 tons in 1942. December, 1943, shipments were the largest on record for any single month.

While more ships were sent to Russia in 1943 than in 1942, a greater percentage also arrived, 99 per cent of sailing reaching port in safety during the past year. In 1942, only 88 per cent reached Russia, due to enemy submarine, surface raider, and bomber interference.

Up to Jan. 1, 1944, more than 7800 planes had been sent to the Soviet Union. Over 3000 of these were ferried all the way by air. More than 5000 planes were sent in 1943, twice as many as in 1942. Virtually all planes sent have been combat types. In 1943 they were principally Bell Airacobra P-39 fighters, Douglas A-20 attack bombers and North American Mitchell B-25's.

To Jan. 1, 1944, over 4,700 tanks and tank destroyers, 170,000 trucks, 33,000 jeeps, and nearly 25,000 other military motor vehicles were shipped. Army boots have been shipped, together with large quantities of food needed to maintain the Soviet Army rations. Food shipments up to Jan. 1, 1944, totaled 2,250,000 tons.

In addition to food, we have sent 9000 tons of seeds to aid in new agricultural regions and in devastated areas reconquered from the Germans.

Other shipments to the Soviet Union up to Jan. 1, 1944, have included: 177,000 tons of explosives for manufacture into bombs and shells in Soviet factories; 1,350,000 tons of steel; 384,000 tons of aluminum, copper and other metals; $400,000,000 of industrial equipment, machinery, and machine tools; and 740,000 tons of aviation gasoline and other refined fuels and lubricating oils.

In order to reduce the Soviet's need for refined fuels from the United States, 145,000 tons of refinery equipment have been sent for installation in the U.S.S.R. American engineers in the U.S.S.R. are now assisting in

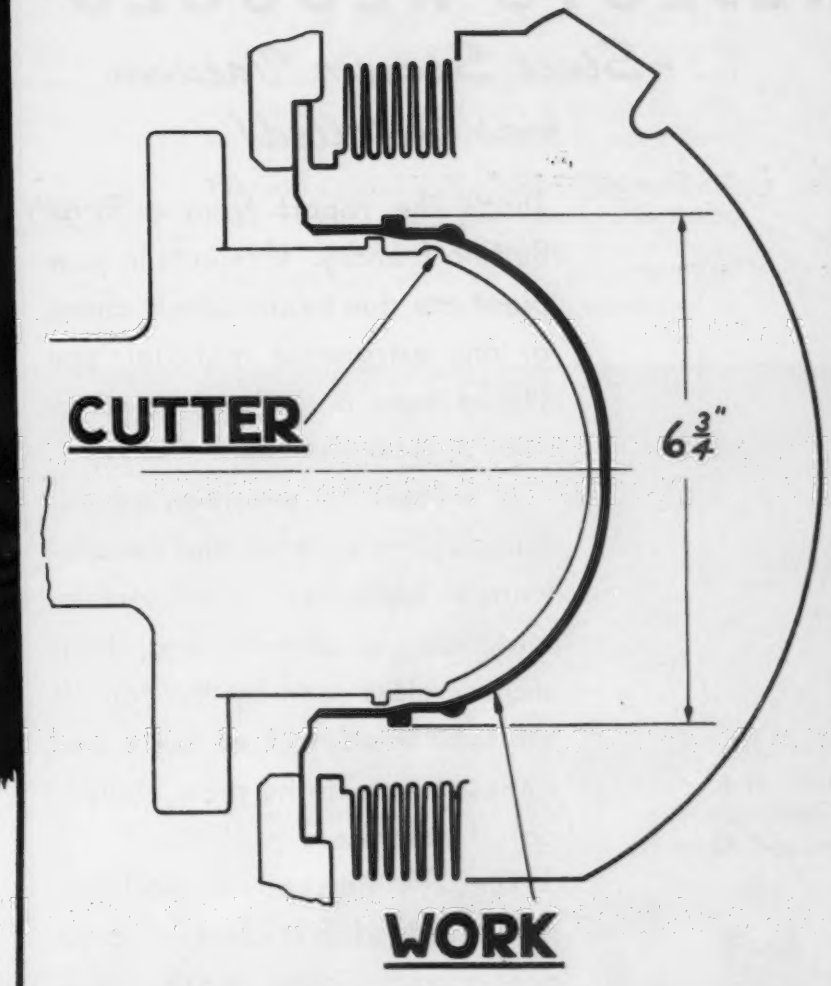
MILLING THE *Dome* IN ALUMINUM CYLINDER HEADS FOR AVIATION ENGINES ON THE HALL PLANETARY

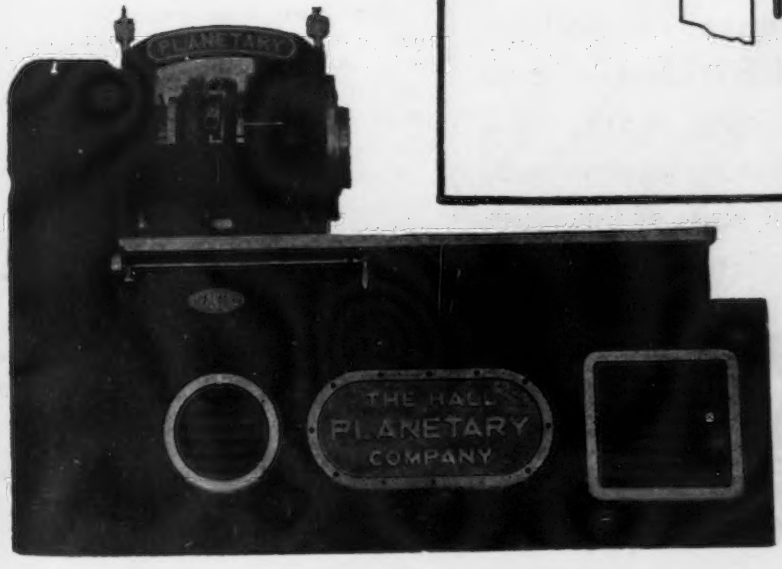
This Planamilling job consists in milling the thread and shrink band clearance for the subsequent operation of milling the thread and shrink band diameter. The operation takes about TWO MINUTES on the Planetary. Close "aircraft" accuracy is easily maintained.

☆

Send us your prints for suggestions on speeding war production with Planetary milling and threading.

Details upon request





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HALL PLANETARY CO.
Fox Street and Abbotsford Ave.
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REJECTS REDUCED

-Since Spencer Vacuum was installed!

That's the report from a large Buffalo foundry. If rejects in your plant are due to dirt, dust, chips, or any extraneous material, you should have a similar experience with Spencer Vacuum.

It is ideal for precision operations such as watches and communication equipment. It will reclaim materials, or convey slag, lead shot or glass sand by the ton. It will take liquids out of tanks and sumps, or clean the most complicated machinery.

The 7½ horsepower portable shown at the left is ideal for large areas and heavy work, or a Spencer Stationary system may be piped to all parts of the plant. Ask for the bulletins.

Spencer also Recovers Sand and Removes Chips Scales and Abrasives

SPENCER HARTFORD VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD 6, CONN.

7

the construction of these refineries which will, when completed, produce large additional quantities of aviation gasoline and other refined products from Russia's own oil resources.

Similarly the United States shipped to the Soviet Union in 1943 used and new machinery for a complete tire factory that can produce at least 1,000,000 military truck tires annually from the Soviet's own synthetic and natural rubber supplies.

Chain Belt Employee Gets War Department Citation

• • • **John P. Hess**, foreman in the Ordnance Division of Chain Belt Co., and employee of the company for 15 years, has been awarded the first War Department citation in the Milwaukee Regional Office of the Chicago Ordnance District and the 143rd citation in the entire nation.

Mr. Hess gained this recognition by designing a new tool for ordnance production which accelerated production, made unnecessary the purchase of additional machinery, and saved 36,000 man-hours. This new tool finishes in one operation the work formerly done in three cuts.

New Books

• • • **"Mechanical Properties of Metals and Alloys,"** issued by the National Bureau of Standards, has been brought up to date. The new edition, 482 pages, is for sale by the Superintendent of Documents, U. S. Government Printing Office, for $1.50. The book includes new data on the numerous alloys introduced since 1924.

"Time Study Engineering," by William H. Schutt, president, Detroit Time Study School, deals with phases of time study applied to specific machines for the purpose of determining cost, pay and production efficiency.

Simplified explanations of machine speeds and feeds are given, with an analysis of production line tasks. (McGraw-Hill Book Co., $5.).

"Lubricants and Cutting Oils for Machine Tools," by William G. Forbes is a practical reference book for lubrication and cutting oil problems. Standard laboratory tests on new and used oil are outlined in simple form and the action of cutting tools is illustrated to help solve cutting problems as they arise in practice. (John Wiley & Sons Inc., $1.50).

works this way . . .

on a Cross Special Machine that anyone can operate

CROSS Engineers designed and built this machine for a specific purpose—to face and center or drill both ends of axle shaft forgings, and provide continuous, automatic production of from 100 to 130 pieces per hour. At the push of a button, the forgings are hopper-fed and automatically clamped, machined, unclamped, and ejected in a continuous production process.

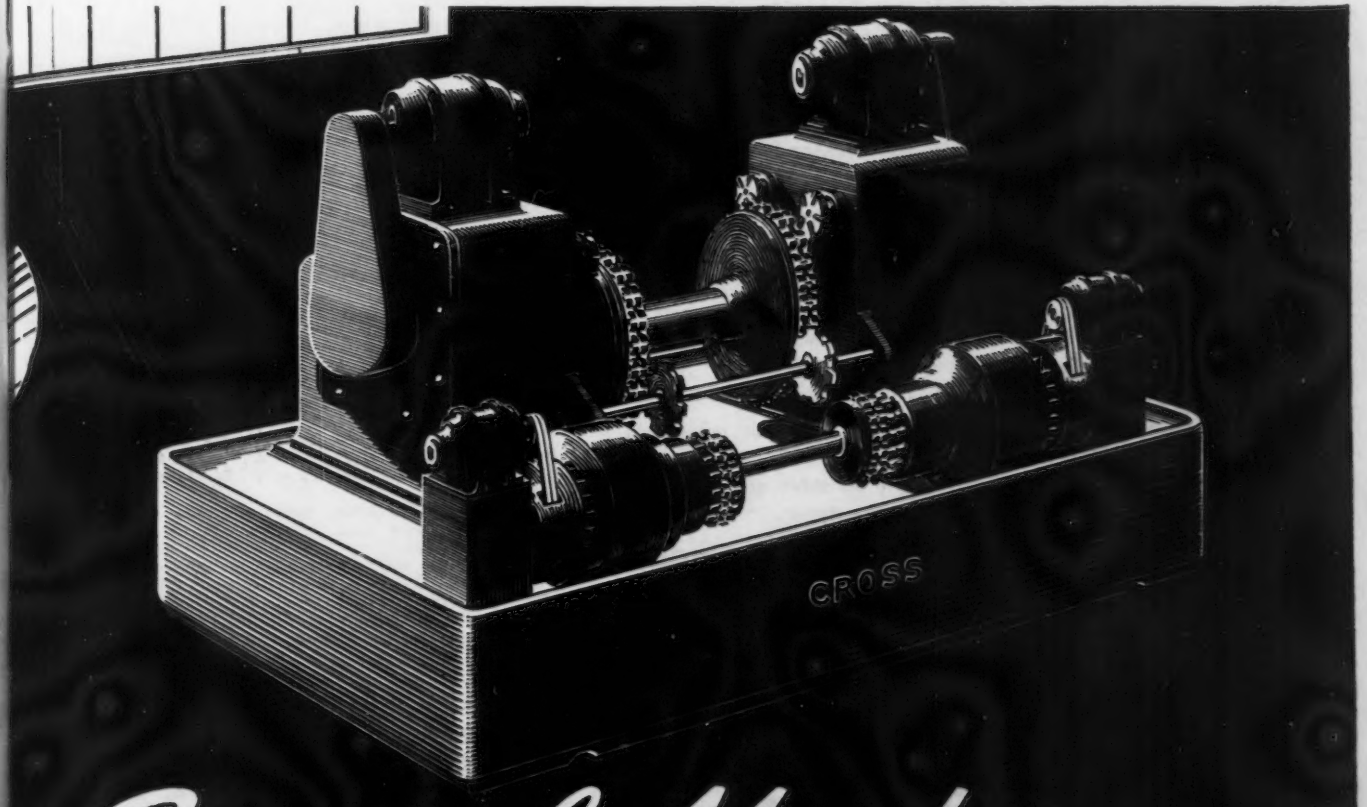
Thus milling and centering or drilling are combined into one fully automatic operation by means of a Cross *Special Machine* that *anyone can operate.*

By modifying the design of this machine, similar forgings of different dimensions can be machined in the same way.

The principle behind all Cross *Special Machines* is the same—removal of metal at lower cost on automatic equipment that anyone can operate. It is a principle that can be applied to any type of machining operation, a principle that is being used successfully in hundreds of plants all over the world.

Cross Production Engineering is a complete service. Cross Engineers are available now to survey your present machining methods and, if special machinery can lower your costs or help solve your labor problem, they will design, build and install the machines for you, and show your workmen how to operate them.

The new Cross Catalog contains 38 case histories of successful Cross *Special Machines.* A copy is yours for the asking. Just write on your company letterhead to The Cross Company, Detroit 7, Michigan. Department 12



Special Machines

for automatically performing any one or a combination of metal cutting operations

TURNING · MILLING · DRILLING · BORING · REAMING · TAPPING · GRINDING

THESE EUCLID CRANES

Almost without exception EUCLID CRANES outlast normal life expectancies because quality is built into even the smallest parts to assure many years of efficient, economical service.

High grade, wide face coarse pitch gearing is used throughout. Shafts are short and strong to withstand torsional stresses. Anti-friction bearings assure longer life and lower power consumption. Every part has a liberal factor of safety.

EUCLID CRANES of standardized design, with all parts jig-machined to assure interchangeability, are built in capacities from 3 to 25 tons with spans from 20 to 100 feet. Larger and heavier cranes of greater capacity are built on special order.

Every detail of construction reflects the combination of traditional EUCLID ruggedness and simplicity with perfected and proven principles of electric crane design.

★ WE CAN DELIVER A LIMITED NUMBER OF 5 to 10 TON CRANES in 60 to 90 Days

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1361 Chardon Rd., Euclid, Ohio

Metallurgical Techniques In Seized Enemy Patents

• • • **This is the seventeenth** list of seized enemy patents, available on license from the Alien Property Custodian. These patents are grouped in classes. Sub-class numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationally, and the date of issuance.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time procedures for obtaining the patents for use were described with information concerning their usage and possibilities. Seized patent applications were shown in THE IRON AGE on July 8.

Class 75—Metallurgy (Continued)

(50) 1,955,481. Process for the production of pig iron having a fine graphitic texture. A Wirtz, Germany. 4-17-34.

(51) 1,650,157. Process for the elimination of phosphorus from pig iron. R. Schenck, Germany. 11-22-27.

(51) 1,787,806. Process for separating zinc sulphate from sodium sulphate. H. Weidmann, Germany. 1-6-31.

(51) 1,936,282. Method of measuring the elongation of hollow cables. G. Zapf, Germany. 11-21-33.

(51) 2,258,850. Process for desulphurizing iron or iron alloys. F. Eulenstein and A. Krus, Germany. 10-14-41.

(53) 1,970,067. Process for the production of age-resisting iron and steel. C. Wallman, Firtz Halbrock and E. Kumpmann, Germany. 8-14-34.

(54) 1,730,960. Process of purifying pig iron. F. Wust, Germany. 10-8-29.

(54) 1,782,923. Process of purifying pig iron by means of a dephosphorizing and desulphurizing slag to which carbon as been added. K. Hoffmann, Germany. 11-25-30.

(55) 1,651,492. Process of desulphurizing molten metal and briquettes used therefor. R. Walter, Germany. 12-6-27.

(57) 2,173,205. Process for the deoxidation of steel baths. O. Johannsen, Germany. 9-19-39.

(57) 2,237,485. Process for the deoxidation and degasification of steel. P. Hardt, Germany. 4-8-41.

(58) 1,818,556. Method for the purification of iron and steel. M. Jaeger, E. Pokorny and G. Gossrau, Germany. 8-11-31.

(58) 2,120,894. Method of producing free cutting steel. J. Haag, Germany. 6-14-38.

(59) 1,821,407. Process of decarburizing iron or steel or their alloys. W. Schottky, Germany. 9-1-31.

(60) 1,846,234. Refining process for producing pure iron. H. van Royen, Germany. 2-23-32.

(60) 2,093,666. Process for treating iron and iron alloys. A. Vogt, Germany. 9-21-37.

(62) 1,759,661. Production of pure metals in a finely divided state by the thermal decomposition of metal carbonyls, other than iron carbonyl, or mixtures of same either with each other or with iron carbonyl. C. Muller and W. Schubardt, Germany. 5-20-30.

(63) 1,739,992. Process of working up mixed shavings of white metal and red metal. A. Schwarz, Germany. 12-17-29.

(63) 1,819,607. Method of treating waste alloys for the purpose of removing therefrom certain constituents whose presence renders the alloys unsuitable for certain uses. P. Kemp, Austria. 8-18-31.

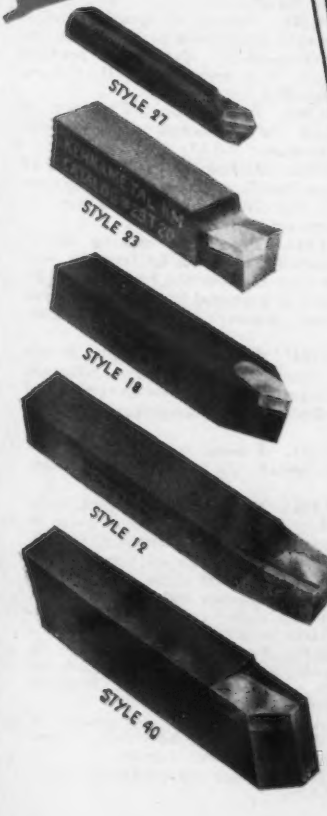
(63) 1,864,161. Separating and recovering non-ferrous metals from metallic initial materials. W. Wittner, Germany. 6-21-32.

(63) 2,207,461. Separation of the constituents or alloys or mixtures of metals and/or elements similar to metals. P. Kemp, Germany. 7-9-40.

(63) 2,254,805. Process for the separation of metals. E. Junker and W. Leitgebel, Germany. 9-2-41.

(65) 1,827,174. Method of melting oxidizable

THE RIGHT STEEL-CUTTING TOOL *for every Job*



To get maximum steel-cutting production—consult KENNAMETAL field engineers about the proper application of KENNAMETAL, the wear-defying tool material whose chief ingredient is a unique, super-hard intermetallic compound (tungsten-titanium carbide). KENNAMETAL engineers will help you . . . (1) select the right grade . . . (2) choose the correct tool style . . . (3) determine the most efficient machine set-up . . . (4) install a money-saving tool maintenance program.

Yes, KENNAMETAL engineering service assures the *right* KENNAMETAL tool on every job . . . and performance studies show that the *right* KENNAMETAL tool, used properly, often can remove stock from the toughest steel up to 3½ times more efficiently than other carbides! There's a KENNAMETAL field engineer in your locality. Ask him for advice—and always keep a copy of our Tool Manual on hand. Write for one today.

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KENNAMETAL *Inc.*

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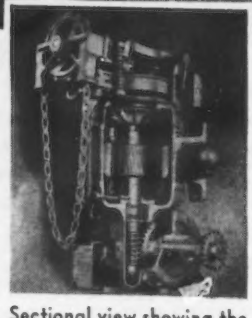
SUPERIOR CEMENTED CARBIDES

Install KINNEAR ROLLING DOORS and gain these advantages



Sectional view showing the rugged construction of the Kinnear Motor Operator.

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material. C. Tama, Germany. 10-13-31.

(66) 1,818,881. Manufacture of potassium. W. Busch and E. Noack, Germany. 8-11-31.

(67) 1,989,456. Flux for the smelting and refining of magnesium and magnesium alloys. A. Luschenowsky, Germany. 1-29-35.

(67) 2,067,275. Purification and refinement of magnesium and magnesium alloys. A. Luschenowsky, Germany. 1-12-37.

(67) 2,106,221. Process for the refinement of magnesium and magnesium alloys. A. Luschenowsky, Germany. 1-25-38.

(67) 2,258,374. Process for the production of magnesium by means of thermic reduction. L. Amati, Italy. 10-7-41.

(68) 2,039,165. Method of treating aluminum or aluminum alloy. K. Hayakawa, Japan. 4-8-36.

(68) 2,090,451. Manufacture of aluminum. O. Kruh, Austria. 8-17-37.

(68) 2,131,549. Cleansing means for metal and metal alloys. W. Claus, Germany. 9-27-38.

(68) 2,174,926. Process of removing magnesium from aluminum alloys containing magnesium. G. Messner, Germany. 10-3-39.

(72) 2,239,626. Recovery of nickel and copper from nickel-copper mattes. H. Schlecht and L. Schlecht, Germany. 4-22-41.

(71) 2,074,806. Process for the extraction of cadmium. A. Por, Germany. 3-23-37.

(75) 2,155,325. Process for removing bismuth from copper or copper-containing melts and products. O. Nielsen and E. Lauber, Germany. 4-18-39.

(76) 1,869,497. Process of treating molten ferrous metals and alloys with compositions containing "lithium-alkali" alloys and products resulting from such treatments. H. Osborg, Germany. 8-2-32.

(76) 1,869,498. Process of treating molten copper and copper alloys with compositions containing "lithium-alkali" alloys and products resulting from such treatments. H. Osborg, Germany. 8-2-32.

(76) 2,190,570. Process for treating copper. L. Orlando, Italy. 2-13-40.

(78) 2,006,598. Corrosion-resistant and malleable alloy. W. Muller and M. Niessner, Austria. 7-2-35.

(78) 1,855,377. Coating material for metal articles. R. Auerback, Germany.

(78) 2,006,599. Mechanically workable alloy. W. Muller and M. Niessner, Austria. 7-2-35.

(78) 2,006,600. Corrosion-resistant and malleable alloy. W. Muller and M. Niessner, Austria. 7-2-35.

(78) 2,006,601. Corrosion-resistant, mechanically workable alloy. W. Muller and M. Niessner, Austria. 7-2-35.

(82) 1,869,499. Process of treating molten nickel and nickel alloys with compositions containing "lithium-alkali" alloys and products resulting from such treatments. H. Osborg, Germany. 8-2-32.

(83) 1,896,807. Process for the recovery of platinum and its by-metals from mattes. G. Bauer, Germany. 2-7-33.

(84) 1,673,043. Method for the producing of technical pure beryllium respectively for freeing metallic beryllium from impurities. H. Fischer, Germany. 6-12-28.

(84) 1,682,058. Process of making technically pure metallic tungsten by treating with alkali or alkaline solution the impure metallic tungsten which is prepared by reduction of impure tungsten oxide. K. Anjow, Japan. 8-28-28.

(83) 1,723,444. Method of producing metals or metallic combinations from ores, minerals, rocks or products of the metallurgical and chemical industry. J. Savelsberg, Germany. 8-6-29.

(84) 1,877,961. Process for the production of tungsten metal. E. Pokorny, Germany. 9-20-32.

(84) 1,915,243. Method of producing chromium by the reduction of chromium oxide or ore by hydrogen. W. Rohn, Germany. 6-20-33.

(84) 2,121,084. Production of beryllium by the reduction of beryllium oxide with the aid of carbon or carbonaceous reducing agents at high temperature under certain novel conditions of working. O. Kruh, Austria. 6-21-38.

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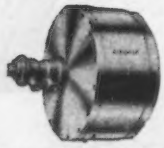

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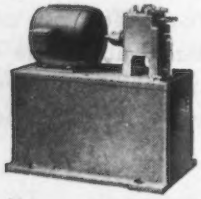

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(84) 2,242,759. Reduction of difficulty reducible oxides. H. Schlecht and M. Jahrstorfer, Germany. 5-20-41.

(84) 2,246,386. Process of preparing metallic chromium from chromium chloride. K. Schneider, Germany. 6-17-41.

(84) 2,301,663. Process of preparing metals and alloys. E. Zinti and W. Morawietz, Germany. 11-10-42.

(85) 1,824,475. Process for smelting material containing tin oxide. M. Freise and H. Maschmeyer, Germany. 9-22-31.

(86) 1,705,128. Process of producing zinc from zinciferous ores and other materials containing zinc. C. Matzel, Germany. 3-12-29.

(86) 1,728,094. Process of reducing zinc ores which consists in reducing the ores with carbide in a nitrogen-current. H. Wittek, Germany. 9-10-29.

(86) 1,950,249. Distillation of readily volatilizable metals. F. Johannsen, Germany. 3-6-34.

(86) 2,000,140. Process for the distillation of zinc and similar metals. A. Leysner, Germany. 5-7-35.

(86) 2,011,400. Process of treating zinciferous iron ores. F. Eulenstein and A. Krus, Germany. 8-13-35.

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(87) 1,728,681. Treatment of sulphide ores or sulphidic metallurgical products. F. Johannsen, Germany. 9-17-29.

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(87) 1,754,170. Process for treating ores and metallurgical products, slags and the like. F. Johannsen, Germany. 4-8-30.

(87) 1,755,712. Process of recovering volatilizable metals from ores or the like. H. Stephani, Germany. 4-22-30.

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(89) 1,731,898. Treatment of ores and metallurgical products. H. Heine, Germany. 10-15-29.

(89) 1,754,169. Method of recovering gasifiable metals as oxides. F. Johannsen, Germany. 4-8-30.

(88) 2,121,306. Method for the deoxidization of technically pure zinc. F. Schreiber, Germany. 6-21-38.

(89) 2,286,663. Reduction of inorganic oxidic compounds by silicon monoxide. E. Zinti and H. Grube, Germany. 6-16-42.

(92) 1,713,436. Method of blowing various charging materials into blast furnaces. P rieskamp, Germany. 5-14-29.

(92) 2,290,192. Operation of shaft furnaces. E. Karwat, Germany. 7-21-42.

(93) 1,810,801. Method of removing gases from molten light-metals such as aluminum and its alloys. W. Todt, Germany. 6-16-31.

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(93) 1,869,496. Art of treating metals. H. Osborg, Germany. 8-2-32.

(93) 2,042,735. Method of avoiding coarse crystallization at the solidification of metallic castings. E. Scheil, Germany. 6-2-36.

(93) 2,301,947. Method and apparatus for separating out admixtures from molten metal baths. C. Hannen, Germany. 11-17-42.

(98) 1,723,411. Process for the treatment of scrap iron. A. Dossmann, Italy. 8-6-29.

(98) 2,055,732. Process of recovering tin. L. Schertel, Germany. 9-29-36.

(101) 1,902,513. Method of making and hardening steel tools provided with hard metal members. A. Meutsch, Germany. 3-21-33.

(103) 1,825,211. Recovery of metals and metal compounds soluble in ammoniacal liquors. L. Schlecht, Walter Schubardt and F. Duftschmid, Germany. 9-29-31.

(105) 2,273,569. Process for the recovery of silver. A. Goette, Germany, 2-17-42.

(108) 1,686,391. Process of precipitating

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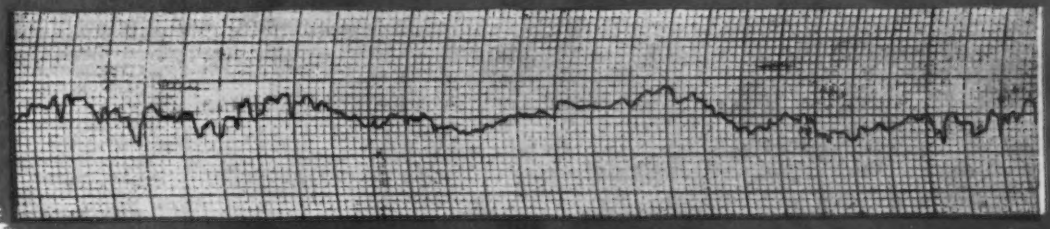

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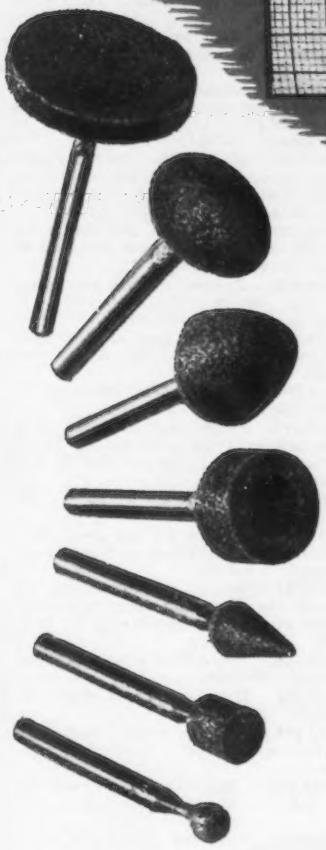

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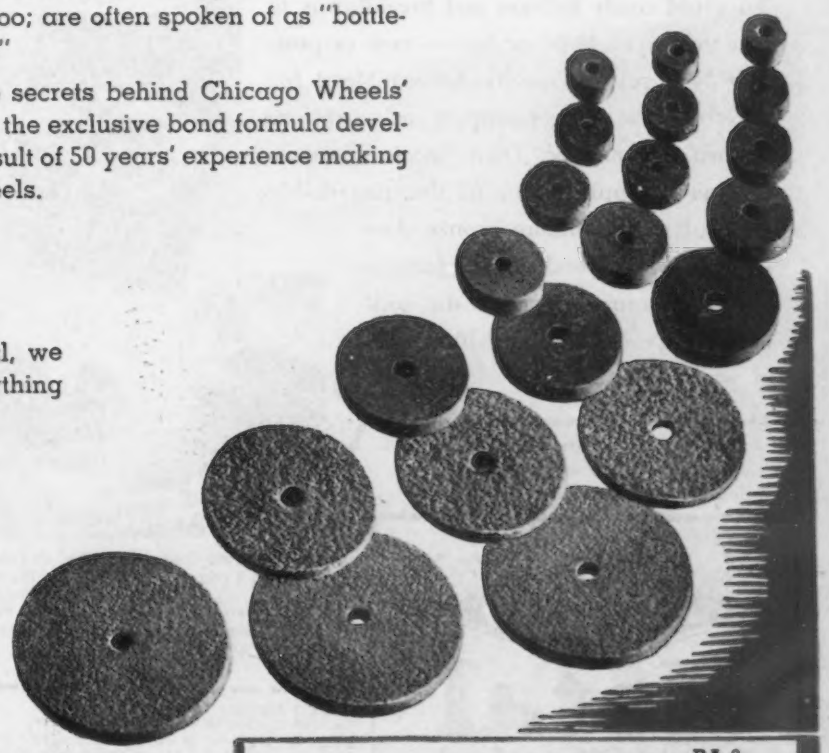

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(109) 2,068,296. Process for the precipitation of copper and for the treatment of substances containing copper and nickel. F. Lausberg, Germany. 1-19-37.

(109) 2,189,263. Precipitation of copper. G. Hamprecht and G. Pauckner, Germany. 2-6-40.

(111) 2,305,829. Method for recovering zinc and iron oxide from filter dust. H. Pieper, Germany. 12-22-42.

(114) 2,186,293. Decomposition of nickel-copper matte. G. Lamprecht, Germany. 1-9-40.

(117) 2,227,783. Process for dissolving metallic copper and reprecipitating the same from the resulting solution in metallic form. E. Klumpp, Germany. 1-7-41.

(119) 1,863,807. Process for the treatment of materials containing nickel and/or cobalt, together with copper, iron, lead, and precious metals. W. Schopper, Germany. 6-21-32.

(119) 2,180,520. Process for the separation of nickel from copper. G. Hamprecht and G. Pauckner, Germany. 11-21-39.

(119) 2,223,239. Process for the separation of nickel and copper. G. Hamprecht, L. Schlecht and G. Trageser, Germany. 11-26-40.

(120) 2,142,274. Manufacture of lead from substances containing lead. E. Kuss, Germany. 1-3-39.

(121) 2,170,394. Treating metal mixtures. H. von Zeppelin, Germany. 8-22-39.

(121) 2,274,237. Process for the removal of metallic magnesium from mixtures of beryllium and magnesium. G. Jaeger and A. Rudert, Germany. 2-24-42.

(122) 2,250,687. Manufacture of alloys. H. von Zeppelin, Germany. 7-29-41.

(122) 2,291,865. Process for the production of metal alloys. H. Bernstorff and A. Allendorfer, Germany. 8-4-42.

(122) 2,301,366. Method for increasing the temperature of the beginning recrystallization of metals and alloys. H. Bumm and H. Muller, Germany. 11-10-42.

(123) 1,760,326. Iron-nickel alloy. F. Stablein, Germany. 5-27-30.

(123) 1,910,801. High speed tool steel. L. Kluger, Austria. 5-23-33.

(123) 2,013,600. Articles which must have a reduced tendency to rust. K. Carius, Germany. 9-3-35.

(123) 2,059,893. Manufacture of articles from steel alloys. F. Naumann, Germany. 11-3-36.

(123) 2,105,652. Steel for permanent magnets. K. Honda, Japan. 1-18-38.

(123) 2,105,653. Steel for permanent magnets. K. Honda, Japan. 1-18-38.

(123) 2,105,656. Nickel, titanium, cobalt, iron, and manganese permanent magnet. K. Honda, Japan. 1-18-38.

(123) 2,132,877. Manufacture of articles from steel alloys. F. Naumann, Germany. 10-11-38.

(123) 2,157,146. Scale-resisting steel alloy. G. Riedrich, Germany. 5-9-39.

(123) 2,157,653. Manufacture of articles from steel alloys. F. Naumann, Germany. 5-9-39.

(123) 2,173,312. Silicon-iron alloy. W. Rohn and W. Hessenbruch, Germany. 9-19-39.

(124) 1,942,779. Alloy steel, H. Schiffler, Germany. 1-9-34.

(124) 2,043,631. Chromium-aluminum steel adapted to be used for articles exposed to high temperatures. E. Scheil, Germany. 6-9-36.

(124) 2,056,591. Articles with reduced tendency to corrode. H. Schulz and C. Carius, Germany. 10-6-36.

(124) 2,061,370. Iron alloys of the heat resisting type containing aluminum and sometimes chromium and a metal or metals of the rare earths group, and a method for preparing such alloys. W. Rohn, Germany. 11-17-36.

(124) 2,105,283. Heat resistant alloys. Willi Godecke and W. Guertler, Germany. 1-11-38.

(124) 2,105,655. Alloy of nickel, titanium, cobalt, iron, and aluminum for permanent magnets. K. Honda, Japan. 1-18-38.

(124) 2,193,768. Magnetic alloys having a very high permeability and specific resistance and very low hysteresis loss. H. Masumoto and T. Yamamoto, Japan. 3-12-40.

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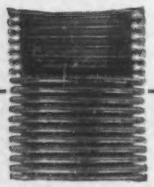

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(125) 2,105,654. Nickel, titanium, cobalt, iron, and copper permanent magnet. K. Honda, Japan. 1-18-38.

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(126) 1,711,733. Steel alloy which possesses high strength at high temperatures. E. Houdremont and V. Ehmcke, Germany. 5-7-29.

(126) 1,877,962. Steel alloy. F. Polzguter, Germany. 9-20-32.

(126) 1,979,015. Process for obviating or reducing cold shortness in steels containing phosphorus. E. Schulz, Germany. 10-30-34.

(126) 2,110,891. Corrosion-resistant and cold workable molybdenum steel. H. Reitz and E. Hengler and A. Buttinghaus, Germany. 3-15-38.

(126) 2,159,086. Manufacture of high speed steels. E. Houdremont and H. Schrader, Germany. 5-23-39.

(126) 2,218,888. High resistance steel. A. Marchetti, Italy. 10-22-40.

(127) 1,906,184. Method of reducing metal oxides. W. Rohn, Germany. 4-25-33.

(127) 1,986,702. Manufacture of iron alloys. V. Angelini, Italy. 1-1-35.

(127) 2,004,836. Process for the production of chromium steel alloys by the basic process. E. Schulz, Germany. 6-11-35.

(127) 2,008,055. Method of producing ferrochromium. V. Angelini, Italy. 7-16-35.

(128) 1,630,448. Steel alloy. W. Oertel, Germany. 5-31-27.

(128) 2,031,904. Machine parts and apparatus intended for high temperature operation. F. Rittershausen and H. Korschan, Germany. 2-25-36.

(129) 1,666,428. Process of preparing pig iron in highly-heated mixers. K. Stobrawa, Germany. 4-17-28.

(129) 1,860,568. Process for manufacturing shear-resisting iron such as iron for die-casting nuts, iron for screws, and the like. F. Borggrafe, Germany. 5-31-32.

(129) 2,026,390. Method of manufacturing magnetic iron and steel. H. Kamura, Japan. 12-31-35.

(129) 2,144,200. Method of manufacturing silicon-iron alloys. W. Rohn and W. Hessenbruch, Germany. 1-17-39.

(130) 1,683,714. Process for the production of iron castings with a low-carbon content. K. Emmel and H. Walbert, Germany. 9-11-28.

(130) 1,726,433. Process for the manufacture of strong machinable cast iron. F. Greiner, Germany. 8-27-29.

(130) 1,887,453. Method of producing cast-iron of strength in a cupola furnace. K. Emmel, Germany. 11-8-32.

(130) 1,965,436. Process for the production of cast iron. K. Sipp, Germany. 7-3-34.

(130) 1,985,553. Process of making cast iron. W. Ruff, Germany. 12-25-34.

(131) 1,863,642. Manufacture of alloys. R. Wickersham Stimson, New York, N. Y., and Wilhelm Borchers, Germany. 6-21-32.

(131) 2,053,149. Process of producing iron alloys. F. Johannsen, Germany. 9-1-36.

(131) 2,128,615. Process for the production of ferro-manganese. A. Kruss and H. Steffe, Germany. 8-30-38.

(133) 1,674,119. Method of making ferro-boron and boron-steel. T. Miyaguchi, Japan. 6-19-28.

(133) 1,847,350. Process of manufacturing titanium steel. W. Mathesius and H. Mathesius, Germany. 3-1-32.

(133) 1,991,685. Method of producing steel in basic open hearth furnaces. P. Kuhn, Germany. 2-19-35.

(133) 2,137,945. Process for producing titanium steel. W. Mathesius, Germany. 11-22-38.

[To Be Continued]

PARISH

METAL STAMPINGS

★

MODERN DESIGN AT LOW COST

★

HOUSEHOLD APPLIANCES

New refrigerators, cabinets, bathtubs, stoves, and a wide range of other household necessities will be a joy to the post-war housewife.

Pressed Metal Parts and stampings will make possible unparalleled efficiency, smart beauty, long life,—all those qualities that lower sales resistance in a competitive world.

No other method provides *all* characteristics required,—resistance to elements, ability to take hard knocks in every day use, relative low cost, tensile strength, beauty and so forth. Parish Pressed Steel has completely rounded facilities; engineering cooperation in the drawing board stage, all sizes of presses for most efficient production, welding facilities, painting and finishing departments, and full assembly facilities.

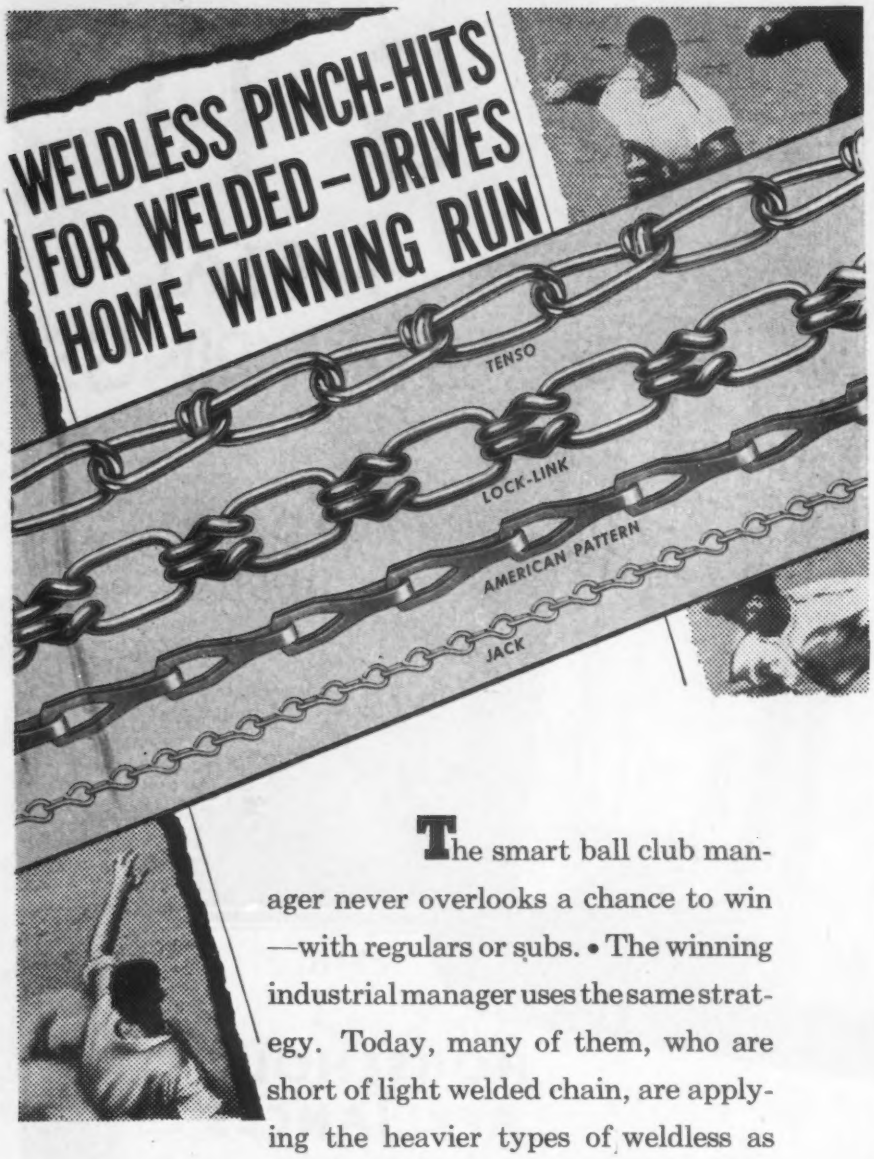
It is not too early to plan your new designs. We are ready to work with you in the preliminary stages.

And as our contribution to post-war progress, we are now equipped to stamp, fabricate, and heat treat aluminum, in addition to steel.

ARMY E NAVY

PS

PARISH PRESSED STEEL CO., Reading, Pa.
Subsidiary of SPICER MANUFACTURING CORP.
Western Representative: F. Somers Peterson, 57 California St., San Francisco, Cal.



The smart ball club manager never overlooks a chance to win—with regulars or subs. • The winning industrial manager uses the same strategy. Today, many of them, who are short of light welded chain, are applying the heavier types of weldless as pinch-hitters. • The four types of American Weldless Chain shown above have surprised engineers and operating executives with their strength, their endurance, their adaptability to a variety of new jobs. • Write us for information about the substitution of Weldless Chains for needs formerly filled by Welded Chain, or for manila rope.

AMERICAN CHAIN DIVISION
York, Pa., Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Portland

AMERICAN CHAIN & CABLE COMPANY, INC.
BRIDGEPORT • CONNECTICUT

ACCO *In Business for Your Safety*

Trade Notes

Allis-Chalmers Mfg. Co., Milwaukee, has established a new Texrope department to handle the Texrope line of multiple V-belts and sheaves. The new department is part of a reorganization move in which Allis-Chalmers set up a separate basic industries department.

•

Springfield Heat Treating Corp., Springfield, Mass., has succeeded the former Gorman Heat Treating Corp. located in the old East Springfield Rolls-Royce plant. Additional facilities will be installed, primarily for conservation of alloy steels used for tools and ordnance material in western Massachusetts plants.

•

All-Tools Co., Inc., Milwaukee, Brumder Building, has been organized by Lyman P. McIntosh, Charles Ackermann and Paul H. Paulsen.

•

Milwaukee Screw Parts Co. has been organized at 161 W. Wisconsin Ave., Milwaukee.

•

J. K. Smit & Sons announce that they have no connection whatsoever with Leonard J. A. Smit and Anton Smit & Co. who were recently named in U. S. proceedings in connection with certain diamond transactions.

•

Taylorcraft Aviation Corp., Alliance, Ohio, is consolidating its four factories into one by adding 74,000 sq. ft. of floor space to its main plant.

WPB Makes Changes in General Scheduling Order

• • • **WPB has issued** Direction 1 to the General Scheduling Order. The effect is to provide that wherever the designation of an item under Order M-293 is changed by an amendment to a table, or an item is removed from a table, or wherever an item under a scheduling order becomes an M-293 product and is removed from such other scheduling order of WPB, manufacturers of the item in question must continue to observe any frozen schedules or specific directions which they received under the earlier procedure, unless the schedule or direction is amended under Priorities Regulation 18.

Where the placing of a purchase order was approved for a Class Y item, or for a product covered by similar procedure under any other WPB order which was or has become an M-293 product, the approval remains effective and the person with whom the purchase order is placed must accept and schedule the same accordingly, even if he receives it after the item is reclassified.

WPB has also issued Direction 2 to M-293 pointing out that despite the amendment of the scheduling order, the tables 3-15, which apply reporting forms to various types of commodities, remain in effect until those tables are themselves changed or amended. It is added, however, that the classification of any product on any table as a Z product must be disregarded.

Contact **KAYDON** of Muskegon

For Unusually Large, High Precision Bearings

BALL and ROLLER BEARINGS

Standard and Special

FROM 6" INSIDE DIAMETER TO 100" OUTSIDE DIAMETER
COMMERCIAL FINISH OR ULTRA-PRECISION

Radial Ball Bearings • Thrust Ball Bearings
Radial Roller Bearings • Thrust Roller Bearings
Taper Roller Bearings

Straight or Self-aligning . Extra Heavy Duty or Special Light Type

LIGHT WEIGHT NON-METALLIC CAGES OR STANDARD BRONZE TYPE

★ *Early Delivery* ★

Also any type of

PRECISION MACHINE WORK OR GRINDING

to unusual accuracy in large diameters

ATMOSPHERE HARDENING • FLAME HARDENING • PRECISION HEAT TREATING
METALLURGICAL LABORATORY • MICROSCOPY AND PHYSICAL TESTING

ARMY E NAVY

For excellence in production of extremely precise, unusually large ball and roller bearings

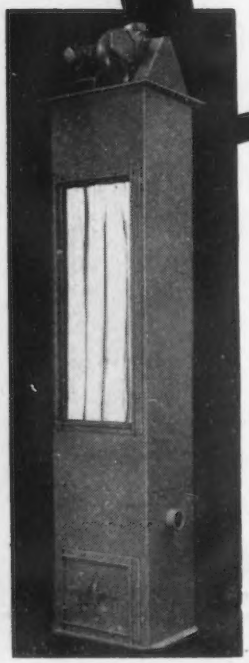
THE KAYDON ENGINEERING CORP.

McCRACKEN STREET • MUSKEGON, MICH.

Specialists in Difficult Manufacturing

CHECK CHART

- High Efficiency
- Simplicity of operation
- Low operating and maintenance costs
- Rugged construction
- Modern engineering features
- Approved by health, safety, labor and insurance commissions
- Designed and built by experienced dust control engineers



DUST control is too important for you to be satisfied with anything less than factors like these—factors that mean top efficiency in operation and long service life. That is why spotlight attention is being focused so strongly upon Dustube Dust Collectors today. Compare them point by point. See how well they coincide with your own views on what the ideal dust control system should include. Write for descriptive Bulletin No. 112.

AMERICAN
FOUNDRY EQUIPMENT CO.
510 S. BYRKIT ST. • MISHAWAKA, INDIANA

DUSTUBE
Dust Collectors

Briefly Told—

• While slight improvement in plastics production is expected by the middle of the year, the supply situation will remain critical throughout 1944, leaving little for civilian allocations, according to Clinton Rector, chief, plastics section, WPB. Contrary to expectations growing out of increased allocations of plastics during February for civilian items growing military requirements may necessitate cuts in such allocations.

•

• Utilizing a base of plastic resin, a new packaging material was announced by the Goodyear Tire & Rubber Co. The material has been named "V-Film." Although not a substitute, "V-Film" is an alternative in some applications for Goodyear's prewar Pliofilm, made with a rubber hydrochloride base. Pliofilm requires natural rubber so its use is limited to moisture-proof protection of airplane engines. "V-Film" is made with a derivative of polyvinyl chloride. A major advantage of "V-Film" is that it can be produced on equipment installed originally for the manufacture of Pliofilm.

•

• The Welding Equipment & Supply Co., Detroit, has had prepared a sound slide film program involving two separate films with their accompanying recordings. They cover arc welding of tools and dies, a subject that has not been delved into to any great extent by manufacturers of welding rods because of its specialized applications.

•

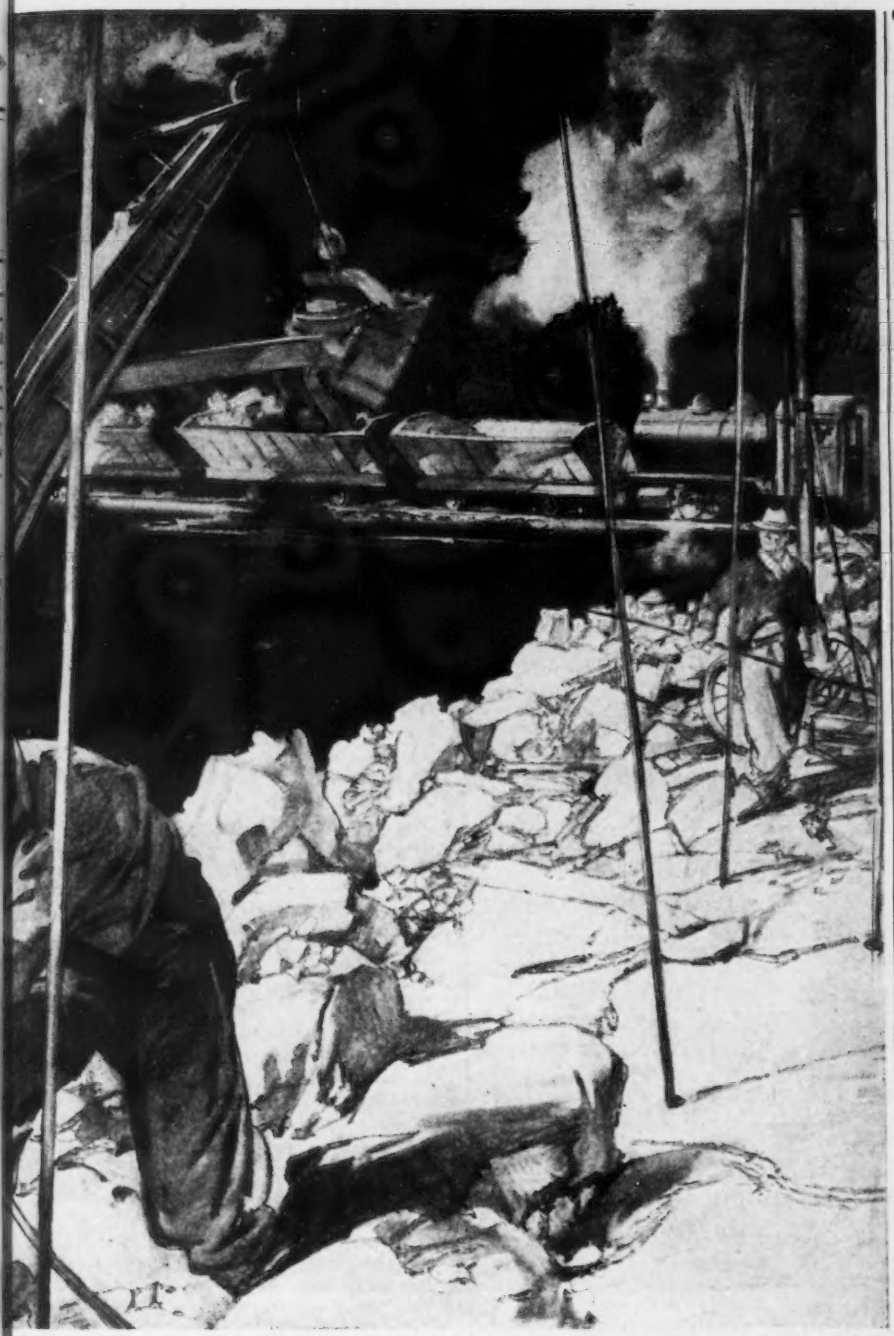
• The council of The Institute of Metals (British) has elected four Honorary Members of the Institute, one each from the four principal Allied Nations: China, Her Excellency Madame Chiang Kai-Shek; Great Britain, Sir Lawrence Bragg, F.R.S.; United States of America, Dr. Irving Langmuir; and Union of Soviet Socialist Republics, Professor P. Kapitza, F.R.S.

•

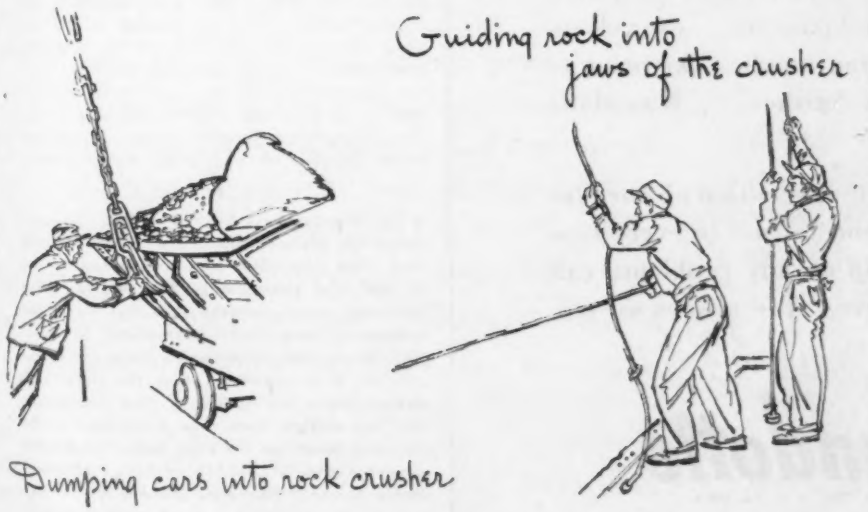
• Plans have been completed whereby the American Society for Metals will provide an annual fund of $1000 for support of fundamental researches in the field of corrosion. The American Coordinating Committee on Corrosion has been designated to receive and approve applications for grants from this fund. This committee will select such research projects as appear worthy of support, approve the qualifications of applicants for grants-in-aid from the fund, and certify to the Society names of successful applicants. The grants-in-aid will vary from $250 to $1000.

•

• Commercial airliners that will burn furnace oil costing only six cents a gallon instead of high octane gasoline that costs about four times that amount, were foreseen by Gordon Lefebvre, president of The Cooper-Bessemer Corp. "It is logical to assume that within the next five years, all commercial aircraft engines will be diesels," said Lefebvre. In addi-



Copyright 1944—Jones & Laughlin Steel Corporation *From an Original Drawing and Sketches by Orison Macpherson*



CONTROLLED QUALITY STEEL FOR WAR

QUARRIES

Like the first winter snow, everything in and around quarries producing limestone for the steel industry is always covered with fine, grey-white lime powder. This harmless stone dust coats the work clothes of the quarrymen, powders their faces, dusts their eyebrows and mustaches, giving them a grizzled, wintry look. All the area around the stone-crushing plant is powdered white and has the appearance of always being in a slight haze.

No quiet retreat is a quarry. Drilling rigs chatter incessantly as they bore shot holes for dynamite crews. The big drag line drops its great steel bucket into the quarry with a thunderous crash. Squat, puffing, hard-working, narrow-gauge locomotives, with much bustle and authority, shove funny little 10-ton dump cars to the crushing plant.

The rocks crash and bound against the sides of the crusher's funnel-shaped maw as the cars are dumped. The huge, powerful steel crusher thumps, thumps, thumps and roars and gnashes, as it disintegrates great slabs of rock as easily as a small boy disposes of a cookie. And then the screens make a racket like hail on a tin roof as they sort out the sizes of stone for various uses.

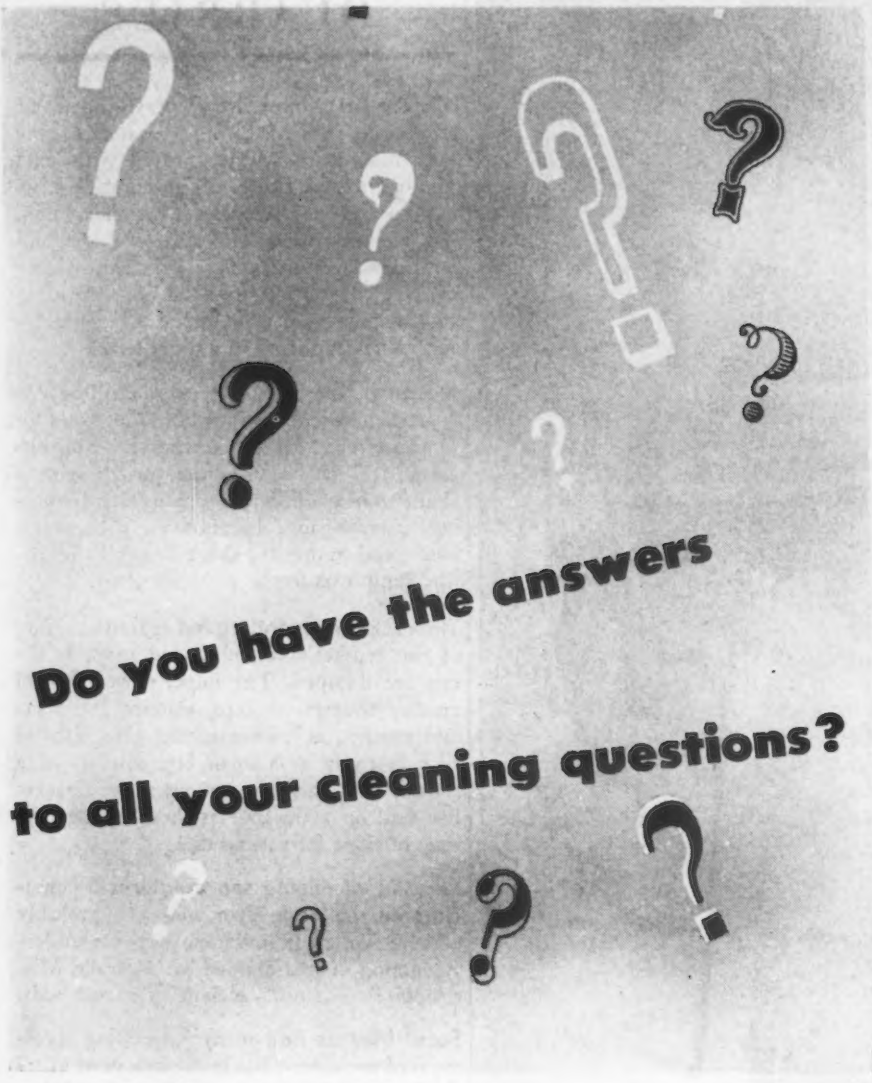
Remains of minute sea creatures accumulated on the ocean floor eons ago, probably account for great limestone deposits underlying most of area drained by Ohio and Mississippi rivers, more ancient than coal beds.

Fossil hunters find many interesting specimens of prehistoric life in the limestone quarries as the light grey rock is blasted and dug out. A worm-like fossil is one frequently discovered in many rock formations.

Metallurgical limestone (calcium carbonate) must have exactly right chemical composition to be applied in manufacture of iron and steel, where it acts as a flux, or scavenger, collecting and fusing together under intense heat the impurities in the iron and steel, and then being run off as slag.

Furnace slag is not wasted but instead finds its way into many uses. Treated in various ways, it becomes heavy, lumpy railroad ballast, fine white granulated road building material, insulating material, roof covering, concrete aggregate, Portland cement, brick, sand for mortar and even fertilizers.

"You hike, you hike, you hike," that's what you do in the Infantry, a new song says. And then you need foot powder for those aching dogs after marching long miles under heavy pack. Foot powder for our soldiers is supplied by the QM Department, put up in containers of tinplate made in the steel plants of the U.S.A.; some of it from the J&L tin mills. But the greatest portion of tinplate production—about 90%—goes for tin cans and closures for containers for foods, fruits and beverages for our fighting men.



HIT-OR-MISS answers won't do—success comes with the *right* answers! That's where Wyandotte can help you—with a *full* line of metal cleaning and degreasing compounds.

In the rush of war production, of aircraft and munitions manufacture . . . for cleaning motor parts, projectile bodies, metal prior to plating and painting . . . for cleaning prior to anodizing, removing anodic film prior to spot welding, stripping airplane finishes . . . Wyandotte works swift wizardry.

Remember—there's a Wyandotte *specialized* cleaner for every metal cleaning problem and for use in every type of equipment. If you wish help on any problems, call in the Wyandotte Representative. He's always on tap.

Wyandotte
Reg. U. S. Pat. Office

WYANDOTTE CHEMICALS CORPORATION—J. B. Ford Division
Wyandotte, Michigan
Service Representatives in 88 Cities

tion to fuel economies, the diesel aircraft will also have the inherent advantages of the non-explosive quality of its fuel, plus the absence of electrical interference, one of the most common hazards in air travel.

•

• Borg-Warner Corp., Chicago, has secured an additional $50,000,000 VT loan through 12 Chicago, New York, and Detroit banks to provide working capital during the interim between cancellation of war contracts and final settlement. The credit extends to Dec. 31, 1946, and is in addition to a $15,000,000 bank credit arranged in 1942, which runs until July 1, 1947. This former credit has not been used. Interest on the new loan is 2½ per cent on the portion utilized, and ⅜ per cent per year on the unused portion.

•

• Arrangements have been completed by Studebaker Corp. with 25 banks in various parts of the country for an $80,000,000 VT loan in order to supplement working capital and to replace government advances formerly granted on war production contracts. The loan also will assure necessary working capital during the period between termination of war contracts and financial settlement. The agreement which will expire Dec. 31, 1946, provides that the company may borrow the sum in units of $4,000,000 or multiples thereof. These loans will be made against notes maturing in not more than 90 days and bearing 2¾ per cent interest. The unused portion of the credit will carry ⅜ of 1 per cent annual interest.

•

• A new type bomb rack giving better control over loads carried by warplanes has been patented by Clem G. Trimbach, chief of the developments-armament department of the Curtiss-Wright research laboratory in Buffalo. The patent has been assigned to C-W. Recessed into the underside of the plane wing, the rack can be dumped with its bombs all set to "safe" when preparing for an emergency landing on a friendly field, according to Trimbach. The rack also can be jettisoned when empty. It is removable for reloading, and a plane can "bomb up" somewhat like loading a clip of cartridges into a rifle. The bombs are loaded on an endless chain conveyor which is moved by a motor under control of the pilot or bombardier. When over a target, they are released one by one as they come into line with a bomb chute. The operator can drop single bombs, sticks or strings as he chooses by regulating motor speed.

•

• The Westinghouse Electric & Mfg. Co. surpassed all previous production records during 1943. Net sales billed were 47 per cent ahead of 1942 and amounted to $714,305,303, after voluntary price reductions in line with the company's renegotiation agreement in 1942. No reserves for renegotiation were set up in 1943, as it is considered that the reductions already made are sufficient. Net income in 1943 was slightly more than 3 per cent of the net sales billed for the year, being $22,355,300 compared with $17,366,841 in 1942. Although during the past year some $320,000,000 in war orders were cancelled, a total of $958,967,057 in new orders was entered on the company's books in 1943. At the end of the year the

At each step in the manufacturing process—from acid open hearth to finished forging—Standard exercises the most rigid, painstaking control. The materials used in Standard products are carefully analyzed by especially trained metallurgists and chemists, using the most modern approved testing equipment. Their job is to safeguard the quality built into every forging delivered to a Standard customer.

The Standard Steel Works Division of The Baldwin Locomotive Works traces its origin to the Freedom Forge, which was established in 1795. From those early days through the present Standard has kept pace with modern developments in the manufacture of steel products.

Thus, today, in the 119-acre Standard plant, quality is kept at peak, unaffected by tremendous war-time demands. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Penna.

ARMY E NAVY

BLW THE BALDWIN GROUP

BALDWIN
STANDARD
STEEL FORGINGS & CASTINGS

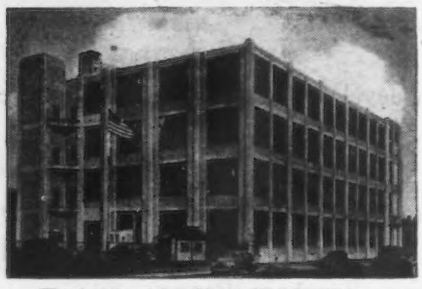
PRECISION PARTS

25 YEARS... a long grind

THE smoke of battle from the last war had hardly cleared away when the present owners of Ace went into business as makers of precision parts. Those first few years after World War I were not easy. But doing highly accurate work, and doing it better and faster, carried Ace steadily along until today it is one of America's outstanding precision metal-working plants.

To our customers and suppliers with whom we have had the privilege of working during this quarter-century, we extend our hearty thanks. To future customers, we pledge the same careful attention to specifications that has made so many friends for Ace in the past.

Let us quote you on small parts or assemblies calling for stamping, machining, heat-treating, or grinding. Send sketch or blueprint.



The Ace Precision Metal-Working Plant.

ACE TRADE MARK

ACE MANUFACTURING CORPORATION
for Precision Parts

1203 E. ERIE AVE., PHILADELPHIA 24, PA.

backlog of unfilled orders amounted to $885,708,065.

•

• In connection with the placing of the Boston area on a 48-hour week in essential industries a supplementary direction by the WLB stated: "The new 48-hour week order does not obligate any firm to pay at the rate of time and a half for extra days work, but can do so at its own discretion. Such pay is permitted but not required."

•

• Eight hundred tons of steel will be salvaged for war production by dismantling four bridges over the old Erie Canal at Buffalo. Contract for the job was let by the City of Buffalo to Lipsett Wrecking & Salvage Co., Jamestown, N. Y., on a bid of $21,900.

•

• Orders have been received from WPB to close the new Extruded Metals Defense Corp. plant in Grand Rapids, Mich., it was announced by John L. Barrett, president. The plant has been operating little more than a year, filling orders for aluminum parts for aircraft and other war requirements. Cost was about $7,000,000, it was reported. Mr. Barrett said that the order would not affect the privately owned aluminum extrusion plant at Belding, Mich., of which he also is president.

•

• *January bookings of fabricated structural steel for bridge and building construction totaled 43,147 tons as compared with 35,282 tons in December, 1943, according to the American Institute of Steel Construction.*

•

• The Holt, Ala., blast furnace of the Tennessee Coal, Iron & Railroad Co. was taken out of production March 1 for an indefinite period. Need for ferro-manganese, which the furnace has been producing, has been met for the time being, company officials said.

•

• A 27,100-ton aircraft carrier takes a lot of equipment, judging from statistics released when the Bennington was launched Feb. 26 at New York, after 3,625,000 manhours were required to build the ship in 14 months. The amount of welding deposited was 442 tons, or 1190 miles. Some 4,425,000 welding rods were used. Other particulars are: 900 electric motors; 5700 electric fixtures; 10,000 valves, ranging from ¼-in. to massive 48-in. sea valves; 100,000 lbs. of paint.

•

• In an effort to speed the deliberations of the Chicago Regional War Labor Board on a request for wage adjustments, Cutler-Hammer, Inc., Milwaukee, sent 15 volumes of data weighing 50 lb. and filling a case three ft. high.

•

• *Backlog of diesel locomotive orders held by the Electro-Motive Corp., La Grange, Ill., is so large as to require plans by company officials for immediate postwar expansion of production facilities.*

IF YOU MEASURE 'EM TO A GNAT'S EYEBROW

. . . Depend on ADECO

FOR YOUR POST-WAR PRECISION PARTS AND ASSEMBLIES

Adeco offers you a dependable source of supply with the know-how, experience and complete facilities for all types of close-tolerance production. It will pay you to include Adeco fabrication in your post-war plans.

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AIRCRAFT & DIESEL EQUIPMENT CORPORATION

4401 North Ravenswood Avenue
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"Your Partners in Production"

PRODUCTION DOUBLED?

In the Case Shown Below Machine Production was Practically Doubled!

Another Cortland War Production Test in the plant of a manufacturer of grinding machines . . . Cortland Chucks and Segments against another brand of Sectored Cylinder Wheels . . . on a Blanchard No. 18 Vertical Surface Grinder; wheel speed 705 R.P.M.

WORK: Plate for Diamond Holder—cast iron; 76.5 sq. in. per piece; 7 pieces per table load.

Here are the Production Test results. Note the tremendous difference in performance of Cortland Chucks and Segments over the brand formerly used.

Detail	CORTLAND Chuck and Segments	*Competitive Brand of Sectored Cylinder*
Cubic inches of stock removed per inch in height of segments	1606.4	739.5
Ampere readings	85	66 - dress
Dressings necessary	None	5
Work heat?	No	No
Grinding time	6 min.	11 min.

In addition to the greatly increased machine production, note that more than double the amount of stock was removed per unit of abrasive.

Why not investigate the possibility of improving the quality and quantity of your vertical spindle surface grinding production with Cortland Chucks and *Diagonal Shearing* Segments? Write for latest illustrated bulletin giving the complete story of Cortland's amazing performance.

CORTLAND GRINDING WHEELS CORP.
7 Cortland Street Chester, Massachusetts

Diagonal Shearing with Varying Contact Means Better Surface Grinding

A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—conserves power.

CORTLAND
Chucks and Segments

CLEAN STRIP STEEL BEFORE ANNEALING AND ELECTRO-TINNING

by using FAST

OAKITE COMPOSITION No. 90

When strip steel speeds along at a thousand or more feet per minute through the large installations necessary for annealing or electro-tinning this metal, unusually FAST, THOROUGH degreasing is a prime requisite. That's why we say ... to obtain the essential, CHEMICALLY-CLEAN surfaces, use quick-acting Oakite Composition No. 90 in your scrubber or washing machine.

You will find that this specially designed anodic degreasing material SPEEDILY and COMPLETELY removes rolling oil, insoluble smut, dirt and other accumulations from steel surfaces. Is also excellent for removal of smut deposits after the acid pickle.

Technical Service FREE!

Our nearby Technical Service Representative will gladly show you how Oakite Composition No. 90 can be utilized in handling this work effectively in your plant. Write today to have him call ... there's no obligation, of course!

OAKITE PRODUCTS, INC.
30H Thames St., New York 6, N. Y.
Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE Specialized cleaning
MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

New Order Sets Procedure In Sales of Idle Stocks

Washington

• • • To facilitate the work headed up by W. L. Clayton, Surplus War Property Administrator under the Baruch plan, the WPB on Feb. 29 revised PR-13 to provide priority procedure for disposing of not only raw materials but all types of property classified as idle or excess.

The revised regulation establishes procedures under which materials may be sold by persons not regularly in the business of selling such materials. While most sales of this kind will be sales of frozen, idle, or excess materials, the regulation also covers sales from inventories.

When idle materials are on hand because a business has been converted to war work; stopped or limited by WPB orders; or contracts have been cancelled or changed, idle or excess materials may be sold only under the rules defined in the regulation. The regulation also controls liquidation, bankruptcy, general auction, and other special sales.

The new rules will govern sales of all idle and excess materials, with three exceptions, which are: (1) scrap; (2) rationed products, which are under the control of some governmental agency other than WPB; and (3) foods, petroleum and petroleum products, including natural liquified petroleum gases, etc.

The regulation contains two lists. List A indicates those industral (raw) materials to which specific rules for special sales apply. The list also indicates what special rules apply to the materials listed. Industrial materials not listed may be sold freely to anyone. List B includes those "finished products" to which specific rules for special sales apply. Finished products not on List B may be sold to anyone who produces such a product in the form in which the holder possesses it or to a wholesaler whose regular business is selling such a product in whole or in part, from stock or inventory. Such sales may be made freely. Sales of "finished products" may also be made to anyone permitted to use such products under WPB rules on a purchase order of AA-5 or better.

Authorization to make a special sale of controlled materials may be granted (a) where the person has an allotment of controlled materials and (b) where the person has no allotment. In the first instance, the person when granted permission to buy idle and excess stocks need not charge his allotment account with the amount of materials so acquired. In the case of copper in controlled material form, permission may be given only if the buyer has an authorized production schedule.

Controlled materials purchased under the special sales procedure must be used under WPB rules. List A and B will be revised monthly.

Year-End Scrap Stocks Total 6,458,000 Tons

Washington

• • • Stocks of iron and steel scrap at plants of consumers, suppliers, and producers at the end of December, 1943, approximated 6,458,000 gross tons, according to the Bureau of Mines, U. S. Department of Interior. Pig iron stocks totaled 1,404,000. This represents an increase over the stocks on Nov. 30, 1943, which totaled 6,391,000 tons, accounted for mainly gains in stocks in dealers yards, the observance of the Christmas holiday by consumers, and the strikes late in December at steel plants. The latter factors caused a reduction in consumption.

Summary of Stocks and Consumption of iron and steel scrap and pig iron, Gross Tons

	Stocks at End of Month			Consumption During Month		
	Scrap			Scrap		
Month	Purchased	Home	Pig Iron	Purchased	Home	Pig Iron
January	5,370,000	1,464,000	1,302,000	1,942,000	2,550,000	4,515,000
February	5,354,000	1,517,000	1,370,000	1,857,000	2,321,000	4,162,000
March	5,343,000	1,507,000	1,350,000	2,102,000	2,685,000	4,660,000
April	5,416,000	1,502,000	1,327,000	2,019,000	2,623,000	4,423,000
May	5,414,000	1,491,000	1,328,000	2,053,000	2,670,000	4,511,000
June	5,385,000	1,531,000	1,374,000	1,944,000	2,549,000	4,239,000
July	5,318,000	1,542,000	1,344,000	1,964,000	2,606,000	4,473,000
August	5,237,000	1,541,000	1,363,000	1,975,000	2,711,000	4,620,000
September	5,067,000	1,546,000	1,385,000	1,978,000	2,679,000	4,571,000
October	4,978,000	1,478,000	1,343,000	2,051,000	2,779,000	4,706,000
November	4,896,000	1,495,000	1,332,000	2,006,000	2,575,000	4,465,000
December	4,939,000	1,519,000	1,404,000	1,906,000	2,543,000	4,481,000

Alloy Scrap Utilization Recommended

REPORTING to a recent Ferrous Foundry Industry Advisory Committee meeting, on a series of tests run by a foundry looking to the utilization of the surplus alloy scrap supply, Victor E. Zeng said that these tests proved extremely satisfactory.

Being faced with the problem of using their own remelt, plus 8 plus alloy turnings in alloy melts under Order M-21-a, electric foundries with smaller melting units frowned on using additional alloy scrap. The melting of these turnings imposed considerable hardship and chance, due to bulk (low poundage per cu. ft.) which caused back charging with loss of time and hazards from flying molten metal; erratic analysis, which gave difficulty in figuring analysis, and thereby limited the amounts of alloy steels that could be used in conjunction with them, and retained cutting oils, which increased carbon content with increased melting and refining time, as well as possibilities of sulphur pick-up.

Late in November a 90-day relief from M-21-a was granted to experiment on making alloy steels with the maximum alloy steel scrap charges. The following is a resume of 100 such heats melted in a period of 17 days.

Scrap Charge	lb.	Per cent
Total scrap	1,171,900	100.0
Foundry remelt alloy	490,500	41.9
Foundry remelt carbon	24,500	2.1
Purchased alloy	544,900	46.5
Purchased carbon	112,000	9.5

Use of some carbon steel scrap is necessary to adjust chemical compositions, as these heats are melted without the use of any additions of virgin alloy.

When first starting this procedure, considerable difficulty was encountered in adjusting charges to maintain a desired composition. However, it is felt that this is now well overcome, and charging instructions are given so as to maintain a specific range that meets all physical requirements.

The chemical range is listed, with the percentage of "withins," for each major element.

Element:	Carbon	Manganese	Nickel	Chromium	Molybdenum
Range	0.27 to 0.37	0.75 to 0.85	0.60 to 0.90	0.40 to 0.60	0.17 to 0.27
Withins per cent	93	92	67	98	95

It will be noted that nickel is the hardest element to control. This difficulty is caused by variations of as much as 0.3 per cent of this element in scrap steels when purchased under the same specifications, while other elements maintain a much narrower range. To show chemical variation, typical average analyses of 11 cars of scrap received during this trial are given.

Car	Specifications	Nickel	Chromium	Molybdenum
A	SAE 4340	1.62	0.62	0.29
B	SAE 4340	1.84	0.66	0.24
C	SAE 4340	1.86	0.68	0.25
D	SAE 4340	1.68	0.60	0.19
E	SAE 4340	1.56	0.58	0.35
F	NE 8600	0.42	0.32	0.32
G	NE 8600	0.50	0.36	0.33
H	NE 8600	0.38	0.33	0.20
I	Moly Plate	....	....	0.29
J	Moly Plate	....	....	0.30
K	Moly Plate	....	....	0.21

Brinell Hardness	Tensile	Yield	Elongation, per cent	Reduction of Area, per cent
207	100,000	75,000	25	45
217	105,000	77,000	23	45
228	110,000	85,000	19	45
241	115,000	90,000	19	42
255	120,000	95,000 to 100,000	17	40
269	125,000 to 130,000	105,000	17	35

Sampling procedure has been found important in the maintenance of proper scrap piles and charges. When cars contain only one type of scrap, two samples are selected and analyses run in duplicate on each sample. When several types of scrap are received in one car, two samples of each type are analyzed in duplicate and the entire lot averaged.

Scrap is then grouped according to the average analysis. For example, in the preceding analyses three groups were used:

Scrap is charged by magnet into charge buckets, in accordance with instructions issued by the laboratory. Charging instructions vary according to analysis of scrap and the quantity of foundry alloy remelt to be consumed. A typical charge is given below:

	lb.
Foundry alloy remelt scrap	4,000
Moly plate (purchased) scrap	1,000
SAE 4340 (purchased) scrap	4,000
NE 8600 (purchased) scrap	1,000
Carbon (purchased) scrap	2,000
	12,000

This type of melting has produced a steel that melts all QQS-681-B, 4B series and 4C series up to 4C3, consistently and regularly, by variation of heat treatment according to the physical properties desired. Since using this practice, the Ordnance Department after testing 20 consecutive heats placed this foundry on a quality control basis for 4C2 steels. A fairly close control of physical properties can be obtained by controlling the Brinell hardness as shown by the average results obtained from regular production tests on oil quenched and drawn steels.

Besides the economy in conserving alloys from this type of melting, there are other economies such as decreased melting time, decreased power consumption, easier operation, and more consistent results from less experienced melters.

By calculations based on average finished analysis and the ratio of scrap to foundry alloy returns, it was estimated that from these 272 tons of alloy scrap 4884 lb. of chromium, 5451 lb. of nickel and 1300 lb. of molybdenum were conserved and utilized to a good advantage.

This is further substantiated by the fact that the foundry is now starting to return to WPB alloy allocations that will not be required.

From this test run, it is believed that 30 to 40 per cent of alloy scrap (purchased) can be melted in addition to foundry returns, depending upon the alloy specification and the analysis of the scrap available. At present schedules, the foundry contemplates using 500 tons of alloy scrap each calendar month.

Plane Output Hits Record

• • • **Record** production in the aircraft industry, with planes being made at a rate 350 per day, was accomplished during February, according to a report by Charles E. Wilson.

Total airframe weight hit an all-time high of 93,500,000 lb. with bombers, cargo carriers, fighters and tactical planes making up 84 per cent of production. The number of planes accepted by the government was 8760 for the month.

"Manufactured Scrap"

THIS HEAPED UP HANDFUL contains 3 lbs. of head trimmings obtained from 100 ¾" x 6" hexagon head bolts made by cold forging on the most modern bolt-making equipment in a Lamson & Sessions plant. ONE BOLT PER SECOND can be produced by this method.

WASTE OF RAW MATERIALS RATIO is 25:1 in this instance MADE BY EITHER METHOD the finished bolt weighs 13½ oz.

THIS WHEELBARROW contains 75 [illegible] of turnings made in producing 100 ¾ 6" hexagon head bolts on the most [illegible] ern six spindle automatic screw mac[illegible] in a Lamson & Sessions plant. ONE B[illegible] PER MINUTE can be made by this meth[illegible]

. . PRODUCED IN MAKING A BOLT EATS UP TIME, EATS UP MONEY . . . AND EATS UP PRECIOUS MATERIAL!

Whether the material for making bolts is aluminum, copper alloy, alloy steel or just plain carbon steel—there is sure to be a needless waste of raw material required for any given quantity of bolts made by milling as compared with making those same bolts by cold forging.

Lamson & Sessions makes bolts by both methods—and always has—but the trend toward cold forging bolts is now so strong that virtually 98% or more of our entire production is by hot or cold forging, otherwise known as upsetting.

Of the two methods of bolt manufacture—milling and upsetting—milling is the slowest and most exacting method. It is very accurate, but very slow; very expensive because close personal supervision of the machine is essential and it is very wasteful of raw materials.

By weighted averages, the waste factor in manufacture by milling as opposed to production by upsetting (cold forging) is about 20:1. The waste (chips produced by milling) ordinarily cuts away about 50% or more of the raw material. We scrap less than 5% of the raw material when we make bolts by upsetting.

Cold forging and rolling threads produces bolts to such close tolerances that the aircraft industry has accepted them after exacting tests had demonstrated them equivalent or superior to the milled product.

It may be made axiomatic—any bolt that *can be made* by hot or cold forging, *should be made* by hot or cold forging, if the quantity required is large enough to justify making the necessary forging dies.

At left is an actual example of scrap produced per 100 bolts (¾"x6", hexagon head) as made by both milling and cold forging.

Keep this in mind when you design for assemblies for war production—*and for post-war manufacturing too.*

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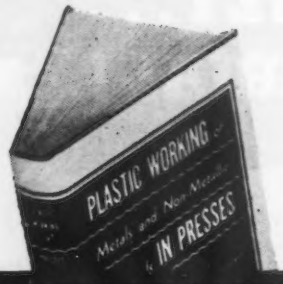

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Canada Drops More Metal Use Controls

Toronto

• • • As of March 1, the Canadian Steel Controller, dropped all control regulations pertaining to the sale of merchant pig iron, with the result that melters now are permitted to place orders direct with producers of their own choice instead of first sending orders to Ottawa for approval as has been the case for the past couple of years. No shortage of pig iron is reported in Canada. On the contrary most producers are carrying good stock piles and are in a position to give prompt shipment on new orders.

Slowing down in Canada's war production program with only minor improvement in civilian production schedules is responsible for curtailment in iron and steel production. With the single exception of sheets, in connection with which Canadian mills are maintaining capacity production and large tonnages continue to pour in from the United States, there is no shortage of steel in this country. While Ontario plate mills are fairly well booked to the end of April, the mills at Sydney, N. S., are operating only about one-third capacity. On bars, structural shapes, and most other types of steel, many producers have unfilled capacity and are seeking new customers.

Canadian Iron, Steel and Ferro Alloy Output

	Net Tons Produced		
	January, 1944	December 1943	January, 1942
Pig Iron	132,128	137,256	138,240
Ferro Alloys	16,495	17,038	18,838
Steel	242,186	227,882	207,008

More steel now is being released for civilian activities and at frequent intervals new items of manufacture are being added to the list that may be produced. H. H. Foreman, administrator of fabricated steel and nonferrous metals, in the Wartime Prices and Trade Board, announced that restrictions on manufacture and distribution of metal windows have been lifted and the manufacture of venetian blinds, prohibited since September, 1942, again is permitted.

COMING EVENTS

March 14, 15—National Association of Waste Materials, Inc., New York.
March 27, 28—American Society of Tool Engineers, Philadelphia.
March 30, 31—American Gas Association War Conference, Rochester, N. Y.
April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.
April 5, 6, 7—SAE National Aeronautic Meeting, New York.
April 12 to 15—The Electrochemical Society, Inc., Milwaukee.
April 17, 18—American Zinc Institute, St. Louis.
April 20, 21—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
April 25 to 28—American Foundrymen's Association, Buffalo.
May 1, 2—Westinghouse Machine Tool Electrification Forum, Pittsburgh.
May 8—Association of Iron & Steel Engineers, spring conference, rolling mill committee, Pittsburgh.
May 25—American Iron and Steel Institute, New York.
June 5, 6, 7—SAE National War Materiel Meeting, Detroit.
Oct. 5, 6, 7—SAE National Aircraft Engineering & Production Meeting, Los Angeles.
Oct. 5, 6—American Institute of Mining & Metallurgical Engineers, Pittsburgh.
Oct. 16, 17, 18—American Institute of Mining & Metallurgical Engineers, Cleveland.
Oct. 27, 28—American Institute of Mining & Metallurgical Engineers, Columbus, Ohio.
Dec. 4, 5, 6—SAE National Air Cargo Meeting, Chicago.
Jan. 8 to 12, 1945—SAE Annual Meeting, Detroit.

Mulac Named to WPB Tools Division Post

Washington

• • • **Anthony A. Mulac** has been appointed an assistant director of the WPB Tools Division in charge of the Industrial Specialties Branch. Mr. Mulac has long been associated with the cutting tool industry and came to Washington from the United Drill & Tool Co. of Chicago, with which he has been associated in a consulting capacity.

Mr. Mulac has been associated with WPB and its predecessor organization OPM, since Aug. 19, 1941. He originally gave his time largely to cutting tool problems. Since September, 1943, he has been chief of the Industrial Specialties Branch, which includes sections handling abrasives, chain, cranes and hoists, metal cutting tools, foundry equipment and supplies, gages and precision measuring tools, heat treating equipment, portable power tools and other industrial supplies.

Eight Point Plan for Small Firms Outlined

• • • **Picturing** small business as being in a perilous position now and needing strong government assistance, Maury Maverick, chairman of the Smaller War Plants Corp., speaking in New York, March 1, outlined an eight-point program to help protect "the little business man." The platform included:

1. Enforcement of anti-trust laws.
2. Elimination of cartels.
3. Financial assistance to small business, aided by present banking facilities.
4. Preference in allocations of materials after the war.
5. No quotas on production of small plants.
6. No curbs on business entry of any line it wishes.
7. First call for small plants on Government-owned tools and equipment.
8. Technical assistance in a manner comparable to that given farmers by the Department of Agriculture.

Maverick warned that returning veterans must be given jobs or the nation faces a dictatorship. He charged that banking interests have not fully planned for the best interests of small business. He declared that many Army cutbacks have been affecting small businesses first.

Idle Tool Holders Must File Monthly WPB Reports

Washington

• • • **To effect an orderly** redistribution of idle tools, WPB has inaugurated a monthly report on idle machine tools. The first report is to be filed by April 1 and there will be a monthly report thereafter. The general instructions accompanying the report form WPB-3475, state:

1—*Who must file* — Every person having physical possession of any government-owned machine tool which is idle, and which had an original cost of $500 or more, must report it on form WPB-3475 to the WPB field office within whose jurisdiction the machine tool is located.

2—*When to file*—The first report is to be submitted on or before April 1, 1944, and may be prepared as of any date within the proceding 30 day period. Succeeding reports must be prepared as of the same date for each month thereafter in which there are any additions or deletions to the list of idle tools. Succeeding reports must be filed within 10 days of the date as of which the report is prepared. Supplementary reports need show only additions or deletions.

3—*Separate reports for each Plancor or facility contract number.*—Use a separate form WPB-3475 to report all machine tools pertaining to each different Plancor number or facility contract involved.

The term "government-owned machine tool" shall mean any power driven mechanism whose primary use and function is to form or shape metal by means of cutting, grinding, shaping, or forming, in which machine tool the United States Government or any department, agency, or establishment thereof has acquired any title, right, or other possessory or property interest.

For purposes of this report, a machine tool is idle if it is not now working on war contracts and if there is no definite work on war contracts scheduled for such machine within the next 30 days.

Cancelled Contract Material Values Explained by OPA

Washington

• • • **On receipt of a** contract termination notice, a manufacturer may have in his plant certain articles which are completed or in process of production. The manufacturer is then required to halt shipments and cease production and is permitted to file a claim for completed articles that are undelivered and for incompleted articles. The manufacturer may be asked to retain these articles and to make an allowance for the metal involved. There are specified provisions for the manufacturer, in determining this metal allowance to be deducted from his claim, for assigning values in excess of the maximum price which would be applicable on a sale of the particular material as scrap.

In such cases, where title to the undelivered articles is retained by the manufacturer, the transaction in question is not a sale of scrap metals, according to the OPA. The value assigned to the metal is but one of the several factors considered in arriving at the amount of the settlement to be received by the manufacturer. In determining the amount of this metal allowance, the parties are not limited by the various maximum price regulations which are applicable to sales of scrap metals. This interpretation applies only to the termination of sales contracts and not to toll contracts.

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MACHINE TOOLS

. . . News and Market Activities

Close Screening of Orders Praised, Blamed

Cleveland

• • • **The machine tool** market continues to register a steadily slackening trend. Orders are considered very spotty and the overall demand has been quite weak and slowly declining. Special tool orders have held up volume somewhat but are also slowing perceptibly. Sudden rush orders for certain types of tooling cause spurts but no flow of business is in sight. Subcontracting is maintaining employment in most plants, however.

One of the most serious complications in the sales of new machine tools at present appears to be the closeness with which WPB is screening requests. The majority of requests for new tools are not being approved and are for the most part being diverted to acceptance of slightly used or government owned tools listed as idle and excess. There is considerable complaint from machine tool builders on this score but also a certain amount of praise of the WPB's efforts.

Realizing that every additional new tool built now will add to the industry's problem of surpluses after the war the close screening of orders by WPB is commended by many tool manufacturers. Those who favor the WPB's action state that manufacturers are in a better position now to absorb the punishment of business diversion than in the period after the war. The other school of thought would favor building of every machine requested as a means of supporting the industry at present with the future of the business to rest in the industry's hands alone after the war.

After more than two years of functioning it is only being learned now that the wording of the machine tool pool contracts is so vague and open that any decision as to who must pay the storage charges on pool tools is just a matter of individual interpretation on the part of the government agency involved.

A recent official report on the growth of the machine tool industry in Australia gives a pertinent tip on what the prospects for post-war exports to Australia might be for American machine tools. Since 1939 Australian facilities have grown from five machine tool plants building less than 100 machines per year to about 75 plants which since the beginning of the war have built and are building on upwards of 20,000 finished machine tools. As a market, saturation appears as evident there as here. Self-sufficiency has been the impetus behind Australian development, the report intimated.

In addition, it was noted, Australia now has 188 plants engaged in the manufacture of small tools and gages which are producing these products at the rate of about 26,000 daily.

•

Westinghouse Machine Tool Forum

• • • **Requirements of** electrical equipment for high speed milling will be explained by prominent machine tool engineers as one of the features of the 1944 Westinghouse Machine Tool Electrification Forum to be held at the William Penn Hotel, Pittsburgh, on May 1 and 2. Many of the problems facing machine tool manufacturers and users today and in the future, will be discussed by recognized experts during the two day session. This will be the ninth annual forum sponsored by Westinghouse Electric & Mfg. Co. to provide information on electrical problems for machine tool engineers and executives of machine tool builders. A portion of the forum time will be turned over to the National Machine Tool Builders' Association for a session on post-war standards for electrical equipment on machine tools. An innovation this year will be the parallel sessions during the afternoon of the first day during which papers of commercial interest will be presented at one session and papers of engineering interest at the other.

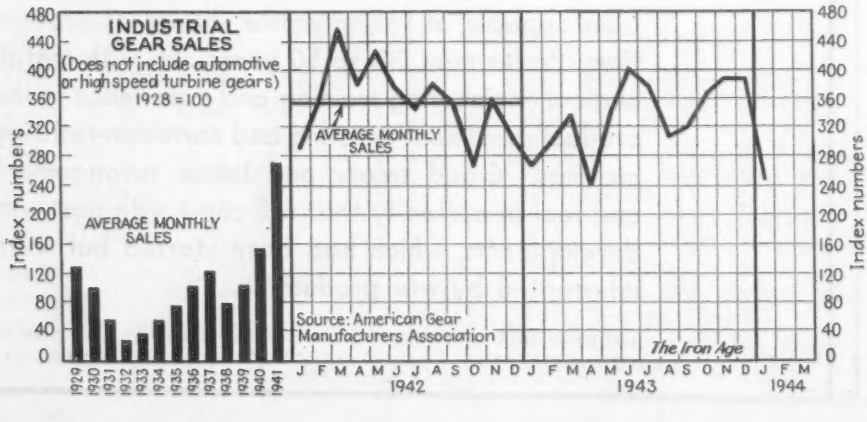
•

Machine Tool Prices Unchanged

• • • **The Bureau of** Labor Statistics' index of prices of standard (non-specialty) machine tools was again unchanged for the fourth quarter of 1943 at 118 per cent of the August, 1939, average, the level prevailing since September, 1941. In January, 1942, the Office of Price Administration fixed prices of machine tools at the October, 1941, average. The level thus established by regulation continued for most machine tools the prices informally agreed upon several months before, but caused a roll-back in prices for certain others. As a result of this action slight price decreases were reported in February, 1942, for radial drills, engine lathes and punch presses, but these changes were not large enough to affect the general average.

January Gear Sales Drop Sharply

. . . The gearing industry as represented by the members of the American Gear Manufacturers Association shows a decrease of 36.5 per cent in the business booked in January, as compared with December. The January index figure was 246 as compared with 387 for December.



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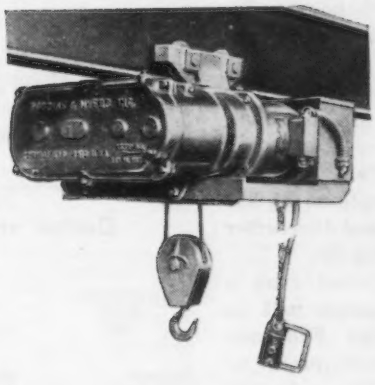

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Making limited (and often inexperienced) manpower go further, R & M Hoists give you the equivalent of several extra hands. These hoists permit you to move materials faster and easier with less help, and prompt delivery of them gives you those benefits . . . now. Two of the many R & M Hoists available for quick delivery are shown here.

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Boston.....74 Needham St.	Jacksonville...305 Bisbee Bldg.	Providence.....44 Clifford St.
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Cincinnati.....418 New St.	Meriden, Conn..135 Colony St.	Seattle.....216 Walker Bldg.
Cleveland. 470 Rockefeller Bldg.	Newark.....700 Bergen St.	Syracuse...204 State Tower Bldg.

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NON-FERROUS METALS

. . . News and Market Activities

Bonus Payments for Tungsten Eliminated

• • • **Premium price payments** to tungsten producers will be discontinued April 30, 1944, the WPB announced. Notice of the discontinuance will be mailed by the Metals Reserve Co. so as to give 30 days' time allowance, as provided in the contracts between producers and the Metals Reserve Co.

This action was taken because adequate stockpiles have been built up and current domestic production and imports are now more than sufficient to meet current consumption demands.

Those tungsten producers who qualified as "eligible" were paid $30 per unit (20 lb.) of contained tungsten for their ore. This premium price (which is $6 above the market price of $24) was set, to secure needed tungsten from marginal mines, in November, 1942.

Under the new program, domestic buying by MRC will continue at $30 per unit until April 30 and thereafter at $24 per unit until June 30.

It was further explained that a similar curtailment program will be followed by the Foreign Economic Administration in the procurement of tungsten from abroad. This reduction in price both in this country and abroad and the decrease in domestic production and imports will be made effective coincidentally by the Metals Reserve Company and by the Foreign Economic Administration.

Nicaro Starts Production

• • • **In his annual report,** L. M. Williams, president of Nicaro Nickel Co. and Freeport Sulphur Co., the parent company, announced the beginning of production at two new nickel plants operated by Nicaro for DPC.

The plants are located at Oriente Province, Cuba, and at Wilmington, Del. Metals Reserve Co. will receive all the nickel made at these plants.

Ore from open strip mines are treated at the Cuban plant where it is crushed, dried and ground to a very fine mesh in hammer and ball mills. The dry dust is then reduced and bleached in an ammonia solution from which the nickel is precipitated in the form of nickel carbonate. The next step is calcining the carbonate to nickel oxide which is shipped to the Wilmington plant for futher refining.

The cost of the Cuban and American plant was $33,500,000.

Scrap Stocks Down

• • • **In the non-ferrous scrap** metal industry, the December summation showed an increase in dealers' receipts and stocks on hand, but a decrease in dealers' shipments to consumers, according to the U. S. Bureau of Mines.

The increase in receipts was slight, but stocks mounted 7 per cent over the November closing inventory, while the decrease in shipments to consumers, from 81,944 tons in November to 77,174 tons in December, registered a decline of about 6 per cent.

Receipts of copper and brass during December showed an increase over November of 3135 net tons or approximately 8 per cent. At the same time dealers' shipments to consumers declined from 39,595 tons in November to 38,994 tons, the lowest point since September and the third lowest point during the entire year. Dealers' receipts in December were above average, but shipments to consumers were almost 6 per cent below the average for the year. It is also to be noted that shipments to consumers for the last six months of 1943 were consistently lower than for the preceding six month period.

The breakdown of various grades of copper and brass scrap shipped to consumers was as follows:

	Net Tons
Rod ends and rod turnings	3,917
Brass mill clips, punchings, etc.	2,587
Unalloyed copper scrap	8,437
Composition and bronze (OPA Group 2)	9,677
Yellow brass (OPA Group 3)	4,087
Radiators	1,195
All other copper-base scrap	9,094
Total copper and brass scrap	38,994

Dealers' stocks of non-ferrous scrap metals in 1943, in net tons

INVENTORY DATE 1943	Type of Non-Ferrous Scrap Metal						Total
	Copper	Lead-Tin	Aluminum	Zinc	Nickel	Magnesium	
January 1	54,815	37,333	8,720	6,312	911	75	108,166
January 31	50,231	35,982	9,137	6,206	831	95	102,482
February 28	49,289	32,885	8,420	5,856	788	100	97,338
March 31	47,945	31,528	8,884	5,731	796	105	94,989
April 30	48,561	30,946	9,340	5,334	847	129	95,157
May 31	48,964	30,621	10,163	5,137	787	153	95,825
June 30	47,952	29,584	12,280	5,133	853	124	95,926
July 31	47,659	28,855	15,518	5,520	783	154	98,489
August 31	46,438	28,740	18,012	4,977	761	141	99,069
September 30	47,829	30,101	19,173	4,948	749	163	102,963
October 31	47,771	31,682	21,167	4,887	807	(1)	[1]106,314
November 30	46,374	31,930	22,826	5,009	861	(1)	107,000
December 31	48,713	35,225	24,400	5,240	927	(1)	114,505

[1] Magnesium scrap statistics discontinued in October.

Dealers' shipments of non-ferrous scrap to consumers in 1943, in net tons

MONTH 1943	Type of Non-Ferrous Scrap Metal						Total
	Copper	Lead-Tin[1]	Aluminum	Zinc[1]	Nickel[1]	Magnesium	
January	42,073	25,832	10,353	3,464	419	167	82,308
February	41,425	25,024	11,112	4,141	396	197	82,295
March	46,056	24,239	11,597	3,817	459	223	86,391
April	43,556	22,187	11,882	4,310	370	238	82,543
May	45,680	21,347	11,417	4,185	421	287	83,337
June	43,524	22,576	9,158	3,657	413	226	79,554
July	39,464	22,648	8,799	3,263	318	132	74,624
August	38,791	22,358	9,173	3,870	502	479	75,173
September	37,185	21,843	11,412	3,402	458	180	74,480
October	40,600	22,803	11,739	3,250	373	(2)	78,765
November	39,595	26,297	12,171	3,332	549	(2)	81,944
December	38,994	22,426	11,482	3,792	480	(2)	77,174
Total 1943	496,943	279,580	130,295	44,483	5,158	2,129	958,588

[1] Includes scrap melted by dealers.
[2] Magnesium scrap statistics discontinued in October.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over.	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Schwartz Lauds Canada's Efforts in Scrap Campaigns

• • • Too frequently in America's drive to get out more scrap for use in the nation's steel plants, the aid afforded by allied nations in obtaining this needed scrap is overlooked. For example, it was pointed out by Benjamin Schwartz, chief of the scrap metals section of the Foreign Economic Administration, that the United States imported scrap metal from 30 countries during 1943.

Speaking before the Canadian Secondary Materials Association at Montreal last week, Mr. Schwartz lauded the Canadian contribution of scrap to the United States during 1943. He said, in part:

"The scrap metal trade of Canada has played an important part in fulfilling the strategic raw material requirements of the United Nations. With reference to the United States alone, the contribution of Canada in the form of scrap iron and steel and nonferrous scrap metals has been substantial. Although figures cannot be quoted, it is pertinent to note that Canada is at the top of the list of 30 countries from which scrap metals were imported into the United States."

Interesting also to note is the fact that the machinery established between the Canadian and American governments for the clearance of exports and imports of scrap has functioned smoothly. The volume of scrap business was distributed over a wide base of dealers and it was possible to facilitate private trading between dealers in Canada and dealers and consumers in the United States without the necessity of direct government purchases.

•

PITTSBURGH — Snow and sleet this past week here will not slow deliveries up to the point where any acute shortages will result. Prices are firm in this area, but short turnings are still coming from Detroit without the springboard. Rejections are not as heavy on material as was the case a month ago. Apparently as result of heavy rejections several weeks ago, dealers and consumers have tightened up on inspections.

•

PHILADELPHIA—Mill stocks of open hearth grades are low and there seems no indication that they will be increased greatly. One mill, however, is still holding up some of its scrap shipments. Some consumers have placed restrictions on machine shop turnings. In contrast to this, electric furnace inventories remain quite large, making low phos difficult to move except at 75c. to $1 below OPA ceilings. Short shoveling turnings are hard to dispose of and this grade, when sold, goes at the price of machine shop turnings. However, crushed turnings still sell at the short shoveling turnings price.

105 MM. CASINGS: *These 105 mm. shell casings have been assorted by Italian laborers near the Cassino front and will be reloaded and used again. The Armed services maintain a careful and extensive salvage program, utilizing as much as possible used and damaged equipment and supplies.*

Details of a plan for utilizing 100,000 tons of contaminated, low grade scrap for ship ballast at Pacific shipyards is described in the "West Coast" column, page 84.

With a bad labor situation that is getting worse scrap yards are not hunting for business, knowing they can barely prepare material they now have.

•

BIRMINGHAM—Cast grades are in good demand here at ceiling prices although remote material of this type is not netting shipper full ceiling. Mills are limiting amount of freight they absorb, with amount absorbed varying. There is also considerable demand for blast furnace and open hearth grades. No demand exists here at present for foundry or electric furnace grades of steel and as a result some material normally made into these grades is being prepared for open hearth use.

•

CINCINNATI — Dealers indicate strict adherance to the ceiling prices with virtually no selling under the ceiling prices, although melters refusing to pay springboard differentials tend to increase. Resistance on payment of freight rates on remote material also is reported. Consumers continue to strengthen in their attitude and dealers indicate that a closer check on specifications is being made with threatened rejections frequent.

•

BUFFALO—Allocations of scrap from outside areas continue while the local yield remains at extreme low level. This winter likely will set a record for shipped-in material, most of it going to the district's leading consumer, whose reserve now is estimated as good for only 15 days. Demand for prime scrap remains firm. Electric furnace items are slow. Some dealers are of the opinion heavy battlefield scrap may appear in this district with the opening of Barge Canal navigation. Except for the waiving of premiums on alloys and stainless, ceiling prices prevail.

•

WEST COAST—Standard heavy melting scrap continues available at from $1 to $3 below ceiling. There is practically no market for machine shop turnings and sales when they occur are at 50 per cent of ceiling. Allocated shipments of shipyard plate scrap continue to midwestern buyers who pay a premium for this material. Because of surpluses and depressed markets, sources of ordinary scrap supply outside of the shipyards are tending to dry up and processing and movement are sluggish.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.	Heavy Structural and Plate			Foundry Steel						
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shovelling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.

UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.
$1.00 per lb. contained W if 1 to 5%.
$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Revised price schedules, establishing dollars and cents differentials for railroad scrap and establishing revisions in cast iron scrap grades are shown on page 158. These schedules, amendment 14 to RPS No. 4, replace the previous schedules on Railroad Steel Scrap and Cast Iron Scrap sold by railroads.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Mar. 9, 1944	Feb. 29, 1944	Feb. 1, 1944	Mar. 9, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Mar. 9, 1944	Feb. 29, 1944	Feb. 1, 1944	Mar. 9, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 153-165.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
March 9, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 16
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	[10] Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[2]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[13]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.88¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.33¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.; Sheffield Steel Corp. $2.55 St. Louis.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—Sheffield Steel Corp. $2.75 St. Louis; W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg, Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018a	3.922	4.772	3.605	3.666	3.822	4.702	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.753	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25c	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.90	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)*

Per Gross Ton

Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

PRICES

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

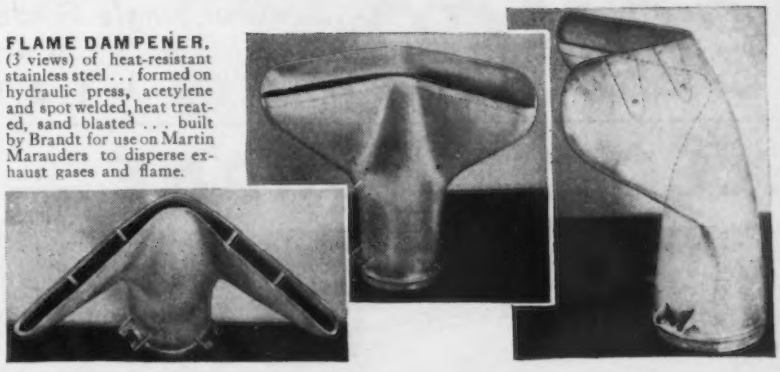
Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00

Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleve-



FLAME DAMPENER, (3 views) of heat-resistant stainless steel . . . formed on hydraulic press, acetylene and spot welded, heat treated, sand blasted . . . built by Brandt for use on Martin Marauders to disperse exhaust gases and flame.

Forming, Welding, Fabricating—

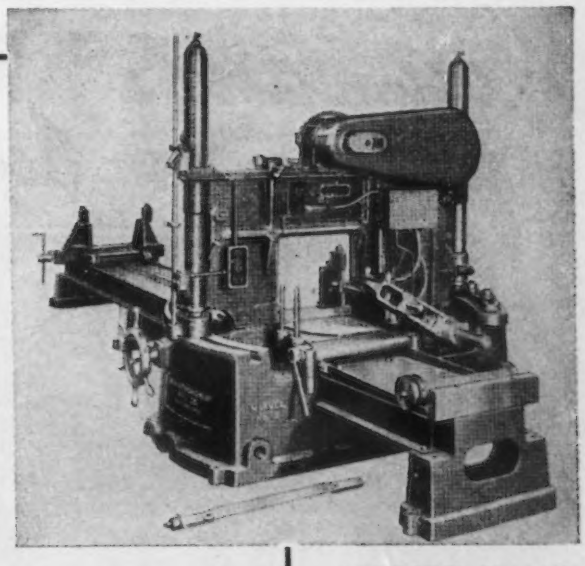
Call BRANDT of Baltimore

for Precision in Heavy Plate and Sheet Steel Work

Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. For information, address: Charles T. Brandt, Inc., Baltimore-30, Maryland.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18

Giant Hydraulic Hack Saw

Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .

● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS

Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.

Builders Of Conco Torpedo Electric Hoist

You can STRETCH MANPOWER by using

CLARK FORK TRUCKS

CLARK TRUCTRACTOR

DIVISION OF CLARK EQUIPMENT COMPANY

BATTLE CREEK, MICHIGAN, U.S.A.

PRICES

land, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

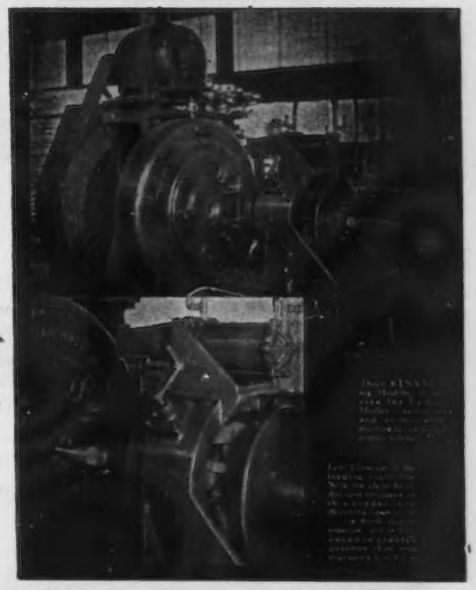
	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

ETNA

A client of ours had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so they did the safe and logical thing—they put their swaging job up to Etna.



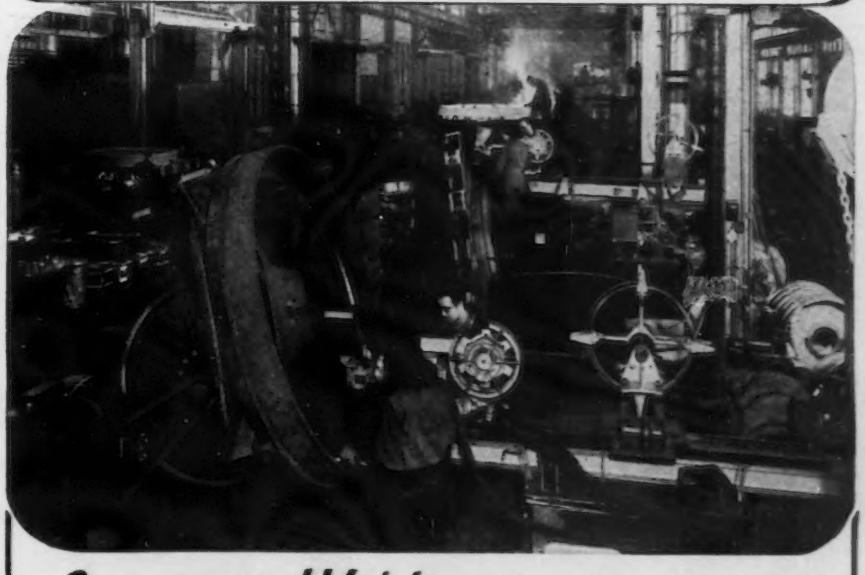
The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...
"Ask ETNA About Swaging"

ETNA
MACHINE COMPANY
TOLEDO OHIO

C-F POSITIONERS



Automatic Welding—is possible on many jobs if you have a C-F Welding Positioner. Coming in 6 sizes (capacities to 30,000 lbs.) tables tilt to 135° beyond horizontal and rotate 360°, under push button control. Exclusive C-F Variable-Speed control gives table rotations ranging down to 0 r.p.m. for all sizes.

All C-F Positioners are multi-purpose tools equally efficient on either job or production welding.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO. 1303 S. Kilbourn Ave. Chicago 23, U.S.A.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$25.50*	....	....
Brooklyn	*27.50*			*28.00*	....	....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	....	....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	....
Everett, Mass.	25.00	24.50	26.00	25.50	....	....
Swedeland, Pa.	25.00	24.50	26.00	25.50	....	....
Steelton, Pa.		24.50			29.50	....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	....
Sparrows Point, Md.	25.00	24.50	....	....	....	....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	....	....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	....	....
Buffalo	24.00	23.00	25.00	24.50	29.50	....
Cincinnati, Ohio	*23.94*	*23.94*	....	*25.11*	....	....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	....
St. Louis	*24.50*	*24.50*	....	....	....	....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.... *$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	....	....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	....
Hamilton, Ohio	24.00	23.50	....	24.00	....	....
Toledo	24.00	23.50	24.50	24.00	....	....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	....
Detroit	24.00	23.50	24.50	24.00	....	....
Lake Superior fc.	....	....	....	....	....	34.00
Lyles, Tenn. fc. (2)	....	....	....	....	....	33.00
St. Paul	*26.76*	....	*27.26*	*26.76*	*39.80*	....
Duluth	24.50	24.00	25.00	24.50	....	....
Birmingham	20.38	19.00	25.00	....	....	....
Los Angeles	*26.95*	....	....	....	....	....
San Francisco	*26.95*	....	....	....	....	....
Seattle	*26.95*	....	....	....	....	....
Provo, Utah	22.00	21.50	....	....	....	....
Montreal	*27.50*	*27.50*	....	*28.00*	....	....
Toronto	*25.50*	*25.50*	....	*26.00*	....	....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

Using Hannifin Pneumatic Arbor Presses means easier handling. Even with new help or women operators the work is simple and easy. A touch of the control valve operates the press, with a positive, rapid, smooth action. Fatigue is minimized, and the operator's attention can be devoted to the work. For fast, uniform production, investigate the advantages of Hannifin Pneumatic Presses. Write for Bulletin 48-A.

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621-631 South Kolmar Avenue
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PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1¼ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Base discount less keg lots

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full keg lots, 10 per cent additional discount.

Stove Bolts	*Consumer*
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer*
	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

ROOFING TERNE PLATE
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

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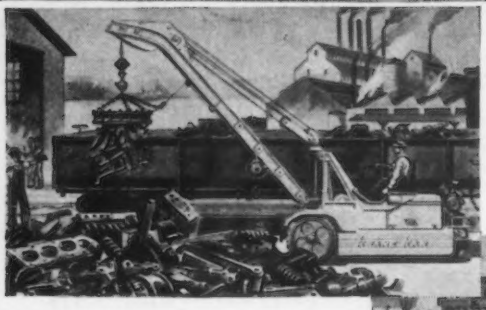
SILENT HOIST CAR PULLERS & BARGE MOVERS



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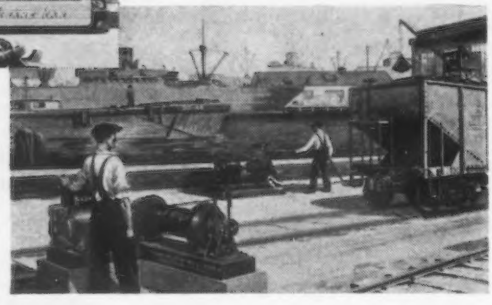

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PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more... $1.90

Ferrovanadium, 50-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30
- Per lb. alloy $1.20
- Ton lots $1.25

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal No. 1, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis, per lb. ..... 87.5c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium ... $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum ..... 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant with usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 6.5c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

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ALLOY STEELS FOR OFFENSE

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Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

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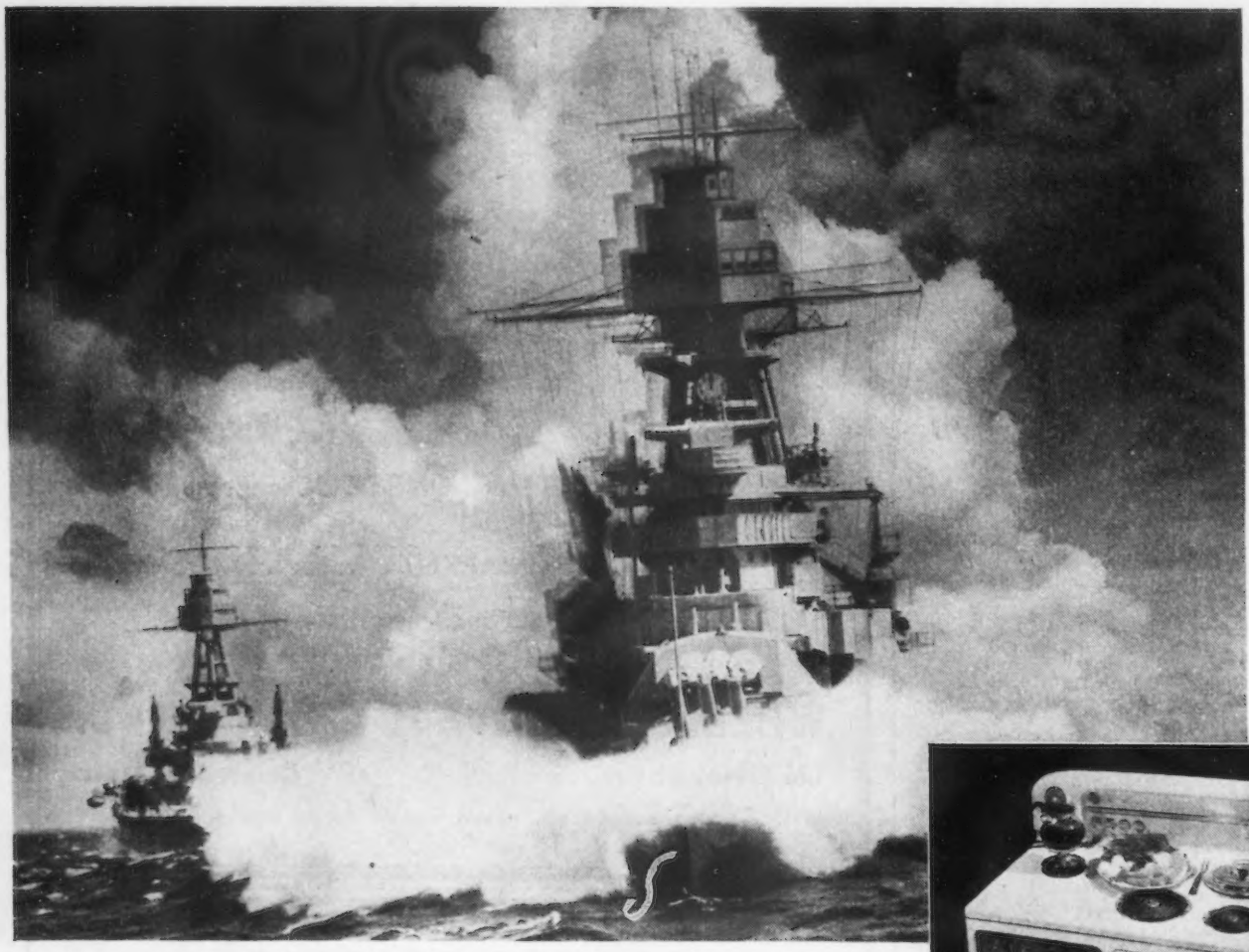

Holding a Ship's Shape... Shaping a Stove's Course

THAT SHIP . . . defying a rough-and-tumble fighting ocean . . . needs stiff-willed stamina in the bolts and nuts that secure its ribs.

That stove . . . built on a fast-moving production schedule . . . needs bolts and nuts that are quick on the get-away and take tightening without fumbling or jamming.

For fastening strength that will resist whatever beating a ship or steam-shovel or stone-crusher can give . . . for accurate mating that hurries a product along an assembly line: fasten with RB&W bolts and nuts.

RB&W developments in cold-forming and cold-punching have set new standards in holding power, accuracy and appearance for all kinds of fastening devices.

The dependability you would expect from the accumulated experience of 99 years and the results of hundreds of thousands of dollars' worth of research work . . . is wrapped up with every shipment of RB&W products. Little wonder that so much of the best-known farm machinery, transportation equipment, electrical appliances, construction equipment and furniture is put together faster and held together better by RB&W fasteners.

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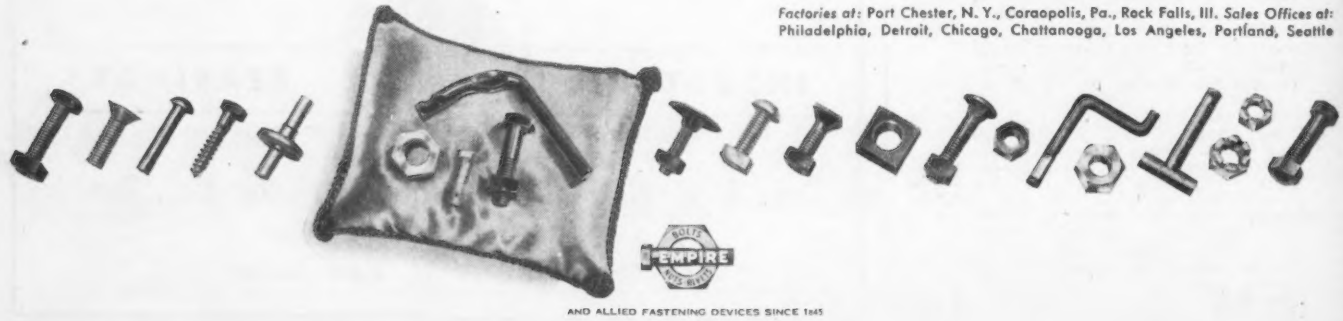

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Seattle

Profit Not Without Honor

YOU remember the saying: "A prophet is not without honor save in his own country." It was originated in the days when a prophet had a hard time making both ends meet or even in getting his neighbors to listen to him. Maybe there had been some overdoing of the art in those days, or a little shady practice by a minority of the prophets which resulted in giving the profession a black eye. It has gotten well over that now and the practitioners of prophecy are doing nicely today, judging by the size of their circulation lists and the prices they charge for their services.

Profits apparently are undergoing a period of public censuring somewhat similar to the lambasting that the prophets took in the days of old. Perhaps it is war psychology and the fact that people do not like the idea of money being made out of suffering that have started people looking askance at profit statements in general. At any rate it has gone beyond the mere war conception and there seems to be a notion that large profits are immoral or at least unethical, at any time.

If this notion carries over into our postwar thinking it will do considerable harm, because what we will need then, for industries to grow in employment and wages and for the National debt to diminish will be more and better profits. The only unprofitable business that I know of that can grow and expand and enlarge its payrolls in spite of red ink is government. And that can only be done by taxing profitable businesses.

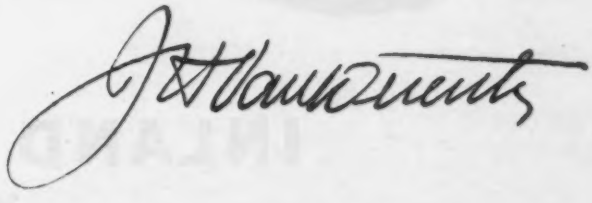
Profits are immoral and unethical only when not earned. Those kind we can eliminate through proper legislation.

The businesses that are the best profit earners are going to be the ones that will put and keep us on our feet after the war. The richest earth gives the best crops. Thistles thrive on stony ground.

Take three typical producers in any industry. One, a submarginal company that just manages to keep its head above water. Another, an average company that earns an average profit over a ten-year period of say six or eight cents per dollar of volume. And still another, an exceptionally efficient and well managed company making the same product but averaging twice that profit. In which of these companies would you expect to find the best wages, the best working conditions and the most promising prospect for growth?

Earned profits should not be without honor in our own country. Millions of profitable private enterprises will do more to keep us free of fascism or any other 'ism than any other factor.

Tax our profits from enterprise as much as necessary, after they are made. But encourage the making of them for therein lies strength and health for both people and government.



INLAND ENGINEERS
Finish Another Wartime Job

Up the channel from the Inland plant, at the lower end of Lake Michigan, stand two new blast furnaces, and two batteries of coke ovens —built by Inland engineers for the Government—to increase the supply of pig iron for the nation at war.

This is only one of the many wartime jobs Inland engineers have undertaken and carried through to completion in fast time. For instance there is the Inland No. 6 blast furnace—put in operation over a year ago—one year after the foundation piling was driven. And the new electrolytic tin plate unit—a project that saves critical tin—reduces by one-half the amount used for plating.

Inland engineers, known for their drive and foresight through the years, apply their skill to the needs of war—and look for new opportunities to serve a victorious America.

INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

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The IRON AGE
MARCH 16, 1944

NEWS FRONT

► If the German war ends before Japan is knocked out, Edwin C. Barringer of the Institute of Scrap Iron and Steel foresees a cut of 33 to 50 per cent in war material production.

All land fighting will not cease then, however, and contracts will be terminated in better fashion.

If government price controls are relaxed in the immediate postwar period, he says price fluctuations may be terrifying.

► First transaction under new setup for surplus war property disposal is the sale of the San Jacinto shipyard at Houston by the Maritime Commission to Dupont. Plant will be adapted for the preparation of phenothiazine.

► The Truman Committee still supports the postwar bond proposal which provides for the setting aside of reserves up to 20 per cent of the normal net income tax to be invested in a special issue of non-negotiable, non-interest-bearing government bonds. These bonds redeemable 18 months after the war would provide the Treasury with immediate funds and the taxpayer with means for reconversion.

► American Brake Shoe Co.'s new experimental foundry can handle castings weighing 2000 lb. Immediate work will be devoted to pilot centrifugal and static castings practices for the aircraft industry and experimental work assigned by the War Metallurgy Committee.

► Curtailed for a while, the landing mat program is being resumed.

► Under pressure to supply operational aircraft for the defense of Germany, the development of new designs in Germany has lagged considerably.

The most interesting new fighter is the Focke-Wulf Fw 290, which has abandoned the BMW 801 motor in favor of the 2000 plus hp. Junkers Jumo 213. This fighter is the first operational type of the Luftwaffe made entirely of wood, guaranteeing a considerable speed-up in production.

Another new fighter is the Me 209, and it also may be built of wood, or some German reports have hinted that the construction will be of plastics. This new plane may be more heavily armored than the 109 series, perhaps replacing the 20 mm. cannon with a 30 mm. calibre.

► Junkers, Arado, Heinkel and Messerschmitt have all done a great deal of developmental work on stratosphere bombers, but indications are that this type of craft has not reached front-line perfection, other than a few prototypes employed for reconnaissance purposes.

There have been many German patents on jet propulsion over the past five years, and Messerschmitt, Heinkel, Arado and Henschel have all studied this development assiduously. However, all indications are that German jet propelled planes will fly into combat until only long after Allied jet planes are in operational use.

► In view of the need for stainless steel in civilian goods, the WPB has allocated some 2000 tons per month for first quarter to OCS. Of this amount, about 900 tons per month may go into flat ware.

► WPB's Iron and Steel Scrap Advisory Committee assails claims of carbon steel scrap sufficiency. Specialties, however, are being sold under ceilings.

► Work undertaken in the laboratories of the Timken Roller Bearing Co. on various steel grades indicates the existence of a definite relationship between hot twisting characteristics and forging temperature.

The hot twist test reveals the temperature which must not be exceeded during forging, changes in ductility with varying temperatures and the change with temperature of the force required to deform the steel.

► The new alloy Galv-Weld has been successfully used to regalvanize bare spots caused by welding.

The low melting alloy is rubbed over the heated bare spots to form a smooth coating of the metal which has all of the corrosion resisting properties as well as the wearing qualities of the original galvanized coating.

The new layer is continuous with no holes or fissures.

Evaluating Steel Forgeability

. . . Data obtained from the hot twist test have been a valuable guide in determining the optimum conditions for hot forming operations. The apparatus and procedures used in this test are herein described and the results of tests on various steels interpreted.

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By C. L. CLARK
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WHILE considerable attention has been given to the high temperature properties of steels during the past several years, most of this work has been confined to the required operating temperatures and pressures of certain types of equipment; that is, up to temperatures of about 1500 deg. F. Data are meager on the properties of steels at the more elevated temperatures, and yet information of this type is of considerable value in establishing the proper conditions for various hot forming operations like forging.

Various tests have been used in the past for determining the proper forging temperatures with varying degrees of success. However, work undertaken in the laboratories of the Timken Roller Bearing Co. indicates that a definite relationship exists between hot twisting characteristics and forging temperature. This test is believed to be more sensitive and the results more quantitative than those obtained from other methods of evaluation.

The hot twist test itself is not new. It was described by Professor Sauveur in his 1939 Campbell Memorial Lecture* in which results were given for several steels, but at temperatures up to 2000 deg. F. only. It has likewise been used by other investigators for determining certain hot working characteristics of steels up to 2500 deg. F.†

* *"Metals at Elevated Temperatures," Transactions, ASST, Vol. 17, pp. 410-448, 1930.*

† *"The New House of Science," Globe Steel Tubes Co., Milwaukee.*

The apparatus used in the Timken Roller Bearing laboratories for determining the hot twist characteristics is shown in Fig. 1. It consists essentially of a furnace for heating and maintaining the specimen at the

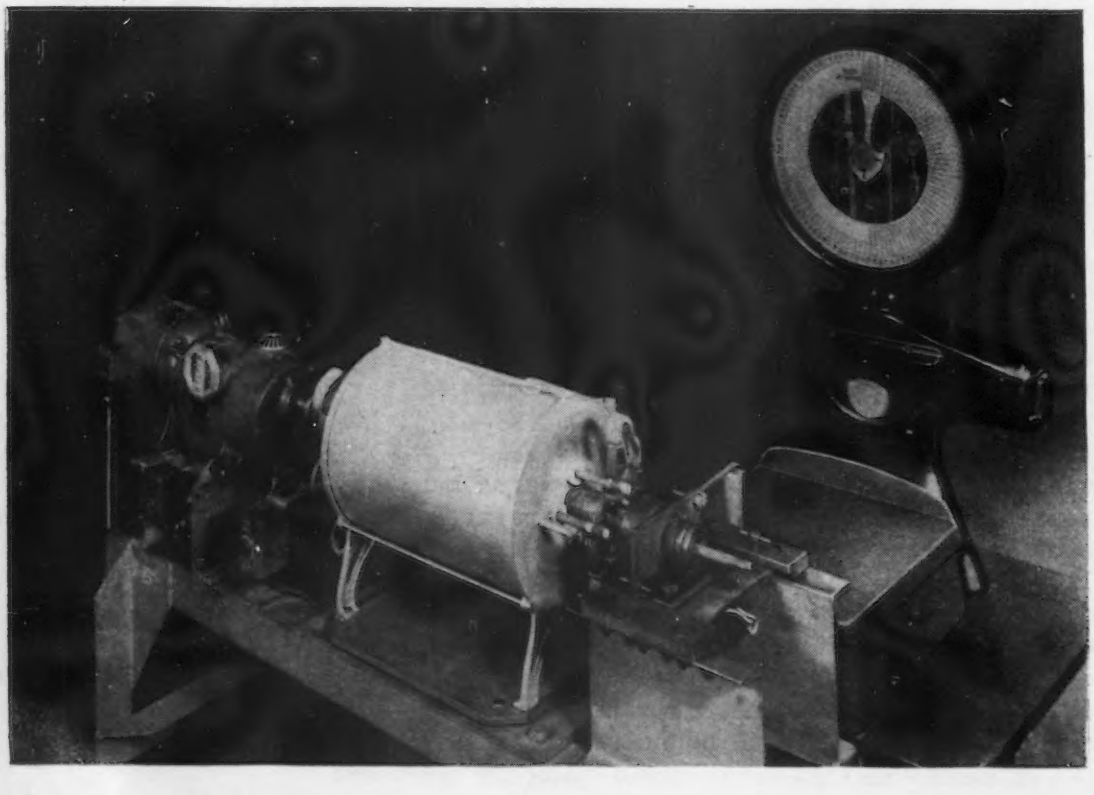

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FIG. 1—Hot twist testing apparatus consists of a furnace, a variable speed motor, a chuck mounted in a bearing and a platform scale for measuring the force produced during twisting. The scale reading times the length of the lever arm gives the torque in in.-lb.

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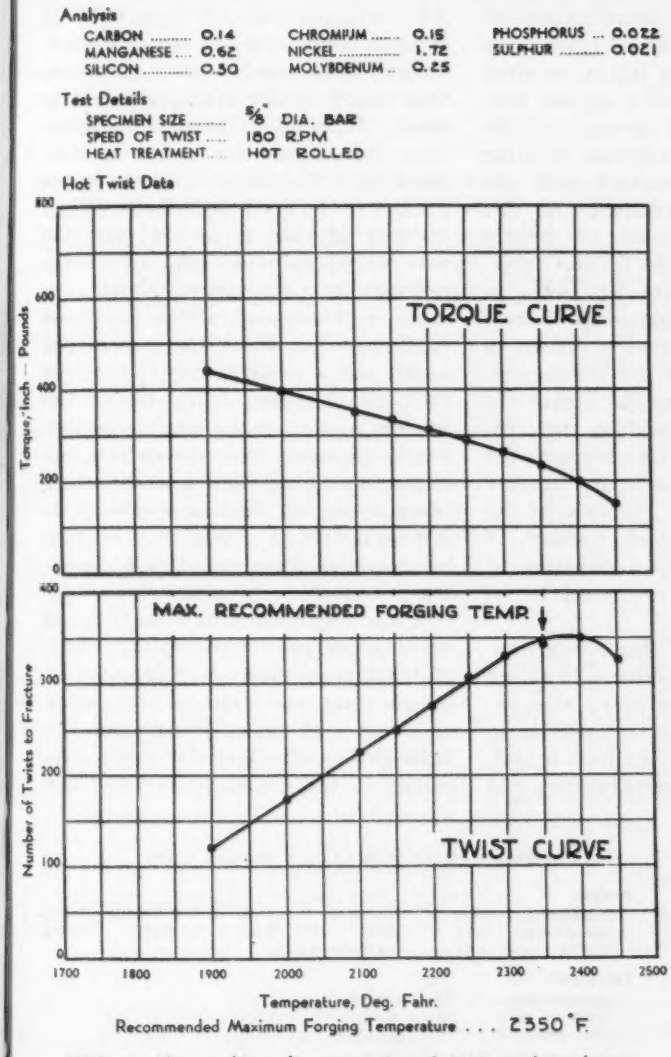


FIG. 2—Hot working characteristics of 4615 steel as determined by the hot twist test.

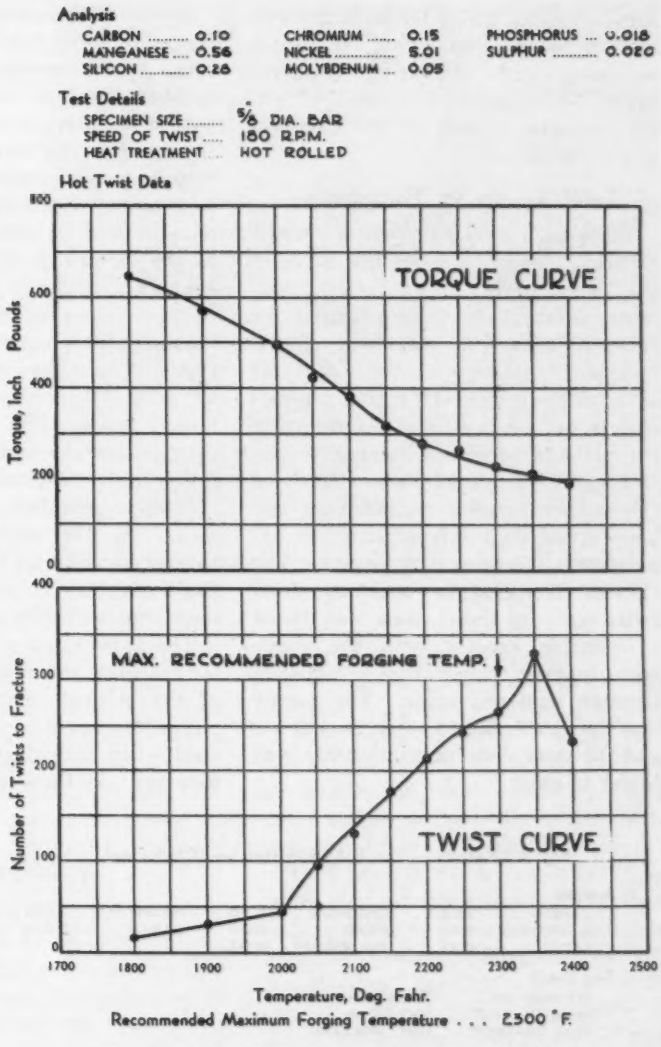


Fig. 3—Hot working characteristics of 2512 steel.

given temperature, a variable speed motor for turning the specimen at the desired rate, a chuck mounted in a bearing to which the torque arm is attached, and a platform scales for measuring the force produced during the twisting of the specimen.

In performing the test, the specimen is placed in the apparatus and fastened in the chuck of the variable speed motor. The specimen is rotated at slow speed while it is being heated to and held at the desired temperature and, after 15 min. at temperature, the motor is stopped, the other chuck tightened and the motor restarted at the desired rate of speed. A counter, which automatically starts and stops at the beginning and end of the test, gives the number of revolutions while the force exerted on the scale is read and recorded. The scale reading, multiplied by the length of the lever arm, gives the torque, expressed in in.-lb.

Work has been done on different specimen sizes, with the steel in varying conditions of initial heat treatment, and at various rates of twist. For convenience, however, the specimen size has been standardized at $\frac{5}{8}$ in. round with the material in the hot rolled condition since at temperatures of 1800 to 2500 deg. F. the initial heat treatment has little if any influence on the results obtained. Likewise for forging applications a rate of twist of 180 rev. per min. is used, which is the lowest operating speed of the motor.

Results obtained from four different steels, two of which are of the constructional type, one a tool steel and the other a stainless grade are given in Figs. 2 to 5.

In each case the number of twists required for fracture increases as the temperature is raised until a critical temperature is reached after which the number of twists decreases. There are, however, differences between the steels in (a) the number of twists required for fracture at a given temperature; (b) the rate at which the number of required twists increases with temperature; (c) the temperature at which the number of twists reaches a maximum, and (d) the rate of decrease in the number of required twists after the critical temperature is passed.

Insofar as the two constructional steels are concerned, not only does 4615 have its temperature of maximum twist 50 deg. F. above that of 2512 but it approaches and departs from this temperature at a much slower rate. The tool steel, 10105, is quite similar to 2512 except that its temperature of maximum twist is considerably lower, being 2150 deg. F. as compared to 2350 deg. F. On the other hand, the stainless 18-8 alloy does not reach its temperature of maximum twist at 2450 deg. F. This steel, however, requires fewer twists for fracture than the other steels, except at the highest temperatures.

The torque curves show the strength to decrease continuously as the temperature is increased and thus the relationship is different from that found in the twist curves. With the different steels, however, there are differences in the magnitude of the

torque at any given temperature and also in the rate at which the torque decreases with increasing temperatures. The stainless 18-8 has the highest strength at each of the temperatures considered.

Twist Results vs. Forgeability

Since each steel possesses a definite critical temperature, on the basis of the twist curves, at which the maximum number of twists required for fracture occurs, it was believed advisable to attempt to correlate this with well established forging temperatures on alloy steels. Considerable trouble had been encountered earlier in forging certain of these steels and the proper forging temperature had been established only after much experimentation on actual forgings. The critical temperature obtained from twist tests on these steels was found to coincide exactly with the maximum forging temperature established through trial and error. The survey was then extended to other type steels and the same definite relationship was found to exist.

A metallographic examination of fractured twist specimens reveals the cause of the decrease in the required number of twists after a certain temperature is reached as well as the reason for the correlation existing between this temperature and the forgeability characteristics. As this temperature is exceeded, the nature of the failure changes in that intergranular cracking appears, even in sections removed from the actual fracture. This condition is shown in Fig. 6. The degree of this intergranular cracking increases the higher the testing temperature is above the critical temperature and this accounts for the resulting decrease in the number of twists. Similarly, the rate of decrease in the required number of twists is undoubtedly a function of the susceptibility of the steel to intergranular cracking.

The appearance of this intergranular cracking at temperatures in excess of the critical temperature also explains the cause of certain defects in steel when forged at too high a temperature. At these temperatures, and for the given rate of application of stress, the strength of the grain boundaries is decreased to such an extent that intergranular cracking is apt to occur. Burning of the steel has often been considered the cause of this cracking, even though oxides are not present in the grain boundaries. While burning of steel is possible and the path of fracture in such cases is intergranular, distinction should be made between steel which has been burnt and that which has been forged at too high a temperature. In the first case, the damage occurs during the heating cycle and the steel is permanently damaged while the defects due to forging at too high a temperature occur during the forging operation itself although of course the heating has established the condition for making those defects possible.

It has long been recognized that the deformation characteristics and path of fracture in steels is a function of temperature and rate of application of stress. At room temperature the deformation of all steels occurs primarily in the grains proper and the

Fig. 4—Results of the hot twist test on 10105 steel.

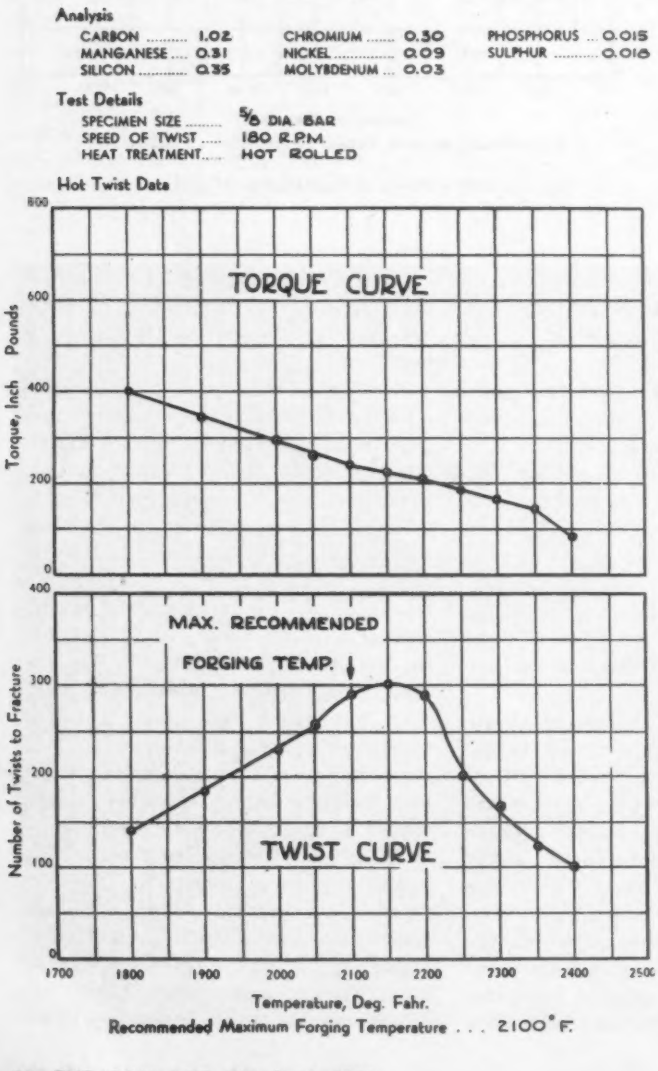
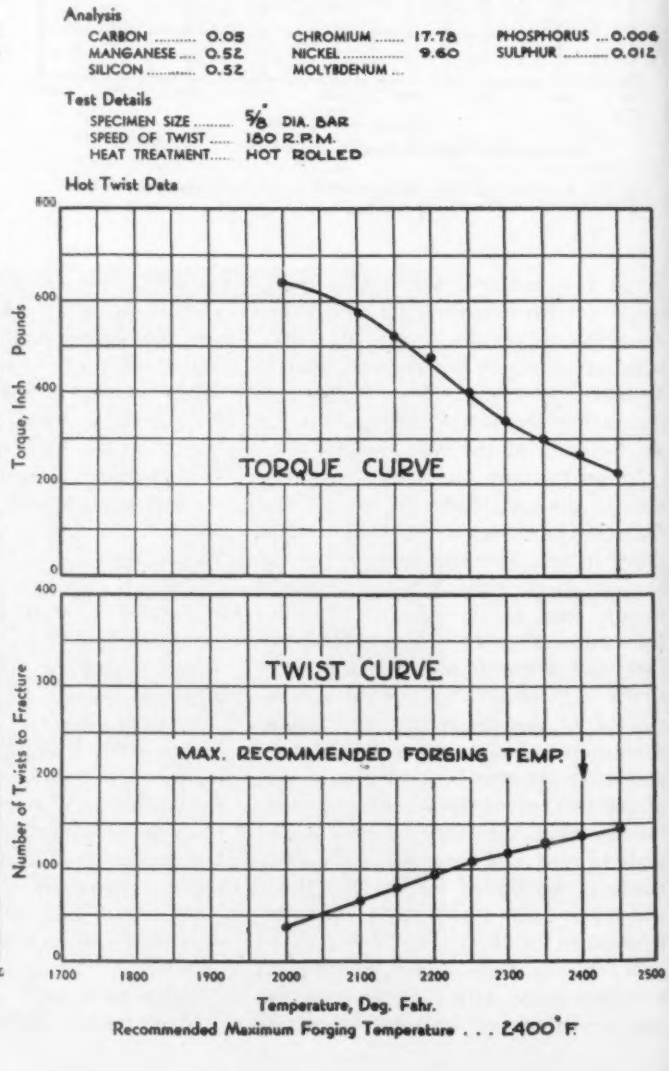


Fig. 5—Results of hot twist on 18-8 stainless steel.



path of fracture is transcrystalline. On the other hand at 1000 deg. F. and under very slow rates of deformation, such as occur in creep or prolonged stress-rupture tests, the path of fracture in the low alloyed steels under simple tension is largely intergranular.

Since rate of deformation is a deciding factor it is not surprising that the temperature required for this change from transcrystalline to intercrystalline failures in the twist test is of the magnitude observed. Moreover, the rates of deformation encountered in forging are similar to those of the twist test and this undoubtedly accounts for the close relationship which has been found to exist between the two. It also explains the reason why tensile tests conducted at these higher temperatures have never been overly useful in evaluating the forgeability of different steels.

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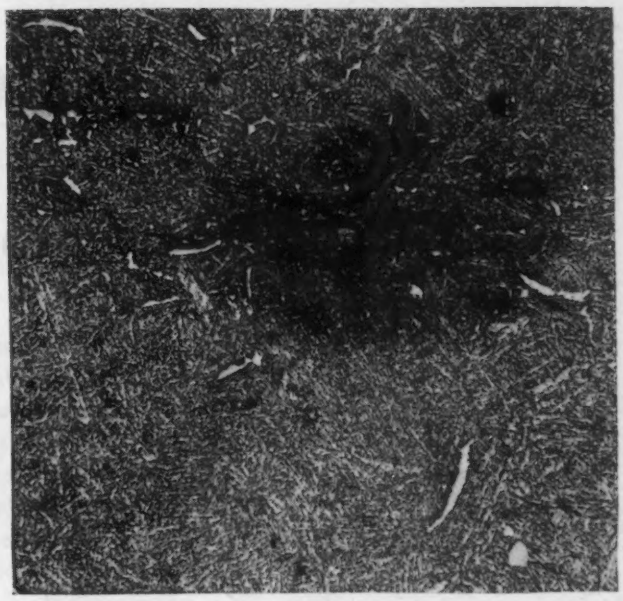

FIG. 6—Exceeding temperatures of maximum twist causes intergranular cracking. (100 diameters.)

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While deformation rate itself is an important factor it seems to lose its effect after a certain rate has been exceeded. For example tests conducted on certain steels under rates of twist varying from 180 to 600 rev. per min. showed the temperature of maximum twist to be nearly constant for a given steel. The speed did, however, have an influence on the total number of twists required for fracture.

It might at first appear strange that correlations should exist between a torsion test, such as the twist test, and forging operations. However, in all forging operations the applied stresses, when they are distributed throughout the steel, are not simple tension or compression, and since metals are weaker in shear than in either tension or compression, it is probably the shearing stresses which are of the greatest importance. This again helps to explain the close relationship which has been found to exist.

Conclusions

Results obtained from the hot twist tests are believed to be of great usefulness in evaluating the forgeability of steels for the test is quantitative in nature and is sufficiently sensitive to reveal:

(1) The temperature which must not be exceeded in the forging operation.

(2) The change in ductility of the steel with varying temperatures.

(3) The change with temperature of the force required to deform the steel. A knowledge of each of these factors should be of assistance in forging all grades of steels and especially those newer analyses on which little past experience is available.

As a matter of precaution and to allow for temperature differentials and possible variation from heat to heat, it is believed advisable to hold the maximum forging temperature 50 deg. F. below the temperature at which the greatest twist results. This precaution is further advisable since it is believed that if the temperature of maximum twist is exceeded the quality of the forging will be affected detrimentally.

Oxygen and Water Vapor in Furnace Gases

OXYGEN present in heat treating atmospheres for steels robs the surface and sometimes even the interior of the steel of carbon. This ruins the surface finish and softens the steel. Water vapor at these temperatures also has a bad effect since it decomposes into hydrogen and oxygen. Water vapor, under such conditions, also appears to act as a catalyst in aiding decarburization.

Presence of unwanted oxygen and water vapor in heat treating atmospheres is detected by passing the gas over a cool surface and by noting the temperature at which condensation occurs. This temperature of condensation varies between —40 and —70 deg. C., depending upon the requirements of the process. Even skilled operators differ in their estimates of dew-point temperature, especially when it is of the order of —40 deg. C. or lower. Furthermore, the process is not continuous and requires the operator to take periodic samples of gas to make the test.

An experimental device developed by Westinghouse utilizes electrons to do the detecting. The electrons furnish a continuous report of their findings to the operator. Oxygen and water vapor is ionized by electron bombardment, whereas constituents of furnace gases are not. The arrangement draws a sample of the gas mixture past an electron gun. As long as the gas is free of impurities, the electron current is constant. However, when oxygen or water vapor are mixed with the gas, some of the electrons are utilized in forming negative ions. This causes a measurable decrease in electron current. Most electron tubes are vacuum devices and the tube employed here is essentially a diode tube which operates with both ends open. The electron emitter and the plate continually operate in a stream of hot furnace gases.

This electronic dew-point indicator removes the difficulty of judging visually determined dew points, a method subject to considerable variation. Furthermore, it provides a continuous indication of gas quality. At present the new development is strictly a laboratory instrument and is not commercially available. Applications of the dew-point indicator will probably be restricted to certain types of furnace gases.

Milling Steel

With Carbide Tipped Cutters

. . . The author compares fly milling with the action of a single point tool taking an interrupted facing cut in a lathe and shows why negative axial rake angles are desirable for maximum cutter life. An exhaustive analysis of all the cutter angles is given, using accepted nomenclature which differs somewhat from that given in the paper originally presented by Mr. Lucht before the annual meeting of the American Society of Mechanical Engineers last December. The author concludes with a tabulation of machine and fixture requirements. The reader is also referred to the article "High Speed Milling in the Aircraft Industry," The Iron Age, Oct. 14, 1943, for other data on the same subject.

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By FRED W. LUCHT
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ONE of the main reasons for the long delay in the successful application of cemented carbides to the milling of steel has been primarily due to the fact that it was applied in exactly the same manner as it was applied to high speed steel cutters in the past. It has since been found that rigidity of setup, power, the proper cutting speed and the proper tooth loading are of even greater importance than with high speed steel cutters. It was also found that the positive cutting angles used for high speed steel cutters in milling steel were detrimental with cemented carbides and little progress was made until it was learned how to properly apply cemented carbides to single point tools for taking interrupted cuts in turning, facing and boring. This resulted in the use of the proper combination of positive and negative cutting angles and gave the first real clue to the successful application of cemented carbides to milling steel because all milling cuts basically are interrupted cuts.

An analogy will be illustrated to show how lathe tool design can be translated into milling cutter design. Fig. 1 shows a piece of work mounted in the chuck of an engine lathe, with the tool, taking an interrupted facing cut as shown in section BB. Note that the tool has a negative back rake angle which prevents it from digging into the work endwise as it is fed outward. When the work hits the tool, this negative back rake allows the initial impact load to be taken back from the nose of the tool where the tool has its greatest strength. This type of setup tends toward maximum tool life.

For comparison, in Fig. 2 a part of the same cross-section as in section BB, Fig. 1, is mounted on the cross slide of the lathe and a cutter body holding the same single point tool is mounted in the chuck jaws of the lathe. When the work is fed into the tool an improvised type of fly face milling cutter is obtained. In Fig. 3 the analogy is carried one step further. In this case the part is clamped to the table of a milling machine and the same single point tool as was shown in Figs. 1 and 2 is clamped in a face milling cutter body. It can be seen that this cemented carbide tipped milling cutter in its simplified form incorporates the same basic features as outlined in the facing operation on the engine lathe.

Angles Control Tool Life

On all cutting tools the proper combination of the side cutting edge angle (bevel angle on milling cutters), the back rake angle (axial rake angle on milling cutters) and the side rake angle (radial rake angle on milling cutters) has a direct bearing on tool life since these three angles control the amount of protection afforded the cutting edge and the nose radius or chamfer. The latter is usually the weakest portion of any cemented carbide cutting tool and must receive maximum protection. It is doubly important to protect the nose radius because it also maintains the size on the cut.

The radial rake angle (see Fig. 4) is the angle which the cutting face of each blade makes with a radial line passing through the cutting edge. In cutting steel, rake angles between 8 deg. positive and 10 deg. negative are being employed at the present time, depending upon the nature of the application. Where the cutters mill past the work and bevel angles can be used, for example, a positive rake is advantageous for soft steels and a negative rake for hard steels. Experience dictates use of about 8 deg. positive rake for steels below 200 Brinell hardness, gradually reducing the rake to 5 deg. negative for steels in the 325 to 500 Brinell hardness range. For operations involving milling to a square or almost square shoulder a negative rake of 3 to 7 deg. should be used to assure maximum strength at the cutting edge even at a sacrifice of cutter efficiency.

It should be kept in mind that rake angles in the positive direction result in minimum power consumption and permit the use of deeper cuts and heavier feeds than negative rake angles. Only when really necessary should negative rake angles be used to strengthen the cutting edge since

their use results in a corresponding sacrifice in metal removing efficiency.

Negative Axial Rake

It has been seen that in facing or turning steel with an interrupted cut with a single point tool, a negative back rake angle is used to permit the impact load to be taken some distance back from the edge. By the same token, when milling steel the cutting face of the teeth on milling cutters should be set at a negative axial rake angle to protect the nose radius or chamfer by allowing the entering impact to be taken some distance back from the corner of the teeth. Use of negative axial rake also tends to build up pressure between the cutter and the work and prevents the cutter from digging in at the entering part of the cut. It also tends to absorb all backlash in the machine before the nose radius or chamfer enters the cut.

The three different conditions shown in Fig. 5 may be encountered when the cutting edge enters the cut. At (A) the face of the work where the cutting edge enters is parallel with the centerline of the milling cutter. The combination of the actual blade angle *B*, the radial rake angle and the bevel angle (side cutting edge angle on single point tools) is such that it develops an effective negative axial rake angle *A*. If the effective negative axial rake angle is 3-5 deg. greater than the angle on the face of the part, the cutting pressures will be held to a minimum and will tend toward maximum cutter life. If this angle is larger than necessary it will tend toward increased power. The radius or chamfer should be the last portion of the cutting edge to enter the part.

At (B) in Fig. 5 the cutting edge enters the cut parallel with the entering face of the part. This combination of the actual blade angle *B*, the radial rake angle and the bevel angle is such that it develops an effective negative angle *A* which actually matches with the surface on the entering side of the part. This creates the maximum impact load and tends to shatter the cutting edge. This condition should never be allowed.

At (C) the radius or chamfer of the cutting edge hits the part first. This condition can develop from using too small an effective negative axial rake angle which results from the wrong combination of actual blade angle *B*, the radial rake angle and bevel angle. This will cause the radius or chamfer, which is the weakest portion of the cutting edge, to chip out or break down rapidly due to the impact load. It is important that a cemented carbide tipped milling cutter never be used under this set of conditions.

The axial rake angles in use at the present time usually vary between 3 deg. negative and 15 deg. negative. An angle of 8-10 deg. negative is recommended for face and straddle mills which cut past the part. For optimism cutter performance a cutter should be designed with the proper axial rake angle to meet conditions outlined at (A), Fig. 5. Experience on applications involving milling up to a shoulder indicates that a negative axial rake angle of approximately 3 deg. retains the inherent advantage of a negative angle and at the same time assures that the part will be held to size by keeping the side pressure to a minimum.

Bevel Angle

The bevel angle (see Fig. 4) on a face or straddle milling cutter serves the same purpose as the side cutting edge angle on a single point tool. It protects the chamfer or radius on the corner of the teeth when the face milling cutter first touches the part and for that reason tends to increase the cutter life.

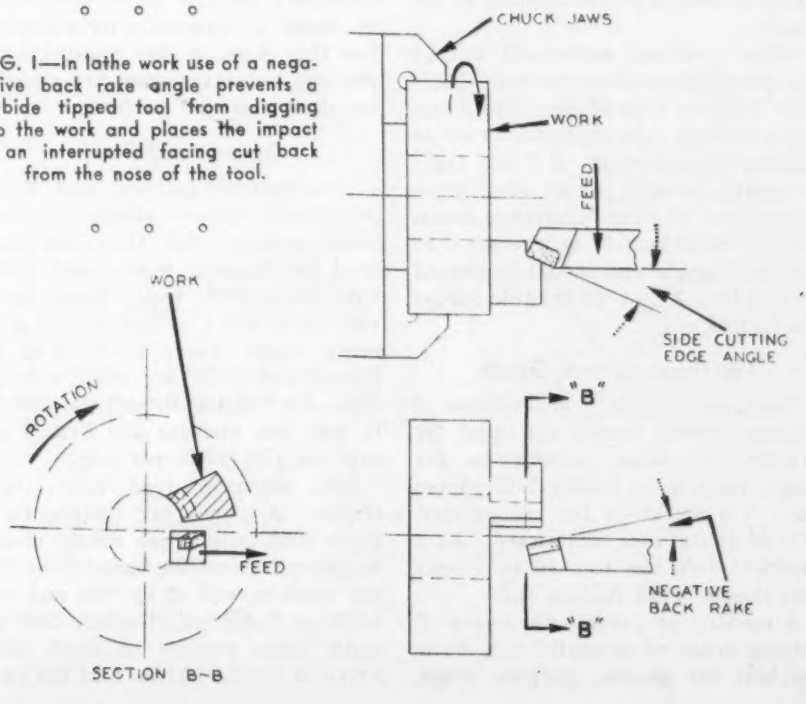
Fig. 6 (A) shows a face milling cutter with a 0 deg. bevel angle entering a cut which has a 90 deg. included angle. This results in short cutter life because of the increased impact along the entire cutting edge, including the chamfer or radius. If a slight bevel angle is ground on the cutter as shown at (B), the initial impact load will be moved away from the weak chamfer or radius to a point of greater strength and the life of the cutter will be materially increased.

At (C) the same face mill as used at (A), Fig. 6 is used for milling work which has an angle *X* on the entering side. At the beginning of the cut angle *X* is comparable to a draft angle on a forging and allows the chamfer on the cutter to touch the work first and takes the full initial impact load of the cut, dulling this portion of the cutter rapidly. The life of the cutter can be materially increased if the bevel angle is made 3-5 deg. greater than the maximum angle *X* on the part. This permits the impact load of the cutter to be taken at a strong portion of the cutting edge.

For most face and straddle milling operations where the cutter mills past the part, a bevel angle of 15 deg. is usually satisfactory. However, where a 15 deg. bevel is not sufficient to assure the chamfer or radius entering the cut last, the bevel angle should be increased up to as much as 35 deg. if necessary. When a 0 deg. bevel angle must be used, the radial rake angle should be 3-7 deg. negative. The width of the bevel angle should be sufficiently large to cover the full depth of the cut.

The relief angle (see Fig. 4) along the bevel angle or along the outside diameter should be ground between 4 and 7 deg. up to an edge. Use 4 deg. for the harder steels and gradually increase the relief angle until it is 7 deg. for the softer free machining steels. The clearance angle behind the

FIG. 1—In lathe work use of a negative back rake angle prevents a carbide tipped tool from digging into the work and places the impact of an interrupted facing cut back from the nose of the tool.



relief angle should be ground sufficiently large to permit the corners *X* to clear the cut up to a land 3/64-1/16 in. wide behind the cutting edge. If after use the land tends to widen rapidly due to wear, the relief angle should be increased. If the breakdown of the cutting edge is due to chipping, reduce the relief angle.

Chamfer or Radius

A chamfer or radius should be ground on all milling cutters to remove the extremely frail sharp corner which is inclined to flake off. A radius gives the greatest strength and should be used if suitable grinding equipment is available and the finished work specifications permit.

On fly cutting tools a radius can be easily ground free hand on all single point tool grinders. A 1/32 in. radius is recommended, ground at the same relief angle as on the bevel or outside diameter and the face. This radius may be enlarged where work specifications indicate a large fillet.

Multi-Tooth Cutters

If work specifications permit on multi-tooth, it is preferable to chamfer the teeth as a chamfer can be ground more accurately than a radius with present-day equipment. A 1/16 in. x 45 deg. chamfer is recommended ground at about 1 deg. less relief than on the outside diameter at the bevel. The two corners left by the chamfer should be brushed lightly with about a 320-grit silicon carbide stone to remove the sharp corner. However, if an accurate cutter grinder with radius attachment is available, radii should be ground on the cutter to give maximum strength.

If part specifications permit, the radius should be ground as shown in Fig. 7. This confines the angular movement *W* to less than 90 deg. and eliminates any chance of the grinding wheel digging into the cutting edge on the outside diameter or face. When no radius or chamfer is permitted, the corner should be broken slightly using a 320-grit silicon carbide stone. Breaking the edge will eliminate chipping. A reduced number of pieces per grind usually results when no chamfer or radius is used.

If the relief angle alone is not sufficient to permit the corners *X* (Fig. 4) to clear the cut, a suitable clearance should be ground up to a land 3/64 to 1/16 in. wide behind the cutting edge. Generally this operation is unnecessary.

Face

The face of the cutter, Fig. 4, should be ground at 2-4 deg. concave from the toe toward the heel and the clearance below the heel should be ground at 5-7 deg. making the face ⅛-3/16 in. long. This increases the distance between the braze line *V* and the cut, and eliminates pickup of work material. When grinding the relief angle behind the cutting edge on fly tools, the relief angle should be maintained the same as on the bevel angle to simplify the blending of the radius.

When grinding multi-tooth cutters the relief angles along the face should vary between 2 and 5 deg. Use 2 deg. for a slotting type of cutter to aid in holding the slot width. A 5 deg. angle is usually suitable for all other types of cutters. The face clearance angle, Fig. 4, should be 2-4 deg. greater than the relief angle and should be ground up to a land 3/64-1/16 in. wide behind the cutting edge.

Tip Thickness and Grade

Minimum trouble is encountered if thicker carbide blanks are used for exactly the same reasons as for single point tools taking interrupted cuts. Tip thickness for milling cast iron is fairly well established. As a practical rule use tips 30 to 40 per cent thicker when milling steel.

A medium or general purpose steel cutting grade of cemented carbide is the best for general purpose rough and finish milling of steel. A finishing steel cutting grade can be used where the depth of cut is not more than 1/16 in. If the medium steel cutting grade breaks down by chipping and *all other conditions have been carefully checked,* a softer steel cutting grade should be tried.

A finishing grade of straight tungsten carbide has been used to take extremely shallow finish cuts (0.005 in. deep) at unusually light feeds of less than 0.001 in. per tooth and will produce a surface smoother and flatter than a ground surface.

Speeds and Feeds

Observations indicate that higher peripheral speeds should be used when milling steel than are being used for turning, boring and facing with single point tools. These speeds vary with the hardness of the steels being milled. For a hardness of 300 Brinell and under use 500-700 ft. per min.; for 300-400 Brinell use 250-500 ft. per min. and for 400 Brinell and over use 150-350 ft. per min.

The optimum feed rate (table travel) in inches per minute for a given steel milling job should always be determined on the basis of the feed per tooth instead of by "cut and try" methods. Table travel equals feed per tooth times number of teeth times r.p.m. A 0.005-0.008 in. feed per tooth

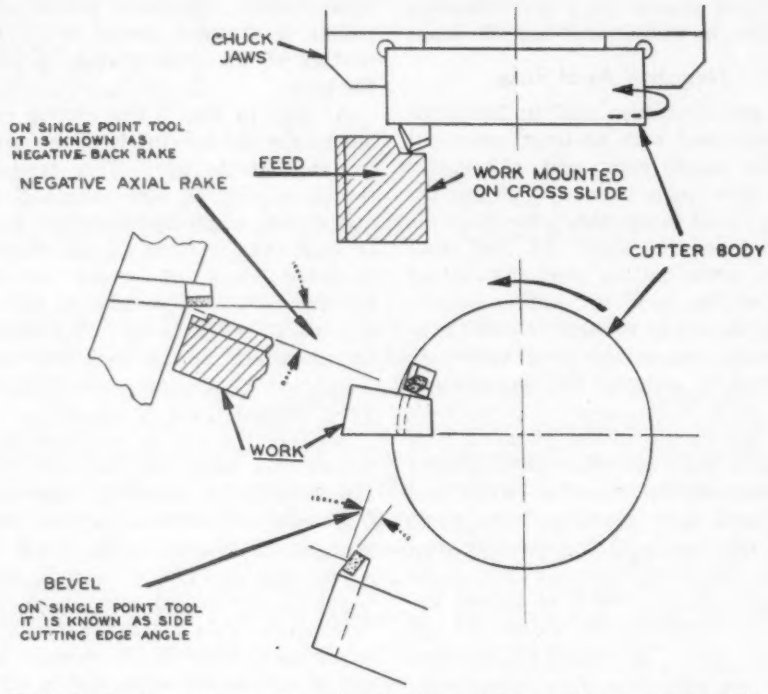


FIG. 2—By transposing cutter and work shown in Fig. 1, there is obtained the equivalent of a fly face milling cutter. The same cutting conditions still obtain.

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will produce the maximum number of accurately finished pieces per grind when using face mills or straddle mills which cut past the work. With lighter feeds the number of finished parts per grind will decrease.

If the milling machine is in good condition and has ample power available, the fixture is rigid and is designed to bring the cut close to the milling machine table, and if the milling cutter is properly designed, the feed per tooth can be increased to 0.015 in. without any detrimental effect on cutter life. When using slotting cutters or other cutters which cut up to a shoulder indications are that a feed per tooth which is about 50 per cent of that used for ordinary face mills and straddle mills will give good results. This amounts to about 0.0025-0.004 in. feed per tooth. When this type of setup has real rigidity, the feed per tooth can be increased to about 0.008 in.

Number of Teeth and Power

When the design of the part being milled necessitates that the corner of the cutter have a large sized radius, as heavy a feed per tooth as possible should be used to reduce the chip thinning effect where the radius blends into the face.

A large number of the milling machines in use today do not have motors larger than 5 to 7½ hp. This limited power restricts the work which can be handled satisfactorily with cemented carbide tipped cutters on these machines and it becomes important that the power available be taken into consideration before starting any steel milling operation.

The power required to mill a certain cut on a given part on a given milling machine depends on:

1. The r.p.m. of the cutter
2. The number of teeth in the cutter
3. The feed per tooth.

The optimum feed per tooth and the optimum peripheral speed is quite definitely determined by the material being milled. This leaves only the number of teeth in the cutter to be considered to keep within the power available. It may be quickly found that the cutter can only have a small number of teeth and in many cases fly cutting (in which the feed per tooth is the feed revolution of the cutter) may have to be employed as shown in Fig. 3.

The following formula provides a means of roughly estimating the number of teeth required in a milling cutter in order to keep within the power available.

$$N = \frac{0.56 \text{ Hp.}}{DFRW}$$

$$\text{Hp.} = 1.8\ DFNR\pm$$

where D = maximum depth of cut, in.
F = Feed per tooth, in.
Hp. = Motor horsepower
N = Number of teeth in cutter
R = R.p.m. of cutter
W = Maximum width of cut, in.

A time-honored practice with high speed steel cutters has been to see that at least two teeth are in contact with the work at all times. At the higher speeds used with carbide cutters this is not essential since there is sufficient momentum to assure smooth cutting action.

The two above formulae are based on 1 hp. being required to remove ¾ cu. in. of steel per min. It is also based on the cutter needing 35 to 40 per cent more power to take a cut when it is dull than is required to take the same cut when it is sharp.

Cutter Body Design

The basic milling operations on which cemented carbides have been used are:

1. Face or straddle milling past the part
2. Face or straddle milling along a shoulder
3. Slotting
4. Plain milling (very limited).

There are two general types of cutters which should be considered: Solid and inserted blade type. Bodies can be made of steel or high tensile cast iron. When a solid body is used ample chip room should be allowed and the carbide cutting edge should be rigidly backed up. There are cases where thin bodies are necessary and in this case the solid type is the only one that can be used. The cemented carbide blanks can be brazed direct to the solid cutter bodies by a low temperature braze.

In milling steel with carbides, it is highly desirable to use a massive milling cutter body in order to take advantage of the flywheel effect. This reduces the shock or rebound from the impact of the cutting edge against the work, provides a smooth cutting action and results in an increased number of pieces per grind and less machine repair. It also enables the machine to level out momentary peak loads considerably greater than that of the rated motor capacity. When it is not possible to incorporate a sufficient amount of mass in the cutter body auxiliary flywheels can be added

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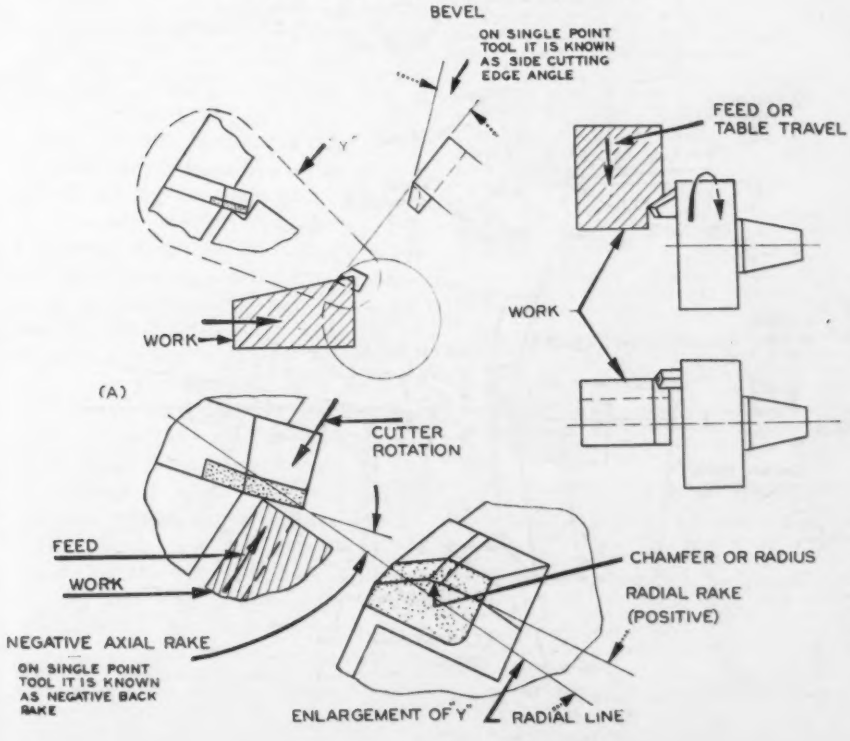
FIG. 3—Action of a fly milling cutter tool in entering the work. These sketches should be compared with the tool action in Figs. 1 and 2.



to the spindles or arbors to smooth out the operation.

Diameter of Cutter

When determining the correct cutter diameter it is desirable to take full advantage of the fact that the smaller diameter cutters have to be run at more revolutions per minute than larger diameter cutters in order to obtain a given peripheral speed. The high revolutions per minute give more teeth per minute and permit a higher table travel for a predetermined feed per tooth. The small diameter face mill helps to do a given job faster than the large diameter face mill because it reduces the length of the approach cut. In general the cutter diameter (as measured at the tooth radius or chamfer) should exceed the width of the work by 25 to 40 per cent.

Conventional methods of holding the blades or tool bits in the cutter body can be used. Heavier blade cross-sections should be used than for the corresponding sizes of high speed steel cutters. The following tabulation shows suggested blade or tool bit thicknesses for various body diameters.

Body Diameter, In.	Blade or Tool Bit Thickness, In.
2¾ and 3	⅝
4 and 5	¾
6, 7, 8 and 9	1
10 and larger	1¼

The blades or tool bits should be allowed to project a sufficient distance from the cutter body to provide ample chip space, or clearance space must be milled in the body. This latter method is preferable on most applications and it is essential wherever heavy cuts and heavy feeds are used. In any event the tools should never project beyond their support more than the shank thickness below the tip. In order to stay within this limit it may be advisable to weld a steel support underneath and behind the blade or tool bit positions before milling the tool slots.

All cutter bodies should be made to facilitate the free flow of chips from the cut. Any tendency to restrict this chip flow will reduce the number of pieces per grind and will ruin the finish on the cut.

Fly Cutting

It may be frequently found that because of machine power limitations the desired feed per tooth, at optimum peripheral speeds for carbides, cannot be obtained with multiple tooth cutters of ordinary design and it may be necessary to use only a single tooth in order to obtain the proper load per tooth without exceeding the available horsepower. Such single tooth cutters are usually employed for shallow cuts through 3/32 in. A typical single tooth cutter is shown in Fig. 3. When the depth of cut is greater than 3/32 in. it is advisable to increase the number of teeth but split-up the total depth of cut into steps, with each tooth cutting a separate step. This gives a smoother cutting action and leaves a flatter surface than a single tooth cutter. For example with a two-tooth fly-cutter the teeth are spaced at approximately 180 deg. One tooth takes the heavy roughing cut and the second tooth the lighter finishing cut. The roughing blade or tool bit is set ahead of the finishing blade radially a distance of 1/16 in. and the finishing blade extends axially ahead of the roughing blade.

Assuming for example that a total depth of cut 5/32 in. is being taken, the finishing blade takes a cut of only 1/32 in. depth while the roughing cut removes 1/16 in. In two-tooth cutters, a depth of finishing cut 25 to 35 per cent of the total depth of cut is generally satisfactory.

Much smoother cutting action can be obtained with fly cutting when applied to cuts ½ in. deep or more if the number of teeth is increased to three or four. In this case the depth of the rough cut will be divided between two or three teeth which would still leave only one tooth for finishing.

When fly cutters are used the blade or bits can be resharpened free hand on single point tool grinders and set to a gage in the holder or body without removing the latter from the machine.

Machine Requirements

The fundamental thought to be kept in mind at all times when considering any milling operation is *rigidity*. This applies to both the machine and the method of clamping the work. Machines rugged enough to withstand all forces and shock incidental to the operation should be used. The life and accuracy of the milling machine can be prolonged, the quality of the work can be improved, cost per finished piece lowered and

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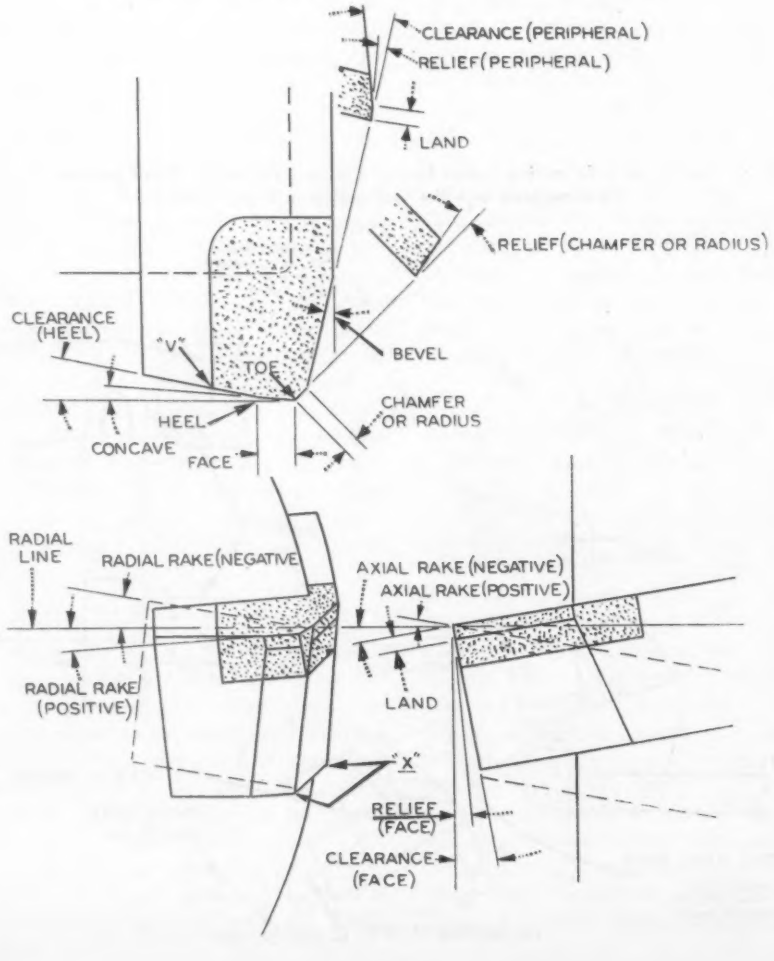
Fig. 4—Definition of angles on a carbide tipped milling cutter.



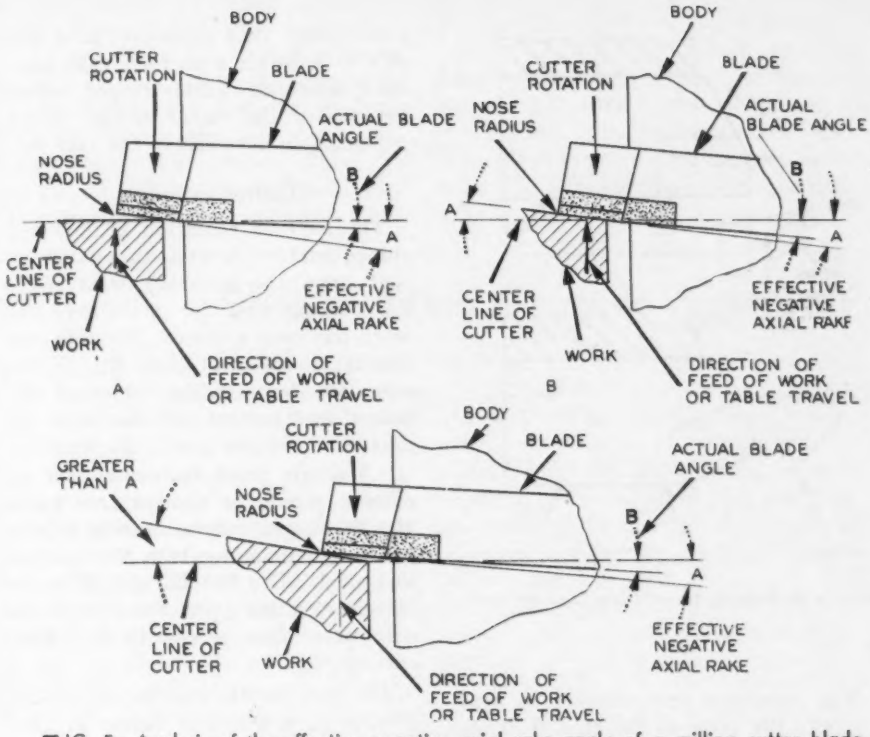


FIG. 5—Analysis of the effective negative axial rake angle of a milling cutter blade with respect to the work.

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shut-down periods of the machine reduced if the following suggestions are used.

1. Backlash in the feed screw should always be kept at a minimum. Machines with backlash eliminator ought to be used.
2. Table gibs should be adjusted to give the table a snug sliding fit.
3. End play in the machine should be kept at an absolute minimum.
4. Because of the higher speeds and increased feed rates, lubrication should be checked to make certain that it is adequate and properly applied.
5. Machine should be inspected periodically to eliminate sloppy fits that cause chatter.
6. The knee and saddle should be securely locked before starting a cut.
7. When the tapered hole in the machine spindle is used to centralize a face mill, it should be clean so that a uniform metal-to-metal fit for the full length of the shank is assured.

The general nature of the work and the proper clamping of it have a direct bearing on the success or failure of any milling operation. The increased feed rates with carbide tipped cutters reduce the cutting time to an amount where loading and unloading time of the part being milled becomes a major problem. Because of this it is necessary to use fixtures with heavy wall sections and actuate them rapidly by either air or oil pressure. The best arrangement is to use an automatic cycle type of milling machine which has a fixture or fixtures which can be unloaded and loaded by the operator during actual cutting time. The following points are of importance in good fixture design:

1. Hold the work rigidly but still allow it to remain in a state of "rest," without torsional or bending strains.
2. Clamp the part so as to keep the surface being milled as close as possible to the machine table.
3. If the surface being milled must be high above the table, the surface of the fixture taking the thrust should support the part directly behind the surface being milled.
4. Cut and table as close as possible to the spindle nose of the machine.
5. The milling fixture should be heavy enough to absorb forces and vibration created by clamping and cutting without springing or deflecting the milling machine table.
6. The construction of the fixture should allow for the free flow of chips from the cut.
7. All cutting pressures should be against rigid stops and supports, never against the clamps.
8. Minimum distortion results if the point of clamping is as close as possible opposite the point of support.
9. Where work sections are thin, it may be necessary to provide additional locking spring plungers or similar devices to adequately support the work.
10. All milling fixtures should be aligned with the table slots by inserted keys on the bottom of the fixture.
11. Equalizing clamps should be used to provide for variations in size and shape of the part.
12. All locating and supporting surfaces of a fixture should be permanently fixed or have adjustable fixed stops. Only the clamping surfaces should be movable.
13. The bottom of the fixture should be cleaned and all nicks and burrs removed before clamping it to the milling machine table.
14. The points of location and support should be no larger than absolutely necessary and positioned near the extremities of the part but still as close as possible to the surfaces being milled.
15. Burring time can be reduced to a minimum on parts which require several cuts if the direction of the feed and the various cuts are positoned so as to throw most of the edges requiring burring on the same side.
16. Where it is necessary to clamp the work from the sides, the clamps should also pull the work against the supports.
17. When a stop and a support surface on a fixture form a sharp corner, the corner should be relieved to simplify cleaning.
18. When clamping, do not use wrenches on hand knobs.

Operating Precautions

The following precautions should be observed when using cemented carbide tipped cutters:

1. Never disengage spindle while feed is engaged.
2. Always have the cutter rotating before feeding the work up to the cutter.
3. Make certain that the rapid traverse is out and the regular feed in before the work contacts the rotating cutter.
4. When stopping the machine, first throw out the feed and then immediately disengage the spindle clutch.
5. Never allow the cutter to idle in the cut as the rubbing of the cutting edges against the work has a dulling effect on the cutting edges.
6. Keep the cutter rotating when returning the table to starting position after a roughing cut.
7. After a FINISH cut, the work should be removed before returning the table.

When face milling on a universal knee type of milling machine, the table should travel normal to the centerline of the cutter spindle, or be set to travel slightly past at an angle equivalent to 0.002 in. in 18 in. so that the trailing portion of the cutter will not spoil the work. When face milling on a plain type milling machine of either the horizontal knee or the vertical type, the angular relation of the milling machine spindle to the direction of table travel is such that the trailing portion of a properly ground cutter will not spoil the finish on the work. This also applies to the manufacturing and planer type of milling machine.

Dragging Work Across Cutter

Indications are that increased cutter life is obtained when the work is not dragged across the cutter on the return stroke. The reason is that the milling cutter builds up a pressure between the work and the cutter to the extent where the cutter actually takes a cut which is shallower than the machine setting. On the return stroke the work springs back to its normal position and the cutting edge drags across it. This causes chipping when the cutter is not rotating.

If the work cannot be removed before it is returned to the starting position, the cutter should be kept rotating on the return stroke. This will permit it to cut its way across the work, although it is liable to ruin the finish on the work and also increase the wear on the cutting edges. The ideal type of cemented carbide cutter setup is one where either the cutter is automatically moved to clear the work or the work moved to clear the cutter on the return stroke.

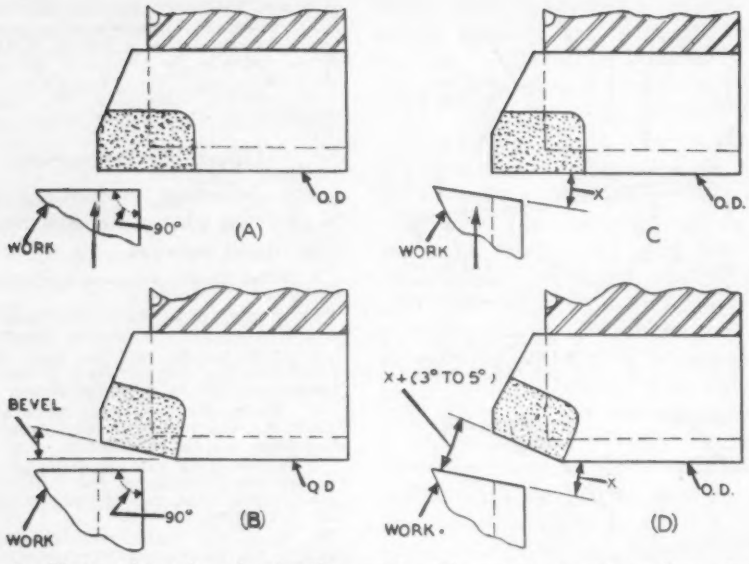

Fig. 6—Choice of bevel angle of milling cutter with respect to entering face of work.

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Dry Cutting Favored

All indications are that the greater cutter life is obtained when milling steel dry because the chips are thin and the major portion of the heat flows into them until they seem to approach a plastic state. In this condition they seem to wear the cutting edge much less than when they are chilled by a coolant.

If proper consideration has been given to chip space but the chips are inclined to stick to the cutting edge there is always danger that they will ruin the cutting edge when it hits the work again. A strong air blast directed against the cut will remove the chips as they form. Chips have been removed from face mill cuts by directing an air blast through machine spindle and the center of the cutter at pressures as high as 150 lb. per sq. in.

The flying chips which result from the high speed milling of steel with cemented carbide tipped cutters can become a hazard to the operators in the vicinity of the milling machine and suggest the use of simple chip guards.

Climb Milling

Indications are that increased cutter life is obtained with "climb milling." This idea can be applied to all types of milling cutters which mill up to a shoulder. The main reason for the improved results from climb milling is that each tooth makes a chip of a definite thickness at the time it enters the cut. With conventional milling (also known as up-cutting) every tooth starts with a chip which has a zero thickness and reaches its maximum near the end of its cut. This maximum chip thickness is practically the same as the chip thickness at the beginning of the climb cut. At the beginning of a conventional cut there is an abrasive action until sufficient pressure has been built up to where the cutting edge penetrates the work.

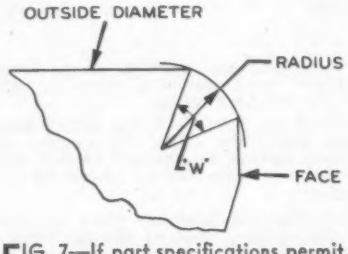

FIG. 7—If part specifications permit, the nose radius should be ground as shown, limiting the angle W to less than 90 deg.

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Climb milling must be applied with caution. All milling machines are not designed for climb cutting. Machines with a backlash eliminator in the feed nut are suitable.

Wherever possible face mills or straddle mills should always be used in preference to plain mills because they operate with reduced cutting pressures, permitting the use of increased feeds and resulting in longer cutter life. In a plain mill it is difficult to maintain a uniform rake angle with cemented carbide tipped cutters because of the cutter width. These problems do not exist in the face mill.

Cutter Grinding

The surface condition of any machined surface depends to a large extent upon the accuracy with which the cutting tool for machining the work has been ground. For this reason it is essential that the proper technique for grinding cemented carbide tipped cutters is followed if the maximum results are to be obtained.

All single point tools used for fly cutting should be ground free hand. Use 60-30 grit silicon carbide wheels for rough grinding both the carbide and steel. Use 180-220 grit diamond wheels to finish grind the carbide tip only to produce a smooth and keen cutting edge.

All multi-tooth cutters should be ground on a tool and cutter grinder equipped with suitable rugged fixture. The machine must be kept in first-class condition with a free running but snug spindle, snug gibs and straight and true ways. Either the cup wheel or straight wheel method of grinding is satisfactory. Use the same grit wheels as mentioned above for fly cutting tools.

Before fly cutters or multi-tooth cutters are used the cutting edges should be brushed lightly with a 320 grit silicon carbide stone at 45 deg. angle to the face of the tooth to remove any feather edges.

Cutter runout should always be checked before using any multi-tooth cutter. For best results it should be kept within the value shown in the table below.

On the outside diameter, no consecutive tooth should have a variation greater than one-half of the total runout.

When several cutters have the same number of teeth and are mounted on an arbor so that they will mill several surfaces on the same or several parts at the same time, a much smoother cutting action will be obtained if the cutters are keyseated to stagger the teeth. This will increase the number

	Permissible Runout, In.			
	Roughing Cuts		Finishing Cuts	
Cutter Diameter	Face	O.D. & Chamfer	Face	O.D. & Chamfer
Up to 12 in.	0.001	0.002	0.0005	0.0015
12 to 16 in.	0.0015	0.003	0.00075	0.002
Over 16 in.	0.002	0.004	0.001	0.0025

of pieces per grind quite materially.

If the cutter is not located properly in relation to the work when face milling a part, an objectionable burr may develop on the side where the cutter enters the work. This can usually be eliminated by increasing the cutter overhang on the side where the burr develops by a slight amount.

Multi-tooth carbide tipped milling cutters are usually difficult to handle because of their size, shape and weight and the cutting edges are often damaged through careless handling. Special wooden boxes or trays, with covers which can be fastened in place by screws, aid in eliminating this difficulty. The cutting edges on single point tools used in fly cutter bodies are also easily ruined by improper handling. This can be eliminated by providing suitable boxes to hold several of these tools in a vertical position.

Shot Blasting Gears to Improve Fatigue Life

SHOT blasting is being utilized in production at transmission plants of Chevrolet Motor Division to substantially increase the fatigue strength of gear parts.

Surface peening by means of shot is effectively carried out at Chevrolet's Toledo plant by means of a cleverly devised fixture which exposes all wear portions of the gear teeth to direct and right-angled blast in a closed chamber. This conforms to requirements outlined in recent papers by J. O. Almen, of General Motors Research Div., who specifies that the most effective use of the surface peening technique lies in directing the shot at 90 deg. angle to the surface at the ends and the roots of the gear teeth.

See Mr. Almen's paper, "Improving Fatigue Strength of Machine Parts," THE IRON AGE, June 10, 1943, page 65.

In the production procedure at Toledo, gears are mounted on an arbor which fits onto the open end of a Y-shaped fixture or yoke. Rubber belting slipped over this arbor is used to rotate the gears at a preselected speed. At the same time the entire fixture oscillates on its longitudinal axis, at a right angle to the arbor axis. This latter movement covers an arc 45 deg. each way from horizontal. The entire fixture is mounted on a vertical arm which swings out to permit ready positioning of the gears, and then swings back into a standard Pangborn Rotoblast shot-blasting machine.

The showers of shot impose steady wear on the supports of this fixture necessitating replacements at regular intervals. Angle iron is used for the forward corners, this having been found the best wear-resistant material.

No. 26 chilled steel round shot of 0.025 to 0.035-in. diameter is used. A wheel of 13-in. diameter, turning at 3300 r.p.m., mounted above the gears, directs the shot at approximately 200 ft. per sec. The shot then drops through grating on the floor of the installation and is returned through a closed circuit to the impeller wheel. The size of the shot is controlled by regular sift checks.

Installations for the shot blasting of gear parts in other Chevrolet plants utilize air pressure to produce a high velocity shot stream. Here the cabinet in which the parts are placed is usually mounted directly above a mixing chamber into which the shot is returned through open grates in the floor of the cabinet. In this chamber, air and shot are mixed and conducted through a rubber tube to a nozzle in the cabinet.

At Toledo, the shot blasting is utilized on first speed gears and first speed countergears of a 1½-ton truck transmission. The low-speed gears are mounted on the fixture three at a time, as illustrated, the countergears one at a time. Rotation of the pieces is at 22 r.p.m., actuated by a ¼ hp. motor with speed-reducer and crank action. This motor also serves to swing the gears back and forth through the 90 deg. arc on the longitudinal axis.

The shot spray is left on for 30 sec. Research has established that a perfectly controlled cycle is 16 sec., but the longer period is specified to permit less expert supervision. A longer cycle than 30 sec. has been proved unnecessary.

The gears which are thus treated are of SAE 8620 steel, previously hardened. There is no subsequent grinding, for obviously any such operations following the shot-blasting would remove the surface and relieve the compressive stresses induced during the peening, thereby destroying the beneficial effect already achieved.

This installation first went into use in May, 1941. Before that time, dynamometer tests gave the gears a life of 2½ hr. at torque of 200 ft.-lb., the maximum engine torque in installed positions in engines being 170 ft.-lb. By use of the shot-blasting technique, these pieces now stand up for 40 hr. under the 200 ft.-lb. torque test.

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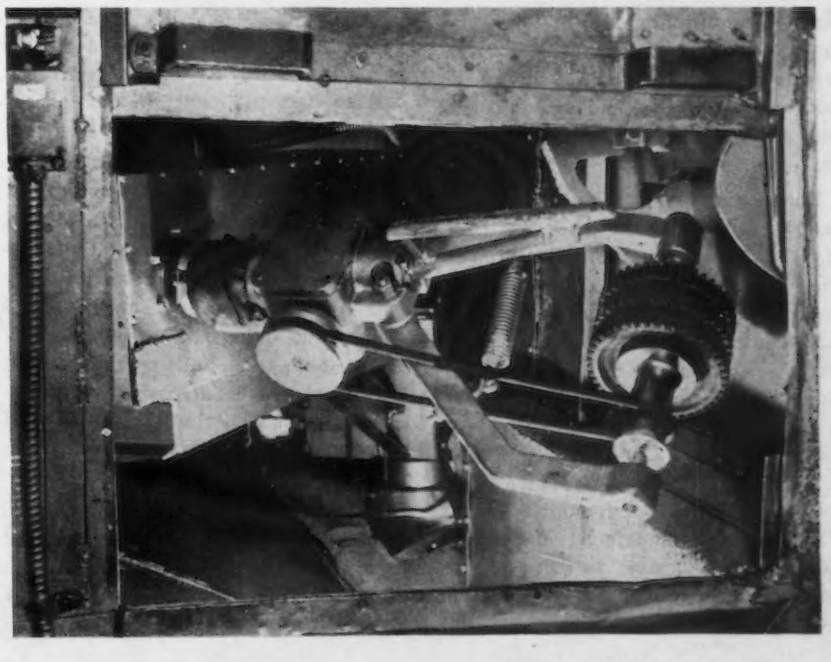
THIS is the fixture devised by Chevrolet for its shot blasting of gears at Toledo. Three first speed gears are mounted ready to be moved into the chamber for peening treatment. At this point the rear arm of the fixture is nearly at the top of its 90 deg. arc. When shot blasting begins, it will swing downward while the arm in foreground rises, this oscillatory movement being actuated by the same motor which drives the rubber belting slipped over the arbor on which the gears are mounted.



China's I

A LATHE made by the Chinese Industrial Cooperatives is unloaded by two students at one of the Cooperatives' schools for technical and mechanical training. Lathes in China are hard to get, and carefully cherished. This one will be used in a machine shop course.

HEAVY industry in unoccupied China has made a small but interesting beginning, recent information received from that country reveals. Before the invasion by Japan, virtually the entire ferrous output of the country was concentrated in areas now occupied, notably in Manchuria, Hankow and Shanghai, so that the present, new-born ferrous production of free China has been achieved over tremendous obstacles and with considerable improvisation and experiment.

The output of pig iron in 1942 was 30,000 tons, increased from less than 12,000 in 1941; that of steel, 10,000 tons, increased from 6000 in 1941. Most of the iron and steel is produced in Szechuan province, in which Chungking is located. The ore deposits found to date in southern China are in small pockets, so of necessity the plants are small. The largest is that owned by the government's National Resources Commission, which moved 40,000 tons of machinery and materials from Hanyang to Chungking. Privately owned iron and steel production equipment totaling 1150 tons was brought from works in occupied China into the free territory. A good deal of equipment which had been ordered was lost by capture of the Burma Road.

The best pig iron has been produced by roasting the ore, then smelting it in very small furnaces, a few hundred pounds at a time. The iron has an analysis in the neighborhood of 0.15 per cent P, 0.6 to 0.8 per cent Mn, 0.04 to 0.08 per cent S, and 0.2 per cent Si.

The Chinese are at present investigating the possibilities of sponge iron, with the relatively small size of ore deposits a point in favor of the process. One sponge iron plant is being constructed by the government and a 2-ton plant, using the Anderson process, is about to be built by the Chinese Industrial Cooperatives at Shuangshihpu, in the northwest. Typical of Chinese improvisation, the ore here will be ground in grist mills, then separated magnetically.

The Cooperatives are also erecting a gray iron furnace at Shuangshihpu, after a design of the 1870's. The tuyere is cooled by means of two lines for water intake and outlet to a wooden tub for cooling. A ton of gray iron a day will be produced in the furnace, which is of 90 cu. ft. capacity. A Roots blower of 200 cu. ft. capacity per min., driven by a 2 hp. engine running on alcohol, and supplemented by two native piston blowers of about 80 cu. ft. per min. each, will supply the blast.

Steel is being made in 1½-ton acid bessemer furnaces with side blow; maximum air pressure is about 5 lb. The ingots cast from these bessemers weigh 440 lb. The phosphorus content in the iron has caused considerable trouble, making it impossible to produce satisfactory steel with a carbon content higher than 0.2 per cent. Chinese engineers now in this country are investigating the "washed metal" process, a method used to a considerable extent here in the 1880's. The bottom of the furnace, in this process, is not durable but is intended to supply ore and lime to oxidize metalloids and give a basic slag. The furnace is not allowed to reach a high temperature because the phosphorus would then leave the slag and return to the

Infant Heavy Industry

. . . Free China is adapting smelter and furnace designs from the earlier days of American and European iron and steel production, in an effort to "grow into" industry. Her ferrous and other heavy industry output, while small, has grown swiftly in the past two years.

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metal. The furnace is tapped when the steel contains 2.00 per cent C, too high a temperature being required to obtain a lower carbon content.

Chinese steel is also being made on a small scale by the old crucible process, with excellent results. Some open hearth furnaces have been set up, but in at least one case considerable operating difficulties have been encountered. Wrought iron is being made by hand puddling methods, but this apparently is still on a very small scale.

Bars of soft steel down to ⅜ in. diameter are being made. The ⅜ in. bars are used for wire drawing to ⅛ in. and less. The steel, with its low carbon and high phosphorus content, is very ductile.

The two or three rolling mills have been made principally from old parts. Shafts from river steamers are used, with rolls up to 15 in. in diameter of cast iron. A recent attempt to make breakdown rolls 18 in. in diameter of chilled steel was unsatisfactory; Chinese engineers now in this country hope to obtain help here in solving this production problem, among others.

Production particularly badly needed at present is butt welded pipe ½ to 3 in. in diameter, steel for shafting, and 16 gage and thinner sheets for oil and gasoline drums. The urgent need for the sheets has been occasioned by the fact that the Chinese are drilling for oil in Kansu province, in hitherto untapped fields. Refining is done by the topping distillation process. The principal problem is transportation, as is reflected by an August, 1943, price of $30 (Chinese dollars) per gal. in Kansu and $400 per gal. in Chungking. Production of industrial alcohol, diesel oil, vegetable oil fuels and native crude oil increased from 5,500,000 gal. in 1941 to more than 9,000,000 gal. in 1942.

In 1942 free China produced 1500 sets of machine tools and 450 power generating sets. Figures on radio receiver and transmitter production are not available, but output exceeded the government's production plan by 142 per cent.

The country has 1915 privately owned enterprises using power and employing more than 30 workers, of which 584 are in or near Chungking and 352 elsewhere in Szechuan. Hunan province has 368; Kwangsi, 173; Shensi, 170; Kansu, 63; and Yunnan and Kweichow, each 49. The industrial distribution of these factories is as follows:

	Per Cent
Machinery	28.5
Chemicals	27.2
Textile and clothing	22.8
Metallurgical	7.1
Food	5.1
Electrical equipment	3.2
Printing	2.1
Others	4.0

Table I summarizes production increases in the major privately owned industries from 1940 to 1942.

TABLE I
Production Increases in Major Privately Owned Chinese Industries

Industry	1941, Per cent (1940=100)	1942, Per cent (1940=100)
Iron	259	555
Steel	122	146
Coal	113	123
Prime movers	200	214
Machine tools	133	137
Acids	105	237
Caustic soda	300	324
Bleaching powder	348	458
Industrial alcohol	104	111
Machine-spun cotton yarn	253	361
Machine-milled wheat flour	139	145

From Guenther Stein, "Far Eastern Survey," Aug. 11, 1943.

In addition the Chinese Industrial Cooperatives have 57 machine and metal works, where lathes, shaping machines, looms, spinning and carding machines, and workshop equipment are produced. The Cooperatives also operate coal mines, and produce coke and charcoal. There are 111 mining cooperatives, 73 of them in the northwest. In the Cooperatives' Bailie schools, about 200 boys a year are given a good technical and mechanical education. Western engineers who can work with improvised methods are still badly needed, as is the technical advice which Chinese engineers obtain in this country.

From present indications, industrialization of China will be accomplished through relatively small, decentralized plants, a system favored not only by the raw material distribution, but by the present distribution of population and organization of Society. It has apparently become recognized in China that its agriculture, on which the entire economy now rests, must be mechanized if the standard of living is to be raised. The agricultural workers displaced by mechanization must be employed in widely distributed industry. Well informed reports indicate that the Chinese intend to accomplish this industrialization themselves, looking forward to the day when they can trade on a large scale with Western nations, rather than as a "colonial" nation with small purchasing power.

Re-Galvanizing of Welded Joints

GALVANIZED structures and sheets from which the original galvanizing is burned off during the welding process are successfully re-galvanized on the job with an alloy called "Galv-Weld" to prevent corrosion. This method of re-galvanizing can be applied to seams made by arc and gas welding. The intense heat of welding burns off the coating of zinc and exposes the bare metal adjacent to the weld. In most cases it has been impractical to re-galvanize the bare spots by the hot-dip method which requires a heated receptacle containing molten zinc and which is impossible in the case of large structures.

This process of re-galvanizing is quite simple and with a little practice any experienced welder or welder's helper can Galv-Weld a seam. In its barest essentials, the process consists of rubbing over the heated bare spots a stick of low melting galvanizing alloy to form thereon a smooth coating of metal which will have all of the corrosion resisting properties, as well as the wearing qualities of the original galvanized coating. The material may be used in bar, powder or liquid form but usually a bar is found to be the most practical for structural work.

After a weld is made it is rubbed briskly while still red hot with a brass wire bristled brush to clean the weld. Then a bar of the low-melting alloy is rubbed along the hot weld and over the adjacent surface to fix a deposit of the alloy and while this galvanizing alloy is in a liquid state the wire brush is again applied to spread the alloy evenly over the entire weld. Although this galvanizing alloy can be applied by utilizing the stored up heat in the welded sections, re-galvanizing can also be done by re-heating the weld to approximately 600 deg. F. The alloy itself melts at 450 deg.

One interesting feature is the fact that where there is enough heat to damage the original galvanizing there also is enough heat to re-galvanize with the Galv-Weld process. It was further discovered that the melting temperature of the residual heat extends fully as far from the actual position of the weld as the outside edges of the bare spots. The importance of this is apparent when one considers the fact that the bare spots may extend as much as 1½ to 2 in. from the position of the weld. It is claimed that no deleterious effects will be produced at the welds and bare spots which may develop during the welding will be left with a galvanized coating. The coating is said to be not only as good, but actually superior to the original coating insofar as toughness, long wear, quality and appearance are concerned.

Comprehensive laboratory tests of Galv-Welded joints also show that the new galvanizing is strictly a continuous layer with no holes or fissures therein, and is of equally good corrosion-resisting quality as the original zinc layer. During these tests it was found impossible to peel or pry the galvanized coating (Galv-Weld) from the foundation metal, nor could it be removed by abrasion employing a stiff steel brush. The coating would yield only to a cutting operation. Photomicrographs of the coating structure are shown in Fig. 1.

The Galv-Weld process was originally developed by the Artkraft Sign

FIG. 2—Skips and burnt galvanized areas on ammunition boxes are salvaged with Galv-Weld alloy which is much more economical than stripping and then re-hot dipping.

Co., Lima, Ohio, and prior to the war was used as a secret technique. It has since been released by Artkraft for the benefit of the shipbuilding and allied industries in wartime. A free license is being granted on all government work by Galv-Weld, Inc., Dayton, Ohio, which holds the patent on the process. Although it will not be available to all manufacturers until after the war, the peace time uses are numerous since every fabricator of galvanized structures will be able to offer a rust proof weld.

Applications in Shipbuilding

In the shipbuilding industry, generally speaking Galv-Weld alloy is used for re-galvanizing welded seams and pipe joints. In some extreme cases where the structure is too large for hot-dip galvanizing tanks, this alloy is used to galvanize the entire structure. One Cleveland builder of submarine chasers, for example, has employed this method to protect I-beam engine mountings against salt water corrosion.

Other applications in the shipbuilding industry were uncovered by a customer use survey conducted in 1943. A few of these uses are: repairing damaged areas of cadmium plated pieces; filling pin holes in castings; coating of sinks, steam tables, bakery proofers and sanitary drains; fuel and water tanks; re-galvanizing bolt and screw holes and repairing doors and hatches.

A typical example of the application of this process is a job in a large Philadelphia shipyard. A weld on the inside of a large tube had to be made corrosion proof. In applying the process about 12 in. of the weld was brought up to heat with a heating torch from the outside. Heating was then carried on slowly around the tube. A man working inside the tube applied Galv-Weld, brushing it on to cover the weld, and following closely behind the heating torch. About 40 ft. of weld was covered in 20 min. The action of the Galv-Weld stick was used for temperature control. Since it was melted by contact with the heated weld, this worked out well, for when the weld was too cold the stick would not melt. When the weld was too hot the alloy drossed and could not be spread easily until the plate cooled. By watching these conditions, the plater could direct the heater as to the proper heating time, until the heater was able to judge for himself.

Fig. 2 shows Galv-Weld being applied to seams on galvanized 14-gage ammunition boxes made in the Artkraft Sign Co.

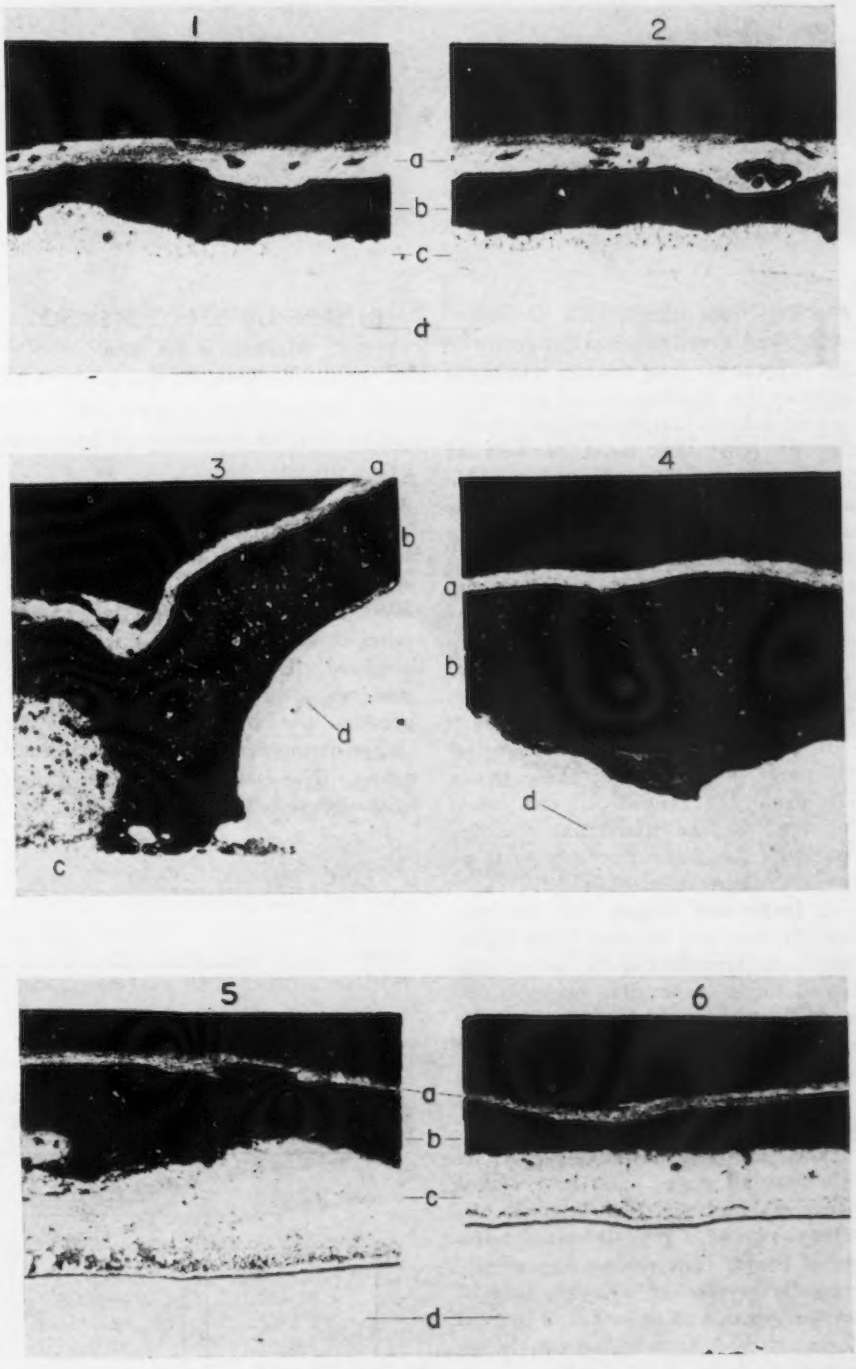
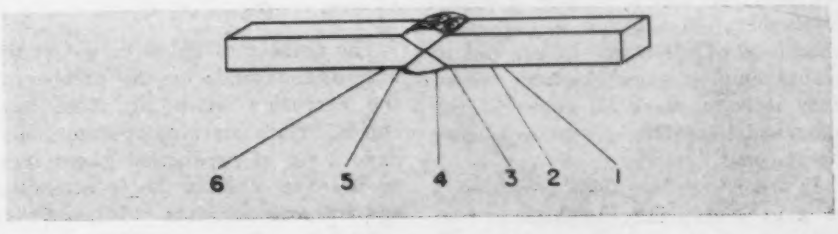


FIG. 1—Microstructure at 100 diameters of a cross-section of galvanized sheet showing a butt-weld treated with Galv-Weld. In order to avoid damaging the alloy coating while polishing the cross-sectional surfaces, the specimens were copper plated.



Sketch showing location of photomicrographs

a—copper plate
b—dross
c—galv-weld
d—base metal (steel)

. . . Forecasting Tool and Ga

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THE preceding article illustrated that certain rules blended with personal experiences when applied to the problem of tool purchases can accurately determine the quantities of tools that must be held at various points in the plant in order to assure continuous production. In the use of gages the reserves which are indispensable for continuous production of interchangeable parts in any mass production manufacturing plant can be divided into three groups:

A. **Master Gages,** for checking accuracy of all gages in use, as well as of those delivered by the suppliers

B. **Production Gages,** for measuring the parts in production; these gages are usually arranged in sets when delivered to the individual machine operators for measuring the parts at various stages of machining

C. **Inspection Gages,** for checking semi-finished and finished parts before they are transferred to other machines for a consecutive operation or to finished parts bins. These gages are also arranged in sets when sent to individual inspectors.

Production and inspection gages are periodically checked for their accuracy. Many plants have a standing rule that all gages must be replaced either at regular time intervals or after a run of a predetermined number of parts. The replaced gages are carefully re-checked with the help of master gages, and those found in good shape or which have been properly adjusted (in case of adjustable gages) are returned to the gage reserves for future use. The worn out gages are either sent to the salvage department of the plant for hard chromium plating and regrinding or are scrapped altogether. In addition to periodical checkings of all gages in use, many plants employ gage checkers whose duty it is to check all gages in the shop and immediately replace all defective ones.

In order to reduce their investments in gage measuring instruments and in master gages, many plants keep all their gage checking facilities and reserves of gages at a gage store room attached to the office of the chief inspector. This arrangement places the responsibility for interchangeability of all products squarely upon the inspection department of the plant. Furthermore, this arrangement helps to segregate all gages of identical dimensions and limits, irrespective of the parts in the production of which they are used. This results in reducing the reserves of gages in the plant and permits the ordering of gages in larger quantities and at advantageous prices. The distribution of the gages in the plant is illustrated by Fig. 4.

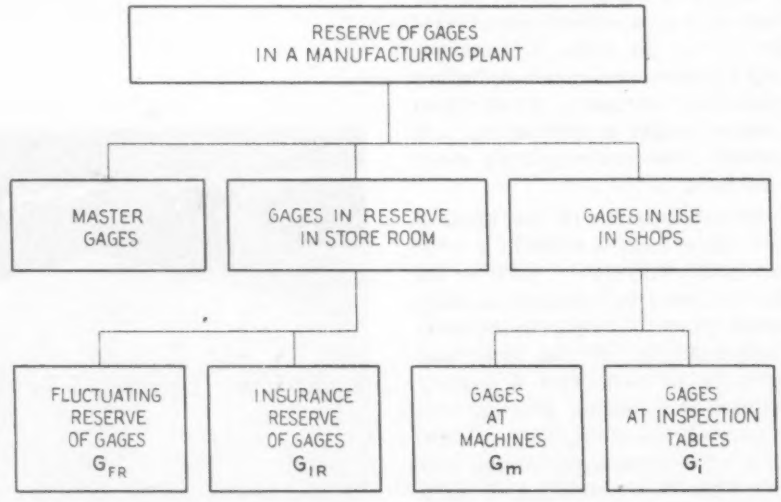

FIG. 4—The distribution of gages in the store room together with gages in use in the shops.

Gages in Use

The number of gages in use at the machines depends on the number of the operators attending these machines. Each machine operator must have a set of production gages irrespective of whether he is attending one or more machines. This number of gages can be expressed by the formula:

$$G_w = \frac{m}{e} \qquad (25)$$

where

G_w = Number of production gage sets at the machines for a particular operation

m = Number of machines performing a particular operation

e = Number of machines attended by one machine operator.

This number lies within the following limits:

$$1 < e \leqq m$$

Parts finished in one machine are usually inspected before they are passed on for the consecutive machining operation or to the bins for finished parts. The number of inspection tables and inspection gage sets depends on the output of the particular machines, and may be expressed by the following formula:

$$G_i = \frac{m}{f} \qquad (26)$$

where

G_i = Number of inspection gage sets at the inspection tables

f = Coefficient, the value of which depends on the number of parts produced by the machines, and which value is within the limits:

$$0 < f \leqq m$$

The total number of gages in use in the shop is then:

$$G_u = G_w + G_i \qquad (27$$

Gage Requirements . . .

. . . This concluding section of a two-part discussion outlines the procedure that should be followed when using the author's formulas in setting up gage purchases. An example shows how the rules of tool and gage procurement are applied to a broaching operation in which the number of broaches in use and those held in reserve are accurately determined.

where

G_u = Number of gages in use in the shop.

Gages in Reserve

When carefully handled, the useful life of gages is long. Therefore, in case of a relatively small production program the number of gages at work in the shop G_u practically determines the number of gages to be procured. In case of a large production program, the number of gages used in the shop serves to determine the adequate sizes of the fluctuating and insurance reserves of gages which must be held in the gage store room and which insure uninterrupted production of the plant. In the following discussion we shall exclude all adjustable gages since their useful life may be considered as indefinite for all practical purposes.

For determining the sizes of the fluctuating and insurance reserves of gages in the gage store room of the plant, let us assume that at the periodical check-ups of the shop gages some are missing and others are worn out and are therefore sent to the salvaging department or scrapped altogether, and that these losses amount in general to l per cent. The number of re-checked gages which can be returned to the gage store room then equals:

$$G_u\left(1 - \frac{l}{100}\right)$$

Let us furthermore assume that the number of individual gages which are brought by the gage checkers for exchange amounts also to l per cent of the total number of gages in the shop. The minimum number of replacement gages which must be held in the gage store room for supplementing the missing gages and for exchanging the defective ones is then:

$$G_u \frac{l}{100} + G_u \frac{l}{100} = 0.02\, G_u l$$

These replacement gages are only a part of the fluctuating reserve of gages in the gage store room. When the average delivery time for new gages in terms of re-check periods is known, the minimum size of this fluctuating reserve of gages can be expressed by the formula:

$$G_{FR} = 0.02\, G_u lz \qquad (28)$$

where

G_{FR} = Minimum fluctuating reserve of gages in the gage store room

Z = Number of re-check periods during the time required for ordering and receiving new gages.

The size of the insurance reserve of gages can be found by using the same method which was described for finding the insurance reserve of expendable tools (see first part of article). Let us assume that the deliveries of the gages are delayed and that a breakage epidemic of gages occurs. In such a case the fluctuating reserve of gages must be of the size:

$$0.02\, G_u lzcd$$

where

c = Coefficient larger than unity ($c > 1$) to take care of breakage epidemics of gages in the shop

d = Coefficient larger than unity ($d > 1$) to take care of the delays in the delivery of gages by the gage makers.

The insurance reserve of gages in the gage store room then equals:

$$G_{IR} = 0.02\, G_u lzcd - 0.02\, G_u lz$$
$$= 0.02\, G_u lz\,(cd - 1) \qquad (29)$$

where

G_{IR} = Insurance reserve of gages in the store room.

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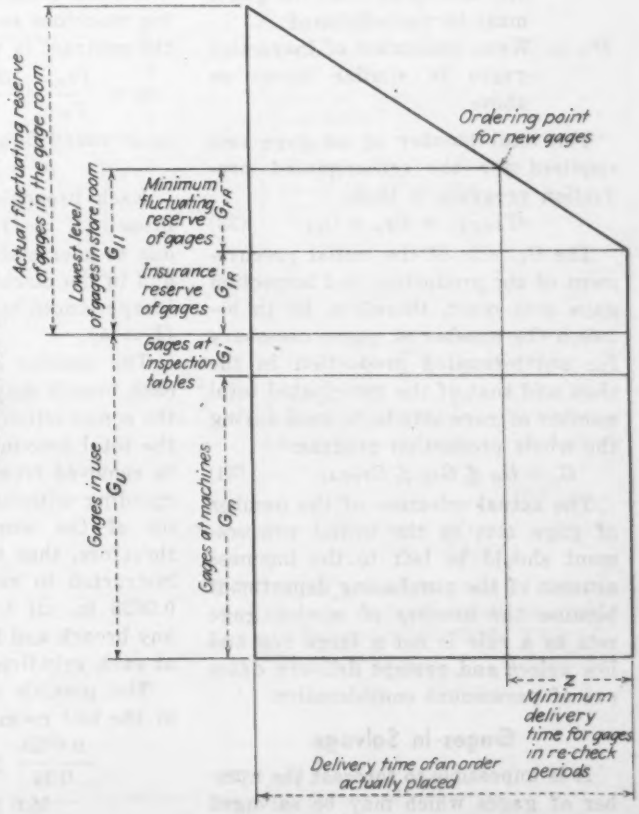

FIG. 5—The classification of gages in a plant illustrating the fluctuating reserve, and ordering point for new gages.

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The lowest level of a stock of gages of one type, size and same limits at the time when a purchase requisition must be issued to the purchasing department is then:

$$G_{ll} = G_{FR} + G_{IR} = 0.02\,G_u\,l_z + 0.02\,G_u\,l_z\,(cd - 1) = 0.02\,lzcd \qquad (30)$$

where

G_{ll} = Number of particular gages in reserve at which level it is necessary to issue a purchase requisition to the purchasing department.

The total requirements of production and inspection gage sets for a production program depend on the number of parts to be produced and on the wear resistance of the gages. Their number, however, must be in multiples of the number of the machine operators and inspectors using them, as follows:

$$G_{TW} = \frac{P_t}{W_w} \qquad (31)$$

$$G_{TI} = \frac{P_t}{W_i} \qquad (32)$$

where

G_{TW} = Total number of production gage sets for a particular operation

G_{TI} = Total number of inspection sets

P_t = Total output of parts in the contemplated production program

W_w = Wear resistance of production gages in terms of the number of parts which may be properly measured until the gages must be reconditioned

W_i = Wear resistance of inspection gages in similar terms as above.

The total number of all gage sets required for the contemplated production program is then:

$$G_{TOTAL} = G_{Tw} + G_{TI} \qquad (33)$$

The G_{ID} size of the initial procurement of the production and inspection gage sets must, therefore, be in between the number of gages necessary for uninterrupted production in the shop and that of the anticipated total number of gage sets to be used during the whole production program:

$$G_u + G_{ll} \leqq G_{ID} \leqq G_{TOTAL} \qquad (34)$$

The actual selection of the number of gage sets in the initial procurement should be left to the business acumen of the purchasing department because the number of needed gage sets as a rule is not a large one and low prices and prompt delivery dates are of paramount consideration.

Gages in Salvage

It is impossible to forecast the number of gages which may be salvaged by chromium plating and regrinding to size. The salvaged gages should therefore be considered as pure savings and they should be deducted from the regular current requisitions.

Table II gives a summary of formulas which are necessary for determining the gage requirements of a manufacturing plant. It also denotes such information and data which are indispensable for solving these formulas. The classification of gages in a manufacturing plant is graphically presented in Fig. 5.

Example

As an example of the application of the formulas presented, let us assume that a plant has a contract for 500,000 parts to be supplied in 10 months. The machining of these parts involves a broaching operation. In calculating the procurement requirements of the plant in broaches, as well as in gages, let us use the same symbols and methods as in the text:

P = Monthly output of contracted parts = 50,000 parts

T_m = Actual working time, in hours per month, of machines in the plant

t_m = Actual broaching time = 3 min. or 0.05 hr.

m = Number of broaching machines to be used.

The plant is working with two shifts, 10 hr. each, 26 days per month and at 75 per cent efficiency:

$$T_m = 0.75 \times 2 \times 10 \times 26 = 390 \text{ hr.}$$

On this basis the number of broaching machines needed for carrying out the contract is (Formula 1.):

$$m = \frac{Pt_m}{T_m} = \frac{50{,}000 \times 0.05}{390} = 6.4$$

or in round figures:

$$m = 7 \text{ machines.}$$

Each broaching machine uses one broach ($K = 1$). The loss of broaches due to poor materials in the broaches and in the machined parts and due to inexperienced help is about 5 per cent ($l = 5$).

The number of grindings g which each broach may undergo depends on the construction of the broach and on the total amount of metal which can be removed from its cutting edges by grinding without impairing the quality of the work. Let us assume, therefore, that the shop tool room is instructed to remove not more than 0.0625 in. all told from the face of any broach and from 0.004 to 0.010 in. at each grinding.

The possible number of grindings in the tool room is then:

$$\frac{0.0625}{0.04} \geqq g \geqq \frac{0.0625}{0.010}$$

$$15.6 \geqq g \geqq 6.25$$

Let us accept that the allowed number of grindings is:

$$g = 9 \text{ grindings}$$

Furthermore, let us assume that the broaches are changed at the start of each working shift, i.e., after 10 hr. of continuous work:

$$t_w = 10 \text{ hr.}$$

The monthly requirements of broaches are then (Formula 9):

$$E_m = \frac{Pt_m K}{t_w\left(g+1\right)\left(1-\frac{e}{100}\right)} = \frac{50{,}000 \times 0.05 \times 1}{10\left(9+1\right)\left(1-\frac{5}{100}\right)}$$

$$= 26.3 \text{ broaches}$$

or in round figures:

$$E_m = 26 \text{ broaches}$$

The working cycle of a broach from the time it leaves the crib and until it returns for regrinding is:

$$t_c = t_w + 2 = 10 + 2 = 12 \text{ hr.}$$

We will assume that the broaches are held in the grinding section of the tool room for a complete working day:

$$t_g = 20 \text{ hr.}$$

The average time for an emergency requisition of the tool room to materialize will be:

$$t_e = 5 \text{ hr.}$$

The values of the coefficients x, y and z are then (Formulas 13, 14 and 15):

$$x = \frac{t_e}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) = \frac{12}{390}\left(9+1\right)\left(1-\frac{5}{100}\right) = 0.292$$

$$y = \frac{t_g}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) = \frac{20}{390}\left(9+1\right)\left(1-\frac{5}{100}\right) = 0.487$$

$$z = \frac{t_e}{T_m}\left(g+1\right)\left(1-\frac{l}{100}\right) = \frac{5}{390}\left(9+1\right)\left(1-\frac{5}{100}\right) = 0.122$$

Number of broaches at work in the machines (Formula 2):

$$E_w = mk = 7 \times 1 = 7 \text{ broaches}$$

Minimum number of broaches to be held in the crib section of the tool room (Formula 10):

$$E_c = xE_m = 0.292 \times 26 = 6.592$$

or in round figures—$Ec = 7$ broaches.

Maximum number of broaches to be held in the grinding section of the tool room (Formula 11):

$$E_g = yE_m = 0.487 \times 26 = 12.662$$

or in round figures—$Eg = 12$ broaches.

The number of broaches in use which must be held in the tool room at any time in order to assure uninter-

rupted production is then (Formula 6):

$$E_m = E_w + E_e + E_g = 7 + 7 + 12 = 26 \text{ broaches}$$

Let us assume that new broaches are delivered to the tool room biweekly which covers half monthly requirements of the shop in broaches. The fluctuating reserve of broaches in the tool room may then be considered equal to (Formula 5):

$$E_{FR} = AE_m = \tfrac{1}{2}E_m = 0.5 \times 26 = 13 \text{ broaches}$$

The minimum number of usable broaches in this fluctuating reserve when an emergency requisition must be issued is (Formula 12):

$$E_e = zE_m = 0.122 \times 26 = 3.172 \approx 3 \text{ broaches}$$

The maximum number of usable broaches to be held in the shop and the tool room is:

$$E_{max} = E_m + E_{FR} = 26 + 13 = 39 \text{ broaches}$$

and, accordingly, the lowest level of broaches in the shop when an emergency requisition for them must be issued is then (Formula 8):

$$E_{II} = E_m + E_e = 26 + 3 = 29 \text{ broaches}$$

The number of broaches to be held in the main store room depends on the number of identical broaches required by other shops of the plant, on the delivery time usually granted by the broach manufacturers and on the time it takes the purchasing department to receive a requisition to issue invitations for bids, to receive the bids and to place the order. Let us assume that only one shop uses broaches of the above type and that it takes at least 2.5 months for a requisition to materialize. This is represented as:

$$T_d = 2.5 \text{ months}$$

The minimum size of the fluctuating reserve of broaches in the main store room of the plant should be (Formula 16):

$$(ET)_{MFR} = E_m T_d = 26 \times 2.5 = 65 \text{ broaches}$$

The insurance reserve of broaches is calculated on the following basis: first, that the demand for broaches during breakage epidemics increases by 20 per cent ($c = 1.2$), and, second, that the delivery of ordered broaches may be delayed about 1.5 times ($d = 1.5$). The size of the insurance reserve of broaches which should be kept in the main store room of the plant is then (Formula 19):

$$(ET)_{IR} = E_m T_d\,(cd-1) = 26 \times 2.5 \times (1.2 \times 1.5 - 1) = 65 \times 0.8 = 52 \text{ broaches}$$

The lowest level of the stock of broaches in the main store room of the plant when a requisition for additional broaches must be issued to the purchasing department is equal to (Formula 18):

$$(ET)_{II} = (ET)_{IR} + (ET)_{mFR} = 52 + 65 = 117 \text{ broaches}$$

The minimum size of the initial procurement of broaches at the start of the production program is then (Formula 21):

$$(ET)_{1.0} \geqq (1 + a + cdT_d)\,E_m$$
$$(1 + a + cdT_d) = [1 + 0.5 + (1.2 \times 1.5 \times 2.5)] = 6;$$
$$E_m = 26$$
$$(ET)_{1.0} \geqq 156 \text{ broaches}$$

The total number of broaches needed for the contemplated production program (Formula 22):

$$E_T = E_m \times T_p = 26 \times 10 = 260 \text{ broaches}$$

The maximum value of the coefficient b in the formula 17 for calculating the procurement requirements for the fluctuating reserve of broaches in

TABLE II

Formulas and Data Necessary for Determining the Number of Gages for Checking Individual Machined Parts

Description	Mathematical formulas		Necessary Data
	No.	Expression	
Number of working gages	25	$G_w = \frac{m}{e}$	e = Number of machines attended by one operator
Number of inspection gages	26	$G_i = \frac{m}{f}$	f = Coefficient which depends on the output of the machines
Number of all gages in use	27	$G_u = G_w + G_i$	
Number of gages in the fluctuating reserve	28	$G_{FR} = 0.02\,G_u lz$	l = Losses of gages in the shop, in per cents z = Time needed for a requisition to materialize, in re-check periods
Number of gages in the insurance reserve	29	$G_{IR} = 0.02\,G_u\,(cd - 1)$	c = Coefficient for "breakage epidemics" d = Coefficient for delivery delays
Lowest level of gages in the gage store room when a new procurement must be made	30	$G_{II} = G_{FR} + G_{IR}$	
Total number of working gages needed for the planned production	31	$G_{Tw} = \frac{P_t}{W_w}$	W_w = Wear resistance of working gages, in number of measured pieces
Total number of inspection gages needed for the planned production	32	$G_{TI} = \frac{P_t}{W_i}$	W_i = Wear resistance of inspection gages, in number of measured pieces
Total number of all gages required for the planned production	33	$G_T = G_{Tw} + G_{TI}$	
Minimum number of gages in the initial procurement	34	$G_{ID} \geqq G_u + G_{II}$	

the main store room of the plant is (Formula 23):

$$b \leqq \frac{1}{T_d}\,[T_p - (1 + a + cdT_d)]$$

$$b \leqq \frac{1}{2.5}\,(10 - 6) \leqq 1.6$$

The last three figures mark the limits within which the purchasing department may plan its procurement policy for securing the necessary broaches at advantageous prices and delivery terms.

We shall now ascertain the number of gages required for gaging the broaching work. The number of gage sets used by the operators at the machines, on the assumption that each operator attends one machine or the coefficient: $e = 1$ is (Formula 25):

$$G_w = \frac{m}{e} = \frac{7}{1} = 7 \text{ gages}$$

The daily production of parts is:

50,000 : 26 ≈ 2000 parts approx.

This number can easily be handled by one inspector, and thus with the coefficient: $f = 7$ (Formula 26):

$$G_i = \frac{m}{\mathrm{d}} = \frac{7}{7} = 1 \text{ gage}$$

The number of all gages in use is then (Formula 27):

$$G_u = G_w + G_I = 7 + 1 = 8 \text{ gages}$$

Let us assume that the gages are re-checked every week and that the losses amount to 1 per cent ($l = 1$); let us furthermore assume that the shop checkers on their tours in the shop disclose about 1 per cent ($l = 1$) of defective gages. Now let us suppose that the plant management has learned from experience that it takes about 2½ months for a requisition for gages to materialize, or in terms of re-check periods $z \approx 12$ periods.

The minimum fluctuating reserve of gages is then (Formula 28):

$$G_{FR} = 0.02\, G_u lz = 0.02 \times 8 \times 1 \times 12 = 1.92$$

or in round figures $G_{FR} = 2$ gages.

Under conditions where the delivery of gages may be delayed, say by 50 per cent, and a breakage epidemic may increase the demand for new gages, say by 20 per cent, the insurance reserve must then be of the size (Formula 29):

$$G_{IR} = 0.02\, G_u lz\,(cd - 1) = 0.02 \times 8 \times 1 \times 12 \times (1.2 \times 1.5 - 1) = 1.536$$

or in round figures $G_{IR} = 2$ gages.

The lowest level of gages in the gage store room when a new requisition to the purchasing department must be issued (Formula 30):

$$G_{II} = G_{FR} + G_{IR} = 2 + 2 = 4 \text{ gages}$$

Let us assume that a production gage will withstand say 25,000 handlings and an inspection gage, 50,000 handlings before they must be reconditioned or scrapped altogether. Since the contemplated production of parts is:

$$P_t = 500{,}000 \text{ parts}$$

the total number of production and inspection gage sets for the required output of parts is (Formulas 31 and 32):

or in multiples of seven:

$$G_{Tw} = \frac{P_t}{W_w} = \frac{500{,}000}{25{,}000} = 20$$

$$G_{Tw} = 21 \text{ gages}$$

$$G_{TI} = \frac{P_t}{W_i} = \frac{500{,}000}{50{,}000} = 10 \text{ gages}$$

The total number of gage sets which will be needed is then (Formula 33):

$$G_{TOTAL} = G_{Tw} + G_{TI} = 21 + 10 = 31 \text{ gages}$$

The initial procurement must be of the size (Formula 34):

$$G_u + G_{II} \leqq G_{1.0} \leqq G_{TOTAL}$$

$$G_u + G_{II} = 8 + 4 = 12$$

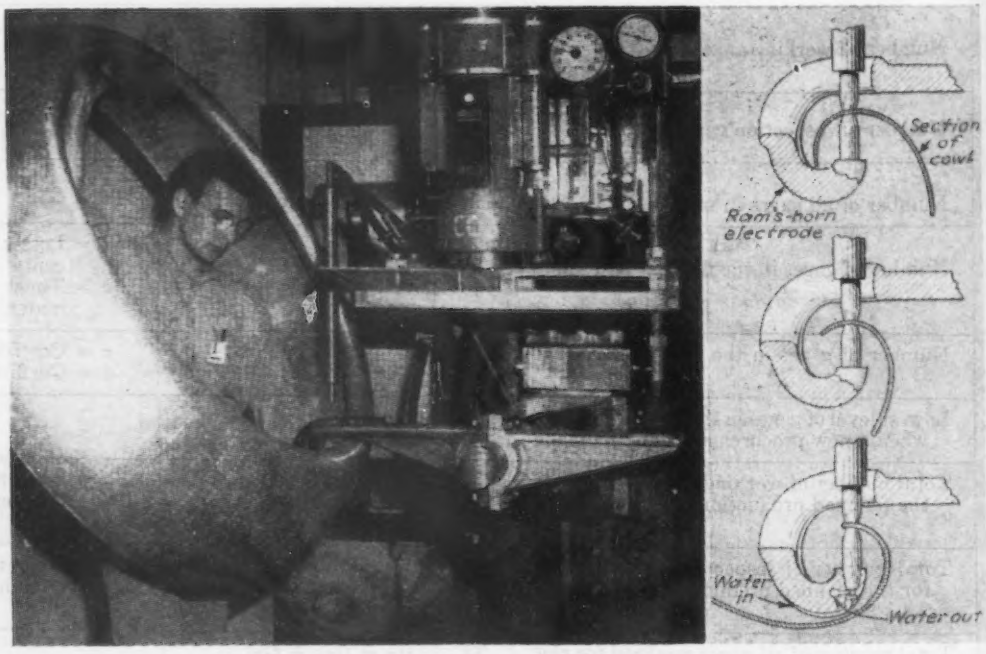
$$12 \leqq G_{1.0} \leqq 31$$

The number of required gage sets is not very large, hence the purchasing department must be given full freedom to order either a part or the total number of the needed gage sets.

Ram's Horn Welds Around Corner

SPECIFICATIONS called for welding reinforcements and joints of an engine cowling made by Miami Division, Consolidated Vultee Aircraft Corp. Most of the welding job was straightforward work, but on the curved inside lip there was no way to do it with standard equipment. The foreman in charge of this work suggested using a "ram's horn" bar, according to the magazine *Wings*. It was tried and is working successfully. Its shape is evident from the accompanying sketches.

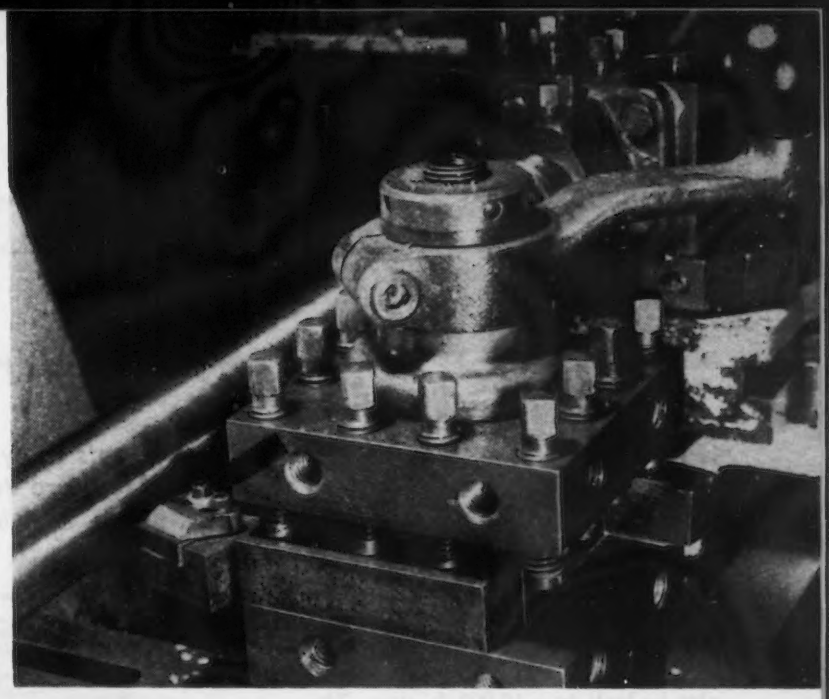
The secret of its success results from the ingenious way in which pressure is applied to the electrodes. If offset electrodes had been used alone, the pressure could not be fully utilized without putting excessive side strains on the welder. Balance arms of the same length are extended to the opposite side. On the upper one is a stud, which can be adjusted to contact a pad on the lower just as the electrodes meet. Thus no side strains are transmitted to the welding-machine head, and pressure at the electrodes can be controlled as though they were directly beneath the center of the head.

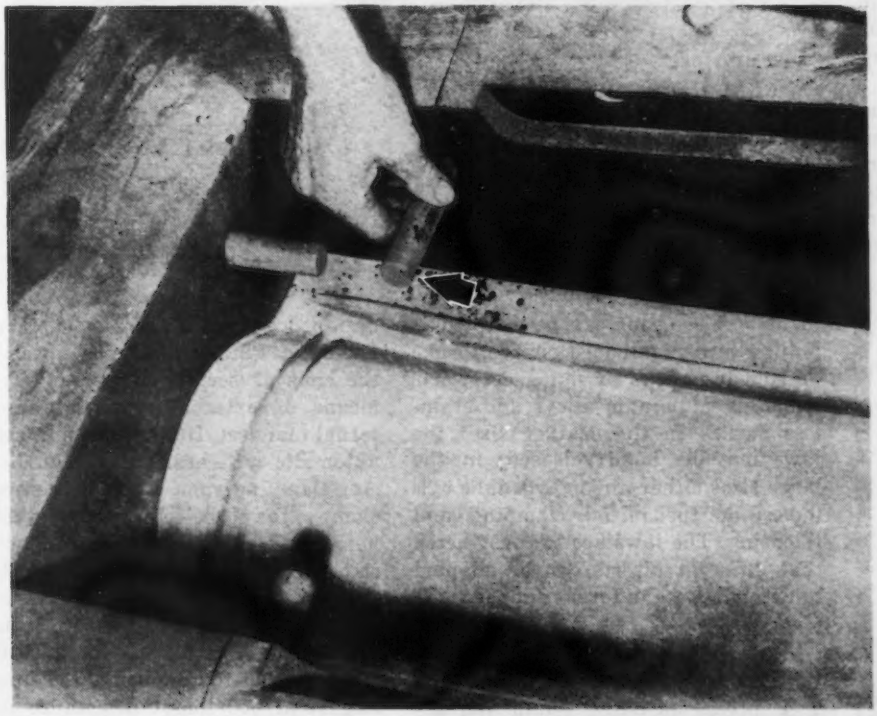


WELDING curved lip on inside of engine cowling. On the left is the welding electrode, on the right the pressure-balance arm. This combination assures perfect control of pressure on electrodes. Cross-sections of the cowl in the sketches at right show how easy it is for the operator to weld all around the curved lip when using this "ram's horn" fitting on the welder.

Production Short Cuts

. . . Employees of North American Aviation, Inc., Inglewood, Cal., and Douglas Aircraft, Santa Monica, Cal., have received suggestion awards for the man and material saving improvements shown here.





o o o

ABOVE

REPLACING the old method of brazing carbide cutting tools to the holder block, this combination clamp and chip breaker, fitted with three set screws, holds the tools to the holder block. A shock shim also is provided. The holder can be used many times longer than was possible with brazing. S. Schimel of the machine shop at Inglewood division, North American Aviation, Inc., devised the clamp.

o o o

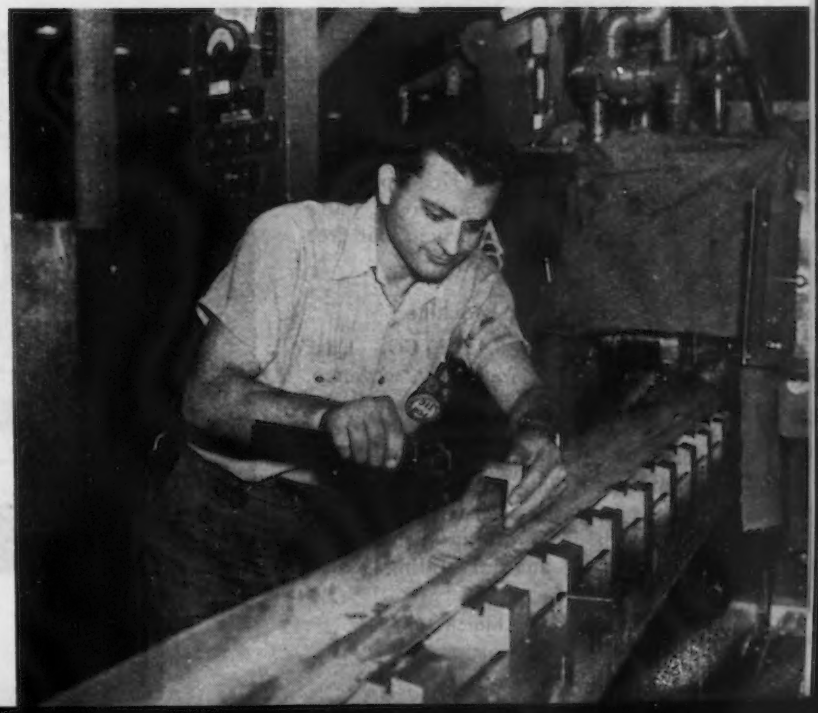
ABOVE

USE of steel chill cores instead of sand saves 5 in. of steel welding rod in each core, as well as the time of drilling the sand cores for lifting pins. The welding rod was formerly used for strengthening the sand cores. The new steel cores are coated with a mixture of clay and graphite and are easily loosened and extracted by a turn of the protruding square shank. They were suggested by Colin D. Matier, molder in the foundry of Inglewood division, North American Aviation, Inc.

o o o

RIGHT

A NEW method of using Kirksite tooling instead of steel to mill spar caps, developed by Ivan J. David, is used at Douglas Aircraft. Blocks of Kirksite are cast and bolted to the bed of the spar cap mills, machined to the proper shape and beveled to hold the spar cap in position for machining. Kirksite tends to dampen out vibrations, resulting in a smoother cut. Obsolete tools can be remelted.

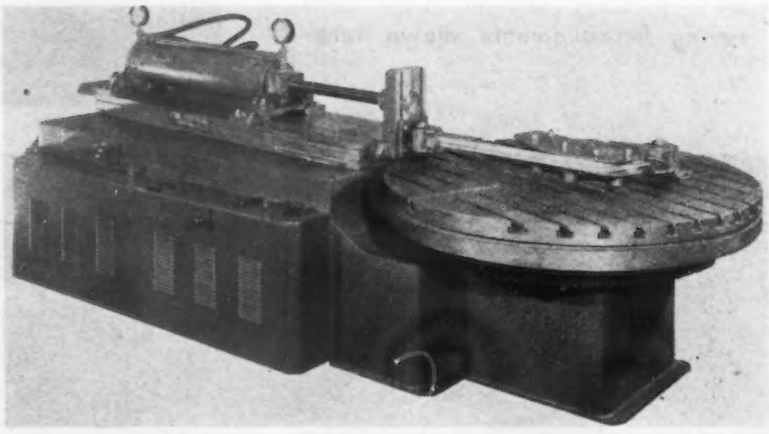


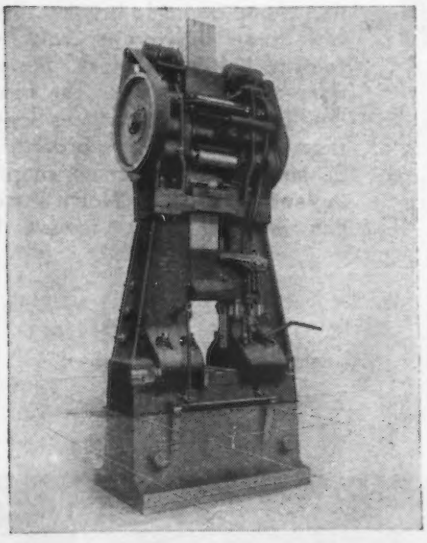
New Equipment . . .

Presses

. . . New developments in hydraulic and hand presses and related sheet metal machinery are described and illustrated in the following pages.

A 7500-lb. four-roll board drop hammer with self-contained motor drive has been brought out by the *Erie Foundry Co.*, Erie, Pa. It can also be built in a 10,000-lb. size. The motors are carried on top of the hammer, thereby avoiding overhanging mountings. The small sheave is above the large one. A gear reduction is placed between the pulley shaft and the roll shafts. While the rolls are free to move in and out to grip and release the board, the center-to-center distances of the gears and pinion do not vary, so that standard involute





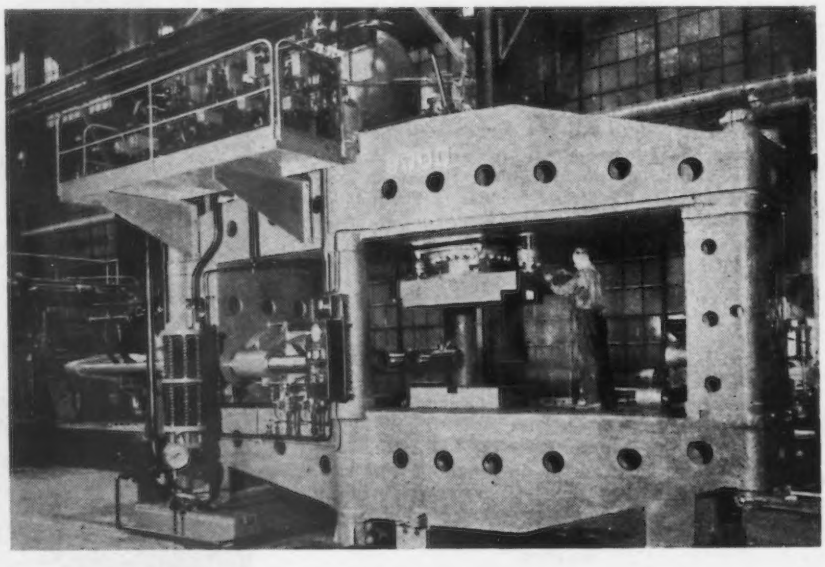
tooth forms can be used. The speed of the pulleys is great enough to provide considerable flywheel effect. The unit uses the patented Erie construction, the rolls being carried in pairs for equalizing frames which float free on the eccentrics.

Stretching Machine

THE CYRIL BATH CO., East 70th and Machinery Avenue, Cleveland 8, has developed a semi-standard stretch head for use in connection with its rotary stretch forming presses. The casing of the head is made in various sizes and may be fitted with jaws giving either two, three or four angular sliding movements. The heads can be adapted to pulling either extruded shapes, brake or rolled sections or flat sheet work, including aluminum alloys and stainless steel. In the smaller sizes the jaws may be hand released; in the large sizes either air or hydraulic cylinders do the initial clamping and releasing. The jaws are so constructed that different inserts can be adapted to accommodate different shapes.

Upsetting Press

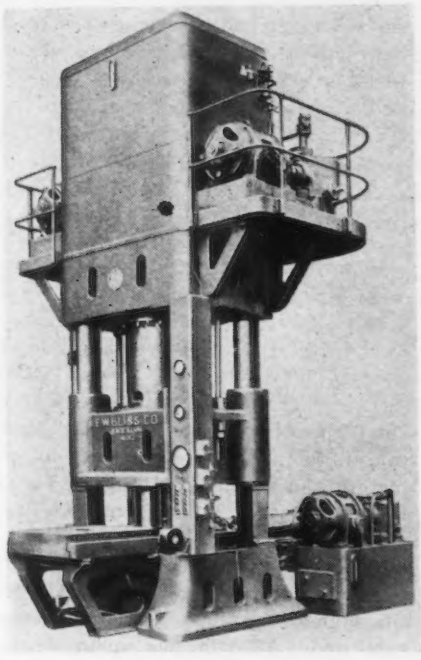
A 600-900-ton hydraulic upsetting press, including pump and accumulator operating system, has been designed by *R. D. Wood Co.*, Wood Building, Philadelphia, for upsetting the ends of seamless steel tubing by means of external dies and an internal mandrel. It operates on a semi-automatic cycle basis. The 28 in. diameter clamping ram, with 12 in. stroke, clamps the tube before the guided horizontal ram can start its work stroke. When the stroke is completed, the 23 x 22 in. diameter horizonal ram strips from the tube before clamp ram pressure is dissipated. Vertical ram has 900 ton capacity, the upsetting ram, 600 tons. Resistance post is provided with adequate adjustment.



An air cylinder is arranged to move a space block into position when the tube is turned around for upsetting the second end. An auxiliary 11 in. diameter horizontal ram stripper strips the mandrel from the tube.

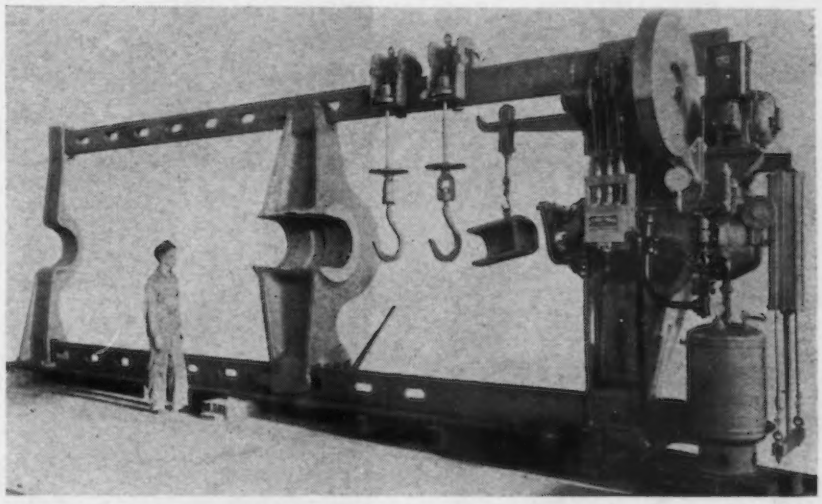
Forging Press

THE 1000-ton self-contained hydraulic forging press built by the *E. W. Bliss Co.*, 53rd Street and 2nd Avenue, Brooklyn 32, N. Y., is equipped with a 35-ton ejector and a sliding die table. It is interlocked by means of an electrical control so that the press, die slide and ejector operations can only occur when the different actions are in their proper positions. The 150-hp. pumping unit permits quick advance speed of 750 in. per min. and return speed of 725 in., with a pressing speed of 37 in. per min. Four methods of operation are provided for the main slide: Semi-automatic cyclic operation; full automatic operation; joggling control by means of a drum type switch; and inching control, permitting small increments of approach.



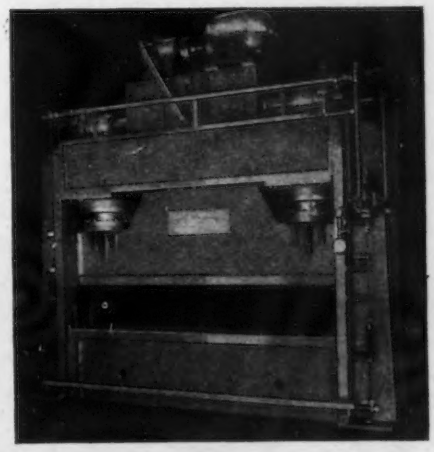
Hydraulic Wheel Press

A SELF-CONTAINED hydraulic wheel press with unique pneumatic pullback, for use in railroad repair shops, machine shops and general industrial work, is being marketed by the *R. D. Wood Co.*, Wood Building, Philadelphia. Openings of 10 in. radius in the resistance post and the end post accommodate the work. The resistance post operates on bearing equipped rollers on the machined face of the base plate. The pump is of the vertical, triplex, two pressure type, having two high pressure and one low pressure plungers, actuated by three eccentrics. The press can be installed flush with the floor. A pneumatic pullback device does away with the necessity of providing a pit to accommodate counterweights.



Forming Press

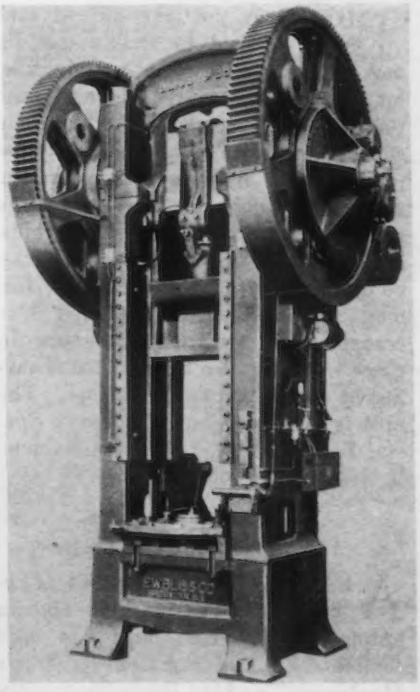
A NEWLY designed, heavily built unit of the closed housing type suited for straightening of armor plate and long lengths of shafting and rolled shapes has been brought out by the *Beatty Machine & Mfg. Co.*, Hammond, Ind. It has a maximum capacity of 400 tons, with an 8 in. stroke. Advance speed is 330, pressing speed 20 and return speed 385 in. per min. Operating pressure is 2000 lb. per sq. in. The units are built in a range of sizes from 100 to 600 tons.

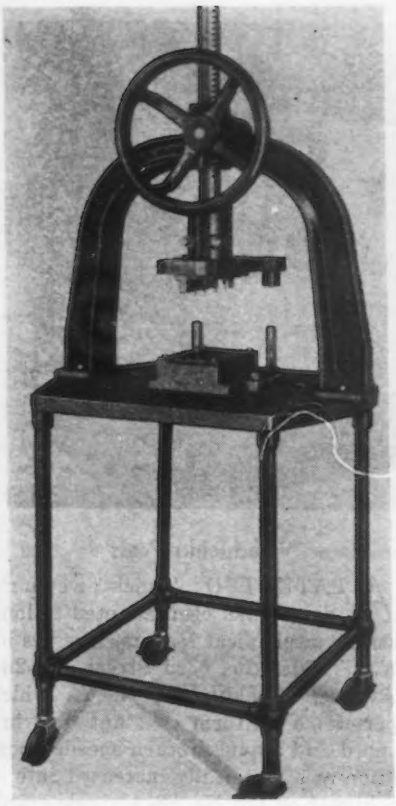


The company has also put on the market a 350 ton integrally built hydraulic press for joggling plates and shapes, heavy forming and bending in shipyards, car and tank shops. This unit is arranged for hand or foot control of the ram movement and is built in capacities from 5 to 350 tons.

Reducing Press

A PATENTED "quick return drive" has been adapted to long stroke mechanical reducing presses by *E. W. Bliss Co.*, 53rd Street and 2nd Avenue, Brooklyn 32, N. Y., which permits a uniform constant drawing speed and a quick return speed. Operation at a materially increased rate is achieved on the No. 88-A single-crank single action press without any increase in the drawing speed. Twin driving gears divide the torsional load between two slides and slabs of the shaft. The machine is of four-piece steel tie-rod frame construction with double gearing and operates at 14 strokes per min. It is equipped with a multiple flywheel type disk, air friction clutch and brake with push button control. For maximum production a six station dial feed is employed.





Die Set Machine

THE Lacey portable die set machine is said to enable the die maker to complete a die set right at his bench and assures faster, truer punch-to-die alinement. With the die shoe clamped to the table and the punch holder fixed in position in the ram, the punch can be removed as often as needed without disturbing alinement. A "one-man" press, it can be operated with one hand under full manual and visual control, and it is transportable with the die shoe in place. It may also be used for shearing in certain types of punches. The unit is distributed by the *Moore Special Tool Co., Inc.*, 740 Union Avenue, Bridgeport 7, Conn.

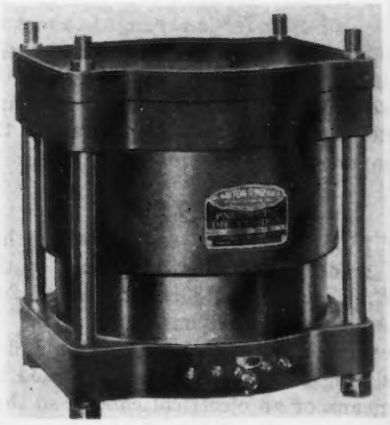
Hydraulic Extrusion Press

A LABORATORY type 12-ton hydraulic extrusion press and an automatic wire feed unit has been combined in one machine by *Moslo Machinery Co.*, 2443 Prospect Avenue, Cleveland. While designed primarily for the extrusion of welding rods, the press may be had with dies for extruding powdered metals, carbon and certain plastics. Pressure of 10,000 lb. per sq. in. is achieved, which, combined with the automatic wire feeding, makes the machine suitable for small scale production of welding electrodes. A separate cylinder is used for slugging. The extrusion die head

is at a 45 deg. angle. Deflection in the wire guide is said to be minimized by this design, due to the fact that the flux is forced in a direction more in line with the wire guide.

Die Cushion

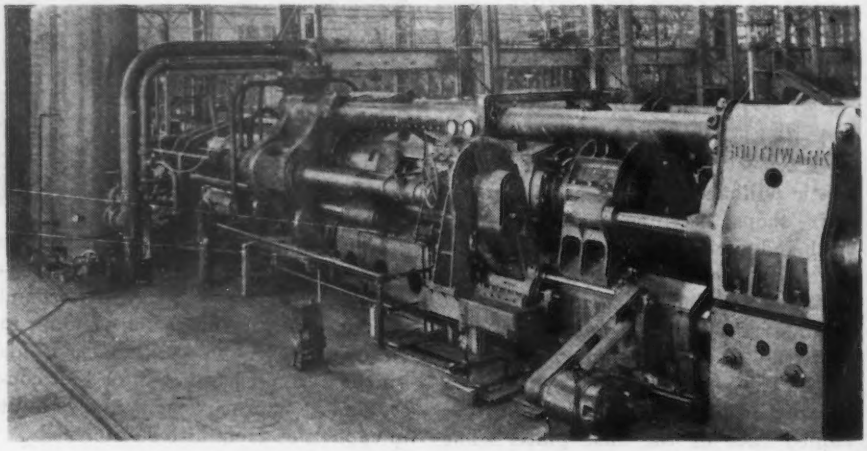
FOR direct mounting to the bolster plate of practically any power punch press, the Model CB pneumatic die cushion has been developed by the *Dayton Rogers Mfg. Co.*, 2835 12th Avenue South, Minneapolis. A hardened and ground pin pressure pad can be machined and fitted to the individual press bed opening, replacing the springs and rubbers on dies already in use. The units are built in sizes from 6 to 24 in., having a drawing capacity from 2 to 12 in. Ring holding pressures of from 1½ to 23 tons are developed on 100 lb. air line pressure. The company has also designed a hydraulic release mechanism which protects the machine frame and crankshaft of a punch press in the event of overload. The connecting link between crank and slide is made up of



a hydraulic cylinder and piston with integral pump and relief valves. Under overload conditions, the safety relief valves crack at the maximum working pressure of the press, shortening the strap and allowing the crank to go through its cycle without damage to the machine.

Extrusion Press

A 3500-TON extrusion press, designed for both direct and indirect extrusion, has been completed by the Baldwin Southwark Division of the *Baldwin Locomotive Works*, Philadelphia. The press is equipped with a 250-ton hydraulic billet shear, two coarse tooth saws driven by 40-hp. motors and a billet handling device to take the heated billet from the furnace and deposit it in front of the extrusion container. It is of the four-rod type, with forged tension rods 16 in. diameter. The 59-in. diameter ram, under 3200 lb. per sq. in. working pressure, will handle billets up to 24 in. in diameter and up to 36 in. long. Its working stroke is 7 ft. Main ram is rapid traversed to working position under a low pressure of 200 lb. The press is operated from two 500-hp. multiple plunger pumps in connection with a hydro-pneumatic accumulator system.



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5. Apply accurately variable pressure either static or in motion?
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9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
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11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
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• The Detroit scene is a wonderland today of facts and fancy, one in which the concrete progress of the times is mingled with events startling in wartime.

DETROIT—The scene in Detroit this March, to borrow from a versifier, has been various. In and out of the public eye, industry has been agitated, intrigued, stimulated and depressed by strike disorders, draft hysteria, technical developments, reconversions, layoffs, hirings, senatorial chest-beating, and plain stupidity.

It has been, to put it gently, a busy fortnight. To wit:

Strike Disorders. The Pratt & Whitney building at Ford's Rouge plant was the scene of slugging of a plant protection man by a worker goon squad engaged in wrecking the office of a labor relations man with whom they had differences. Subsequently the 10 leaders of this curious "demonstration" were discharged and 10 more suspended by the company, with the UAW concurring.

This building has been a troublesome spot for many months. Discipline has gradually evaporated as employes discovered that—until now—the union would back them up in virtually any action they undertook. At Christmas time, for instance, an epidemic of celebratory tie-snipping reached upward from the help to supervision and management; anyone who started off in the building the day before Christmas with a tie lost it. One man lost considerable blood, into the bargain, when he fought to save his tie, failed, and in the process got a good deal of his neck in the path of the shears.

This kind of horseplay, akin to the episode at Continental Motors when a "hotfoot" ignited the greasy overalls of one man and cremated him, is posing a serious problem for many Detroit company officials. A firm management hand is needed, and unless the UAW backs up severe disciplinary action as it has in the 20 Ford cases it will have established beyond doubt what its critics have long maintained —that its end-objective is to disrupt production so completely, war or peace, that it can move in to take charge of the shambles.

Draft Hysteria: Orders from Washington to reconsider occupational deferments led Michigan draft boards to weigh down the postman with 1-A notices early in March, delivered to essential and non-essential men alike. Companies protested and hoped the appeal boards would bear with them. The Automotive Tool and Die Association sharply challenged the statement of state selective service officials that the scarcity of toolmakers was ended, making them fit draft candidates.

The calling up of so many deferred men was expected to be inevitably followed by the induction of at least a fair proportion of them. Companies expected to have to face resultant problems in their engineering rooms as well as in their shops; some said simply that if and when they lost some of the personnel classified 1-A they simply would have to operate in lower gear, because the day of replacements of such top-bracket men has long since passed by.

Technical Developments: Very quietly the war is bringing forth most significant changes not only in products, but in the equipment to fabricate them. Consider, for instance, these three new machine tools which have lately been completed in Detroit:

First, a machine that all but eliminates drill breakage by automatic reversal of the head when chips pile around the flutes.

Second, a machine which shapes gear teeth in a fraction of the time formerly required, and does all teeth around the circumference simultaneously.

Third, a machine which broaches to spherical dimensions.

Reconversion: The Norge Division of Borg-Warner Corp. has resumed production of kitchen gas ranges at Muskegon Heights, Mich., to meet WPB authorizations for civilian goods. This manufacturing is being done on production lines alongside of others producing gun turrets for dive bombers and bottom cowl and other special assemblies for Thunderbolt fighters.

More notable rearrangements were necessary to resume output of tires at Goodyear's Jackson, Mich., plant, which is now in near-capacity volume on casings for essential civilian and military passenger cars and trucks.

Other plants are likewise undertaking jobs akin to their prewar assignments. This leads to the possibility that the return to civilian goods production may not be the abrupt about-face generally expected on Victory Day, but perhaps will have been preceded by a gradual creeping toward this goal in a pre-peace period now being approached.

Layoffs and Hirings: Substantial layoffs are coming to light here and there, beyond others already announced. Olds, in Lansing, has dropped a considerable number of men working on gun jobs which have been cut back. Similar soft spots exist on gun work at Pontiac. In Detroit, Ford has quietly laid off some men since early February.

Hirings, meanwhile, are being made in other plants increasing unspecified aircraft schedules. The overall effect points to what was said here last Dec. 23—that Detroit employment in Michigan dropped 1 per cent in January from December levels, and probably fell slightly in February also.

Ineptitude: The story concerns an officer in one of the services who came to Detroit for certain discussions and, on seeing pictures of some sub-zero cabinets to contain airframe rivets, inquired whether the purpose of such storage was to test the rivets for the high altitudes which they would see in aircraft use. The question assumed grotesque proportions a few minutes later when the officer dropped the remark that he was selected for the work he was doing because of his "technical knowledge."

Senatorial Chest-Beating: Senator Homer Ferguson aroused the ire of his home state's auto industry some days ago when he complained loudly that 70 per cent of auto industry contracts were on a cost-plus basis. The Automotive Council maintains that the proportion was only 25 per cent, and then mostly on types of items on which there was no previous production experience or on which specifications were rapidly changing.

Last week the ebullient senator,

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Here you see a small portion of one day's harvest of dies from Pratt & Whitney's Small Tool Division. These round split dies are but one of many types of accurate thread cutting tools we make, including thread-rolling dies.
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WEST HARTFORD • CONNECTICUT

who evidently conceived a love for front page ink when he did a capable job of operating a Detroit graft inquiry grand jury, sounded off again over the "wrist slapping" punishment meted out to Army officers involved in the sale of surplus cutting tools by the Air Forces last summer (THE IRON AGE, Sept. 30, 1943, page 66).

In the thirst for stern retribution, senses of proportions have apparently been lost by the good senator and a Detroit newspaper which has sensationalized the incident since it came to light. Else they would have inquired why the heaviest punishment—honorable discharge from the Army—should have been meted out to a second lieutenant who appears to have been a perfect version of an innocent bystander. This shavetail was in charge of the storeroom in which the tools were being kept and inventoried. Certainly no one with an iota of realization of Army processes could think that this second lieutenant had a voice in the actual sale of the surpluses.

Discharge from the Army seems to be a high price to pay for the inadvertence of happening to be on a job on which direction from above was undoubtedly stupid, but otherwise clear of wrongdoing. Let the chest-beaters think along those lines for a while, and their indignation might become more justified.

RESIGNS: *Charles E. Sorenson, vice-president of Ford Motor Co. resigned his post last weekend after 40 years of association with the manufacturing end of the company.*

o o o

Magnesium Smelter at Ford to Close

Detroit

• • • **The magnesium** smelter at Ford Motor Co., built by the Defense Plant Corp. in 1942, has been closed down and probably will be held in readiness as a standby plant. The shutdown was ordered by the government in the light of the satisfactory magnesium supply situation today.

The Ford plant, built at a cost of several million dollars, had a capacity upwards of 1,500,000 lb. of magnesium per month. Fires were lighted in it April 20, 1942, and the first magnesium was drawn on May 10 of that year. Since then a total of 94 furnaces have been placed in operation.

The Ford plant was largely experimental at all times, being one of two units planned for operation in this country utilizing the ferrosilicon process. The National Academy of Science was understood to have figured in the developing of details of the process for application at Ford, and River Rouge technicians later made important improvements in the methods.

Simultaneously with the erection of the smelter, the cement plant at River Rouge was converted for burning dolomite limestone ore. The kilns converted for this purpose at the cement plant are, as a result of the smelter's closing, idle at this time.

WPB Advisory Committee

• • • **The WPB Office** of Industry Advisory Committees announced the formation of the Metal Cutting Hack and Band Saw Industry Advisory Committee. William C. Teare, Tools Division, has been appointed the government presiding officer.

Members of the committee are:

H. G. Aldridge, Huther Bros., Rochester, N. Y.; Jacob S. Disston, Henry Disston & Sons Co., Philadelphia; R. F. Ellis, E. C. Atkins & Co., Indianapolis; J. H. Flavell, W. O. Barnes Co., Inc., Detroit; William J. Greene, The L. S. Starrett Co., Athol, Mass.; Ralph K. Lawrence, Simonds Saw & Steel Co., Fitchburg, Mass.; Donald McQuillan, Spartan Saw Works, Springfield, Mass.; Daniel K. Northup, The Henry G. Thompson & Son Co., New Haven, Conn.; Verne Olson, Contour Saws, Inc., Des Plaines, Ill.; and Phillip Rogers, Millers Falls Co., Greenfield, Mass.

Soaking Pit Capacity Cut, Ford Open Hearth Goes Down

Detroit

• • • **One open hearth** in the steel mill at Ford Motor Co. has been closed down due to shortages in soaking pit capacity pending rebuilding of the pits.

It was expected that two or three months would elapse before reopening of the renovated pits would make possible the absorption of all furnace capacity at Ford. The shortened space in recent weeks has built up an inventory of several thousand tons of steel ingots, and reduction of the furnace capacity in the weeks ahead will permit the working down of this stock.

OPA Mailing Simplified Financial Report Form

Washington

• • • **Mailing of a revised,** condensed, and simplified form on which many business concerns are asked to make annual financial reports to OPA has started. This revised annual financial report form, known as form A, has been reduced from 19 to four pages, and convenient 8½x11 in. sheets are used instead of the former legal size. This year's instructions are printed on one single sheet, which is the same size as the sheets in the form. The single sheet replaces last year's 12-page instruction booklet as well as some additional instructions that occupied several pages of the form.

Form B, the interim financial report, also has been simplified and shortened. Mailing of this form started March 10.

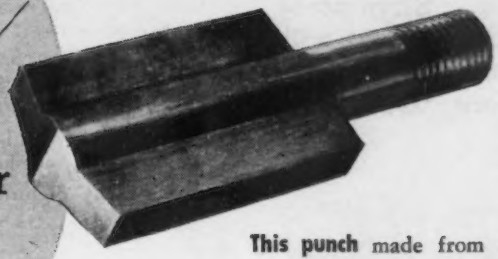
Only those concerns receiving the forms from OPA are being asked to file a report. Since OPA's information must be kept curent, those companies asked to file are also asked to make every effort to file form A within three months after the close of their fiscal year. Form B should be filed within one month after the close of each quarterly period.

The information contained in the returned forms gives OPA the basic background on trends in industry as well as specific information on differerft industry groups and for individual companies. Current information of this type is necessary for the continuance of a fair price control program. It also helps OPA to make quick and accurate decisions on many price problems.

The reports are confidential.

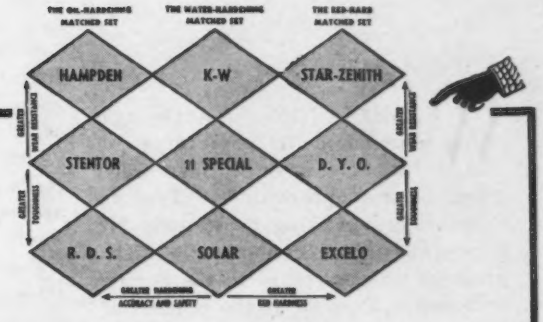
This tool for punching 3/16" thick O. H. steel sheet was made from a tool steel that promised to provide the *toughness* needed on the job. But excessive wear meant that the punch had to be reground after 190,000 holes had been punched.

Which OF THESE TWO TOOLS Will Stay On The Job Longer and Increase Machine Output Per Month?



This punch made from *Stentor* tool steel provided just the right combination of toughness and wear resistance for the job. With it, production jumped over 100%—to 387,000 holes between grinds!

here is WHY one tool does a better job...



The Carpenter Matched Set Method. It points the way to the tool steel properties you need for almost any job. Result — better tools, more output from machines and presses, lower production costs.

For example, you start with the diamond in the center of the diagram, *No. 11 Special* straight carbon (water-hardening) tool steel. But when you want greater *wear resistance,* you travel *north* on the diagram. For greater *toughness,* you go *south,* etc. Each of the *Matched Tool Steels* on the diagram picks up its job where another leaves off, so you know in advance just what results to expect.

A tool giving 100% more production isn't just a stroke of luck! The tool room foreman knew what he needed for the job. He had found a *definite system* for picking the one tool steel that would do the job best. And as the heat treater had complete, easy-to-use instructions, they got real results from the very first.

You can do the same thing, by following the Matched Set Diagram. Carpenter can give you a definite system for finding the best tool steel for each job. And when you put Carpenter's heat treating information to work, you get real results. Full information on the Matched Set Diagram together with an 80-page tool index and steel selector is given in the Carpenter Matched Tool Steel Manual. Free to tool steel users in the U. S. A. Write for your copy today on your company letterhead.

The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Truman Committee pushes postwar reconversion plans . . . Answers defeat of tax amendment by saying advantages outweigh objections . . . Says postwar bond proposal will provide more cash for government use . . .

WASHINGTON — Although eliminated in conference on Jan. 21, after it had been given Senate approval, the Truman Committee is sticking to its guns for a postwar reconversion plan. The proposal was presented to the Senate by Senator Truman at the request of Senator Hatch, Democrat, of New Mexico, a member of the Truman Committee. It was offered as an amendment to the tax law designed to meet the postwar expense problem and was outlined in THE IRON AGE of Jan. 20, page 103.

The Truman Committee's recent annual report, emphasizing the necessity of postwar reserves for private enterprises, said that it is sincerely hoped that further consideration will result in the adoption of some such plan in the near future in order that the individual businessmen and corporations may use their individual initiative in planning a continued prosperity after the war.

The defeated amendment would have permitted the setting aside as reserves up to 20 per cent of the normal net income tax to be invested in a special issue of non-negotiable, non-interest-bearing government bonds, redeemable 18 months after the war. Upon redemption the income from the bonds would be subject to the Federal tax in effect at that time.

The report says that the vast majority of the men who manage our industries have no desire to be war profiteers, and that the renegotiation law has afforded them a convenient and systematic means of readjusting prices and profits to a mutually agreeable and fair basis.

"But," says the report, "industry does want a reasonable opportunity to preserve itself after the war; an opportunity to convert to full-scale peacetime production as rapidly as war contracts are terminated; an opportunity to make quick readjustments which will cushion the shock of discharges to millions of returning soldiers."

THE principal objections to the plan, the report said, seemed to be: 1—A fear that all taxpayers would claim the full 20 per cent deduction in figuring their current taxes, which would reduce the current tax receipts of the government by several billion dollars; 2—A fear that there would be a reduction in tax rates even within the first 18 months after the cessation of hostilities, which would mean that when the proceeds of the projected postwar bonds are returned to income that income would be taxable at a lower rate; 3—A fear that some of the money so set aside might be used by some taxpayers for expenses not strictly of a "reconversion character."

The Truman Committee, however, maintained that the advantages of the proposal far outweigh these objections and is expected to press for legislation putting the plan into effect.

The first objection was dismissed as being without merit because the government's present need is for cash to meet necessary wartime expenses. The committee pointed out that it makes no difference for current purposes whether the cash is derived from taxes or in another manner, provided the basis of obtaining the cash is in accord with principles of sound economics.

THE postwar bond proposal, it was explained, would provide more immediate cash than the amount of taxes, which would be lost because the full amount of the taxpayer's net income used for acquisition of these postwar bonds would immediately go into the Treasury, free of interest charges, whereas the highest tax rate applicable to such income is still substantially under 100 per cent.

The second objection—that there might be a tax reduction within 18 months after hostilities ceased—was declared to be one wholly within the control of Congress. If taxpayers are provided with the means for coming out of this war in a financially sound condition, the report said, it may not be necessary within the first 18 months after the ending of hostilities to reduce taxes materially.

"It may be easier on the taxpayers, whose solvency has been preserved, and sounder national economy," the committee tersely observed, "to keep taxes at a relatively high level now and for a time after the war, than to kill the taxpaying goose that lays the golden eggs now, and plan to do nothing more in the postwar period than weep over the corpse. There is something to be said for beginning now to consider reduction of our national debt in the years immediately following the war. Even if it should be possible to make such an immediate postwar tax reduction, however, a provision could be inserted in the proposed amendment which would prevent any windfalls to taxpayers receiving the proceeds of postwar expense bonds. The proceeds, to the extent that they are not used for purposes deductible as expenses under the then current tax law, could be subjected to tax at the same rate at which they would have been taxable

DR. WILLARD H. DOW: *Appearing before the Truman committee, Dr. Dow, of Dow Chemical Co., charged the Justice Department with falsely accusing his company of being linked with a German cartel.*

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American MonoRail engineers solved the problems of long span multiple runway and inter-connecting cranes, furnishing plants of mammoth size with overhead transportation systems for the movement of massive loads. These remarkable installations, some equipped with over thirty miles of runway, may mean little to the average plant, but the tricks our engineers learned and their ability to solve such problems may be of real value to you. It will pay you to consult with the American MonoRail Engineer. Send for copy of book C-1.

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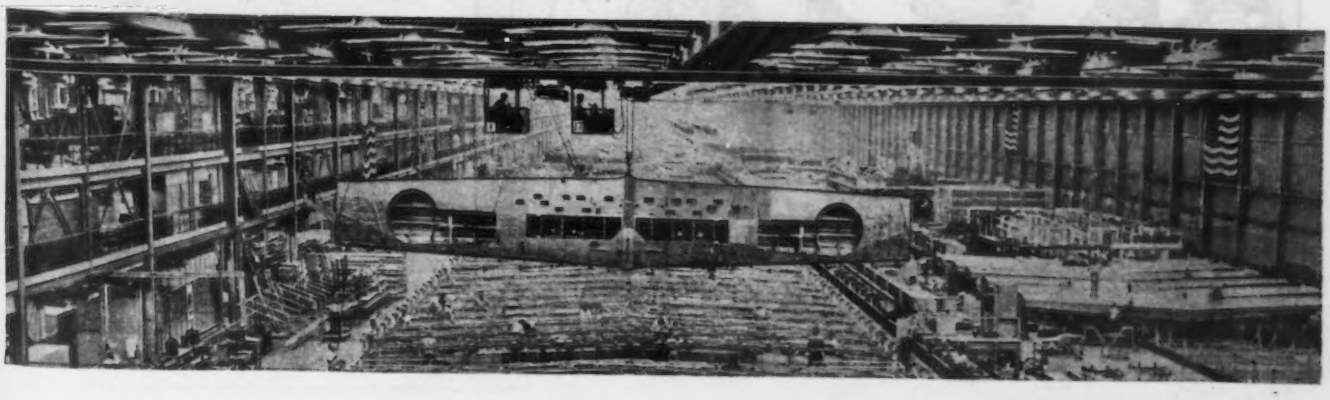


in the year in which they were earned."

AS for the fear that some taxpayers might spend money for purposes which might not be deemed strictly "reconversion expense," the committee said that it is believed that an effort to police the spending of businessmen after the war would completely defeat one of the basic purposes for which this war is being fought.

Businessmen have tolerated, and in many cases welcomed, stringent regulations of their business in the interest of winning the war as quickly and economically as possible, said the report whose blasts against government regimentation must make the old Blue Eagle revolve swiftly in the grave to which it was consigned by the Supreme Court in the early New Deal days of setting business to a goose-step tempo.

"One of their reasons for being willing to do so is to preserve in this country the traditional American freedom of business enterprise and initiative," the report continued. "The tax law and the interpretations respecting the preceding tax laws for the past 30 years have developed a great body of precedents as to what expenses are properly deductible in computing taxable income, what expenses are to be treated as capital investments, and thus subjected to the tax obligations of invested capital, and what expenses are to be treated as purely personal and therefore not entitled to tax benefits.

"Insofar as net incomes are radically reduced in the first 18 months after the cessation of hostilities in this war, it is perfectly reasonable to assume that substantially all of such reduction will be the direct or indirect consequence of economic conditions brought on by the end of the war. It is believed that the existing regulations under the tax law are adequate protection against the possibility of such reserve funds being spent in a manner not contemplated by the proposal. It is further believed that any attempt to set up a machinery for government policing of the purposes of individual and corporate expenditures after the war would involve a basic change in the American system and should not be tolerated."

Acres of Waste

Washington

• • • "There are three acres of toilets in the Pentagon building—the seat of a lot of absenteeism." — Representative William P. Lambertson, Republican of Kansas.

o o o

Draft Boards Irate at New Ruling

Pittsburgh

• • • Local draft boards here, it is said, are incensed at a recent ruling of the State Selective Service, that review of industrial Manning tables is the prerogative of the state organization. A few weeks ago, drastic instructions had been sent out by the state, calling for review of occupational deferments. Most local boards at that time took this as authority to review for the purpose of reclassification all occupational deferments, regardless of whether they were included in Manning tables or not.

It is understood that a considerable number of Manning table deferments had been reviewed by the local boards before the state organization ordered local boards to refrain from any further action along this line until the state had completed reviewing industrial Manning tables.

Local boards here have indicated that they will not now review any more Manning table deferments until the state has completed its study. There is definite indication, however, that when the state has completed its review, local boards who claim they have the authority to do so may start their own reclassification.

On March 11, the State Selective Service director said that 600 of the state's 1940 industrial replacement schedules had been cancelled, that many others have been revised downward, and that cancellations and revisions will be continued indefinitely. It was also said that many schedules, which are allowed to run to their expiration date, will not be renewed. In all cases, it is said, that the local boards can consider the cases of men released through cancellations and revisions of manning tables.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

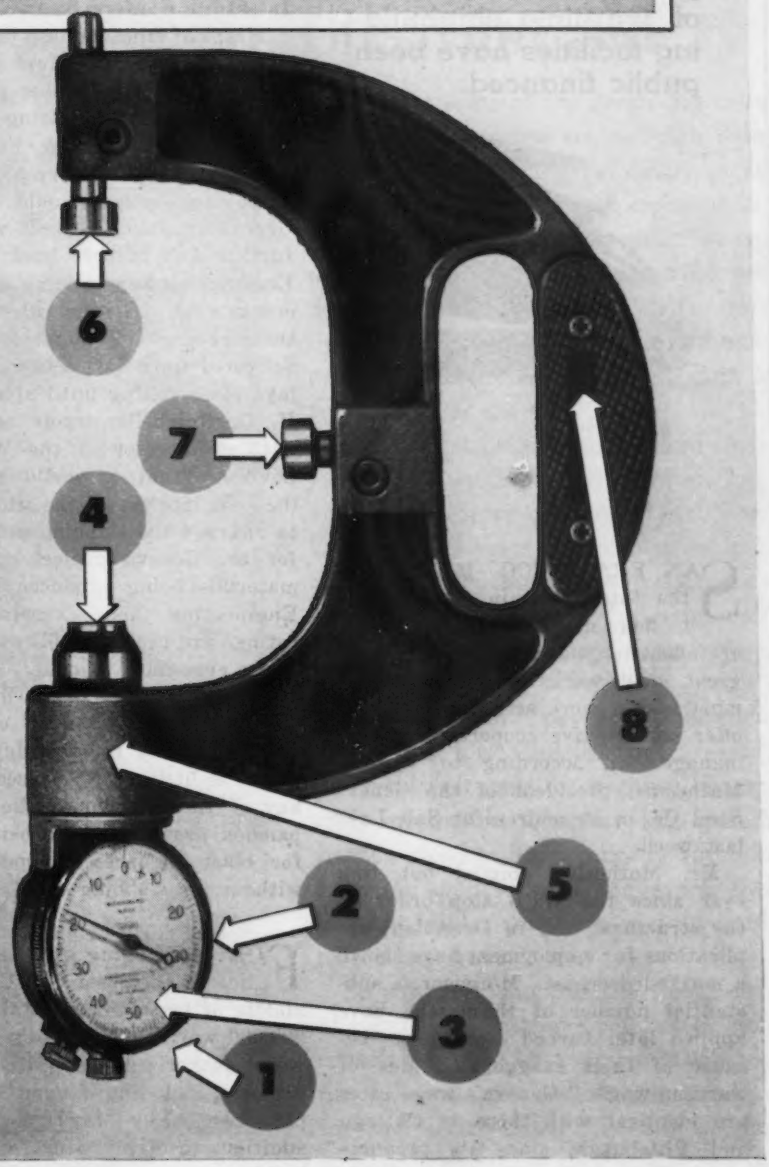
Midvale Nets $2,046,658

• • • The Midvale Co., Philadelphia, reported a net profit for 1943 of $2,046,658 after provisions for taxes, renegotiation of war contracts, and contingencies.

SHEFFIELD

DIAL INDICATOR SNAP GAGE

FOR INSPECTION AND CLASSIFICATION



1 Gage may be used with dial either at the bottom or the top, whichever is more convenient.

2 Dial is adjustable radially and can be swung through 360° to facilitate reading.

3 Scale has a range of .005"—each graduation .0001".

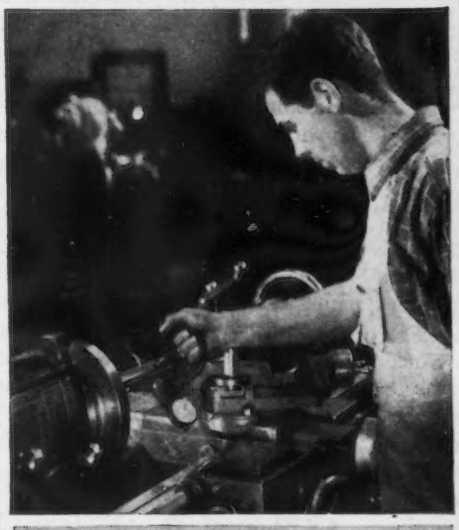
4 Movable anvil is spring urged for constant gaging pressure, but spring has no effect on indicator. Special spring pressures available.

5 Movable anvil bearing is long enough to preserve alignment with the fixed anvil.

6 Fixed anvil is adjustable to a maximum of one inch.

7 Adjustable backstop has a cylindrical face for accurate line contact.

8 Comfortable handle with plastic grip to insulate gage from heat of inspector's hand.



Work may be gaged to the accuracy of a one "tenth" indicator without removing it from the machine.

ARMY E NAVY

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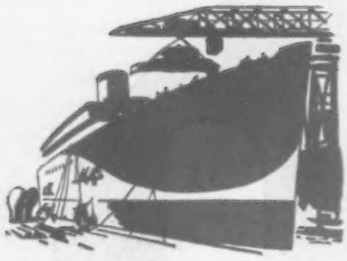
WEST COAST . . . OSGOOD MURDOCK

• If Utah and the Far West expect to hold heavy industry without subsidy, manpower and wages must be competitive . . . 96 per cent of war-time shipbuilding facilities have been public financed.



SAN FRANCISCO—If Utah and the Intermountain states expect to flourish henceforth in an age of industrial maturity, based on the great steel works at Geneva, they must take a more active interest and offer constructive cooperation to the management, according to Walther Mathesius, president of the Geneva Steel Co. in an address at Salt Lake last week.

Mr. Mathesius pointed out that ever since the WPB stop order on the structural mill in December, applications for employment have shown a marked decrease. Moreover, a substantial number of those who have applied later turned down jobs "because of their exaggerated idea of wartime wages." Geneva's wage rates are identical with those in Chicago and Pittsburgh, since its products must sell on the same market and for the same base. Although only 2500 workers are now employed there will be need for 6000 when the plant goes into full production. If local help is not available, it will be necessary to recruit and import men from other sections involving the possibility of social and racial conditions which have not hitherto existed in Utah.

At Salt Lake last week, Utah's Attorney-General Grover A. Giles released copies of correspondence between the U. S. Steel Corp. and the WPB which he had received from president B. F. Fairless of U. S. Steel Corp. to counter charges of delay and half-hearted management which had been made at the recent Interstate Conference at Carson City.

Most of the correspondence was concerned with the effort of the Corporation to obtain higher priority for the slabbing mill being built by United Engineering & Foundry Co. First scheduled to be completed so that plate production could start at Geneva in June, 1943, it was pushed further and further back as United Engineering kept getting government orders with higher priorities. Actually the slabbing mill materials were not delivered until last month which delays plate rolling until after April 1. H. G. Batcheller wrote on Jan. 13, 1943 as director of the WPB Steel Division "that it would not be for the best interest of the war program to upgrade the slabbing mill required for the Geneva project, since other materials being produced by United Engineering and carrying higher ratings are needed to fill war requirements even more critical." In March, 1943, Mr. Fairless advised the Steel Division that unless it could give higher priority for the slabbing mill "there is little use in proceeding with any of the balance of the steel expansion program, there being no use for blast furnaces or open hearths without the slabbing mill."

FOR shipbuilding expansion facilities on the West Coast up to the middle of last year, a total of $542,900,000 worth of materials and labor were authorized by WPB for 113 projects, including a number of complete new major Maritime yards and additions to other yards for all shipbuilding purposes except Navy Yards. Of the total, $20,900,000 or 3.9 per cent was privately financed and 96.1 per cent was publicly financed. Since 1939 contracts for 2500 cargo vessels and warships have been let and approximately half of this number had been delivered by the end of 1943, including approximately 14,000,000 deadweight tons of ships for the Maritime Commission.

Some 600,000 workers are employed by 200 concerns in the three Pacific Coast states and an additional 100,000 work for suppliers and subcontractors. Construction contracts through December, 1943, have totalled 6½ billion dollars with an additional 1½ billion in project orders to Army and Navy establishments, so that the total wartime value of Pacific Coast built ships now in prospect during the war is about eight billion dollars.

A PLANT to reduce bauxite ore to alumina with capacity of approximately 1800 tons per day, similar to the Bayer-bauxite plants in Arkansas, St. Louis, Baton Rouge, and Mobile is being actively sought for the Pacific Northwest to assure continued operation of aluminum reduction plants there situated. Since imported bauxite ore could enter the Columbia River just as well as the Mississippi River, it is suggested that the plant be situated on the lower Columbia between Longview and Vancouver. A wartime emergency transcontinental trainload freight rate of $8.65 per ton on alumina now applies, but since it takes two tons of alumina to make one ton of aluminum, there is a penalty of $17 per ton against aluminum produced in the Northwest, even under the wartime special freight rates. Production of aluminum in the Pacific Northwest is approximately 900 tons per day with present capacity, and, assuming that the war in the Pacific will last another three years, the immediate construction of the Columbia Bayer-bauxite plant is cited to release railroad equipment, save in freight costs and make self-liquidating the federal government's investment of nearly $1,000,000,000 in plants and power developments in the Pacific Northwest.

It is further pointed out that in normal peacetime trade, trans-Pacific ships return in ballast and could economically bring bauxite from the Dutch East Indies or Guiana, returning empty after delivering lumber, wheat, canned goods and the other outgoing shipments from Pacific Northwest ports.

AS normal decades of economic history and industrial development continue to be compressed and accelerated into mere months out on the far western border, with the pace continually faster and the end

Twin Disc Power Take-off Units provide machines like concrete mixers with power links that are easy to operate, have exceptionally long wear life and are simple to adjust.

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THE STONE AGE

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So whenever you consider the question of clutches for machines you buy or build, consult the Twin Disc specialists who have the skill and experience to give you most for your clutch dollar. To find out how you can benefit from their advice and suggestions, just drop us a line today. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin, (Hydraulic Division, Rockford, Ill.).

not yet for some time, assessors and tax collectors, boards of supervisors, and state legislatures are scratching their heads even more viciously than they did in the depression or in the year of the big wind. Instead of a landslide they are threatened with a land hide, insofar as tax liability and assessability are concerned.

In Multnomah County, Oregon, the Federal Maritime Commission pays no local taxes on a $46,000,000 investment in shipbuilding improvements and facilities. If privately owned, the personal property tax would be at least $1,000,000.

In San Francisco it is estimated that the city's annual tax loss, through federal appropriation of formerly taxable real estate and inability of the city to collect a personal property tax on materials and equipment in publicly owned war plants, is at least $1,625,000.

Los Angeles officials put the amount of taxable real estate and personal property taken off the books at $700,000,000.

In King County, Washington, it is estimated that 42 per cent of the actal property value is tax exempt.

Land owned by the federal government in nine central California coast counties, tributary to San Francisco Bay, now exceeds 1,100,000 acres according to a recent compilation by the State Chamber of Commerce and assessed valuation of federally owned property in this district is estimated at $43,524,733. In Monterey County alone 579,731 acres are federally owned, representing 27.25 per cent of all land in the area with estimated assessed valuation of $3,500,000. In little San Francisco County measuring seven miles square, the estimated assessed value of Federal real estate is $28,198,270.

Part of this huge total in real estate and improvements represents military and non-commercial operation but an increasing amount is in port and harbor facilities, shipyards, magnesium plants, aluminum plants, aircraft factories, and actual commercial production, transportation, communication, and distribution facilities, not to mention recreational areas, agricultural projects, and irrigation — reclamation — hydro-electric power ventures to which Paul Bunyan would point with pride and awe.

While the present honeymoon whirlwind is in progress, the problem is only academic, for other tax sources are productive and initial development brings easy money and bulging payrolls to each community. But the strain of readjustment on local government threatens to be disproportionate in this area, because of the concentration here of federal development. There is, therefore, unanimous approval of pending legislation to permit political subdivision to tax certain federal land and installations under mutually agreed circumstances.

Akin to the assessment problem is the total tax take. Just as take-home wages are the actual measure of the workers' income, so total taxes paid by everybody to everybody should be the final measure of drag on income. One-third of California's estimated $11,000,000,000 income for the fiscal year 1943-44 will go for payment of federal, state, and local taxes, according to an analysis by the California State Chamber of Commerce. The federal government is expected to collect $2,870,000,000 in taxes in California, the state government $470,000,000 and local governments $320,000,000.

Eric Johnston Warns Labor To Improve Its Policies

• • • **Warning labor** that it will be "socked" by laws and public feeling, Eric Johnston, president of the Chamber of Commerce of the United States, said that labor was headed for the same downfall as overcame management back in 1933, if it did not overcome many bad practices. In his talk March 13 at the Founder's Day dinner of Boston University, Mr. Johnston outlined "seven sins of labor" and then explained how management was once guilty of the same thing.

The sins to be overcome, he said, are: 1. Arbitrary refusals to accept workers into union membership; 2. Arbitrary crushing fines imposed on union members; 3. Unions who do not hold regular meetings or regular conventions or regular and free and fair elections of officers; 4. Failure to make public proper financial accounts; 5. Too many strikes; 6. Violence on the picket line; 7. Restraints on production.

When management rode high, Johnston said, it too was guilty of these sins as applied in its own field. In conclusion, he pointed out to both labor and management that they could do one of two things: "1. Go ahead and turn this country into a continuous brawl, and government will chain you both; 2. Make a better choice. Work together and stay free."

. . . Cited for Awards . . .

• • • **The following** companies have been awarded the Army-Navy E. for excellence in war production:

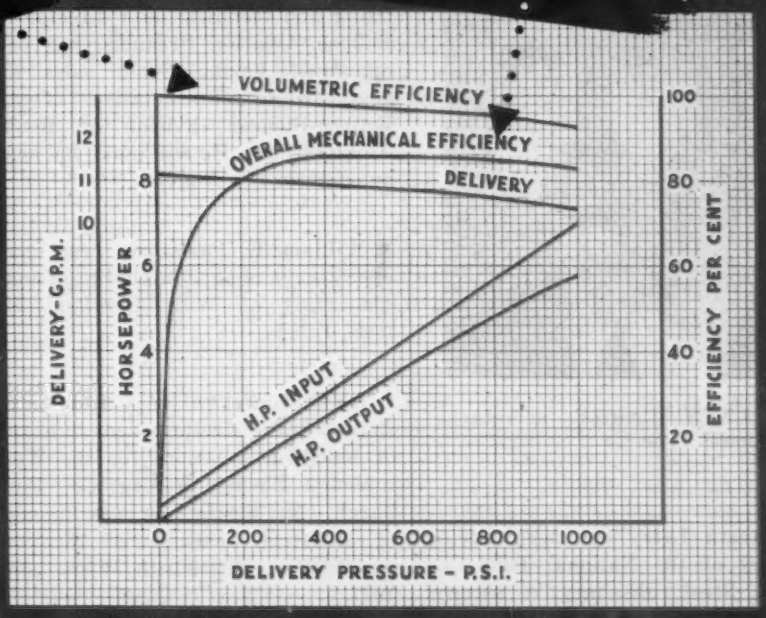
Shenango-Penn Mold Co., Centrifugal Casting Division, Dover, Ohio. (star)
Philco Corp., Storage Battery Division, Trenton, N. J. (third star)
Wellman Engineering Co., Cleveland. (third star)
Osborn Mfg. Co., Cleveland.
Cruse-Kemper Co., Ambler, Pa.
Great Lakes Steel Corp., Stran-Steel Division, Mansfield, Ohio.
Cooper-Bessemer Corp., Mount Vernon, Ohio.
American Red Cross, Blood Donor Center, Harrisburg, Pa.
Arkell Safety Bag Co., Brooklyn.
Basic Vegetable Products Co., Vacaville, Cal.
Bell Armature Works, Knoxville, Tenn.
Bliss & Laughlin, Inc., Harvey Plant, Harvey, Ill.
Bradford Motor Works, Bradford, Pa.
Cincinnati Industries, Inc., Main Plant, Cincinnati.
Collegiate Mfg. Co., Plant A, Ames, Iowa.
General Aniline & Film Corp., Agfa Ansco Division, Binghamton, N. Y., and Ozalid Products Division, Johnson City, N. Y.
General Controls Co., Glendale, Cal.
Gray Mfg. Co., Hartford, Conn.
Green Ball Bearing Co., Cleveland.
James Heddons Sons, Dowagiac, Mich.
Hercules Powder Co., Bessemer Plant, Bessemer, Ala.
Houston Oil Field Material Co., Inc., Houston, Texas.
Illinois Watch Case Co., Erie Basin Metal Products Co., Elgin, Ill.
Miami Industries, Inc., Toledo.
Monarch Rubber Co., Hartville Plant, Hartville, Ohio.
Silver Creek Precision Corp., Silver Creek, N. Y.
Union Hardware Company, Torrington, Conn.
Universal Match Corp., Magnesium & Signal Division, St. Louis.
Walker Mfg. Co. of Wisconsin, Main Plant, Racine, Wis.
Yuba Mfg. Co., Benicia, Cal.
Alco Valve Co., St. Louis.
American Bridge Co., Gary Plant, Gary, Ind.
Anaconda Wire & Cable Co., Muskegon Plant, Muskegon, Mich., and Shelby Plant, Shelby, Mich.
Bethlehem Steel Co., Shipbuilding Division, Baltimore Yard, Key Highway, Baltimore.
Black, Sivalls & Bryson, Inc., Kansas City Plant, Kansas City.
Burroughs Adding Machine Co., Detroit Plant, Detroit.
Combustion Engineering Co., Inc., Savannah Assembly Plant, Savannah, Ga.
Consolidated Steel Corp., Ltd., Landing Craft Division, Maywood, Cal.
Cooper-Bessemer Corp., Grove City, Pa.
Dodge Mfg. Co., Plant No. 1, Mishawaka, Ind.
Free Sewing Machine Co., Rockford, Ill.
Glidden Co., Metals Refining Co., Hammond, Ind.
Link-Belt Co., Pacific Division, San Francisco.
Madison Iron Works, Inc., Madison, N. J.
Risdon Mfg. Co., Naugatuck, Conn.
Soule Steel Co., Los Angeles Plant, Los Angeles.
Stuart-Keith Mfg. Co., Petersburg, Va.
U. S. Rubber Co., Charlotte Plant, Charlotte, N. C.
Walker Mfg. Co., Ajax Division, Racine, Wis.
E. M. Weymer Co., Chicago.
Woodruff and Edwards, Inc., Elgin, Ill.

Maritime M

Mercer Tube and Mfg. Co., Sharon, Pa. (gold star)
Edward Valve & Mfg. Co., Inc., East Chicago, Ind. (second gold star)

HIGHER VOLUMETRIC EFFICIENCY...

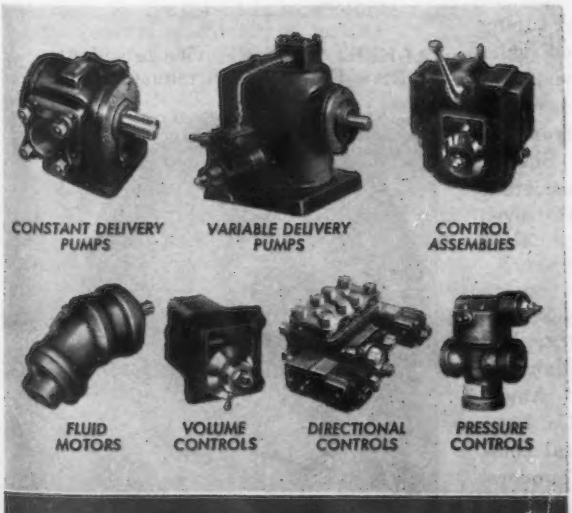
HIGHER MECHANICAL EFFICIENCY:



Typical curves shown are for V-104-D pump at 1200 rpm; curves for other models are similar. Above curves are for oil having viscosity of 150 S.S.U. at 100° F., temperature of 120° F.

VICKERS

BALANCED Vane Type PUMPS



Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

These performance curves merit careful consideration when selecting constant delivery pumps for oil hydraulic power and control systems. The overall mechanical efficiency is extremely high throughout the important working pressure range. Note that pump delivery and efficiency are not reduced appreciably as pressure is increased. These features, together with the 1000 psi continuous working pressure that is possible, effect an important reduction in pump size and cost. This higher working pressure also means a substantial saving in first cost and in space occupied by cylinders, valves, piping, tank, etc. for a given speed and power.

Other important advantages of Vickers Balanced Vane Type Pumps include: (1) Hydraulic Balance which cancels out bearing loads and means much longer pump life, (2) cartridge assembly contains all pumping parts that move and is important to the simplicity, easy inspection and minimum maintenance of these pumps, (3) compact, yet rugged, (4) automatic wear take-up, (5) temperature adaptability, etc. Ask for Bulletin 40-25a for all the facts about Vickers Balanced Vane Type Pumps.

Vickers Application Engineers will gladly discuss with you how Vickers Pumps and Vickers Hydromotive Controls can be used to advantage.

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NEWARK • PHILADELPHIA • ROCKFORD • TULSA • WORCESTER

PERSONALS

R. HEATH LARRY, secretary, National Tube Co.

• **R. Heath Larry** has been elected secretary of the National Tube Co., a U. S. Steel subsidiary, to succeed the late E. W. Criswell. Mr. Larry was formerly assistant secretary. Prior to his present connection he was with the law firm of Ruslander & Kaufman.

• **Anton Erhardt** has been appointed plant superintendent of National Tool Co., Cleveland, in full charge of its production of precision metal-cutting tools. He started with the organization 36 years ago as a punch press and lathe hand, and has since that time worked on every operation in the shop.

ANTON ERHARDT, plant superintendent, National Tool Co.

• **Sidney H. Webster,** former advertising and technical data director for Eclipse Aviation Products, has been appointed Pacific Coast sales and engineering representative of the Eclipse-Pioneer division of Bendix Aviation Corp. He will make his headquarters in Los Angeles.

• **William E. Paris** has been made operating manager in charge of manufacturing at Willys-Overland Motors, Toledo.

• **Ira B. Stiefel** has been made an assistant to the vice-president in charge of industrial relations for the Westinghouse Electric & Mfg. Co., Pittsburgh. Mr. Stiefel has been manager of industrial relations at the company's East Pittsburgh Works since 1937.

• **T. E. Marston** has been appointed manager of ring sales for the Edgewater Steel Co., Pittsburgh.

• **B. L. Weaver** has been elected a vice-president of American Wire Fabrics Corp., a subsidiary of the Wickwire Spencer Steel Co. In his new position he will have direct charge of all operations at the Mt. Wolf plant, Mt. Wolf, Pa.

• **Robert A. Campbell** for nearly 15 years associated with the steel tubing industry, has been appointed sales manager of the steel tube division of Talon, Inc. Mr. Campbell, a native of Youngstown, Ohio, comes from the Ohio Seamless Tube Co. of Shelby, Ohio, where he had been assistant sales manager for the past seven years.

• **Wallace Levi,** metallurgist, Lynchburg Foundry Co., Lynchburg, Va., and **Dr. R. A. Flinn** of the Mahwah, N. J., research laboratory of American Brake Shoe & Foundry Co. have been appointed to the technical committee of the Gray Iron Founders' Society.

• **Harlan P. Ross** has been appointed vice-president of the Upper Merion & Plymouth Railroad Co. with headquarters at Conshohocken, Pa. He succeeds Nicholas L. Moon, deceased.

RICHARD P. FIERST, treasurer, Superior Steel Corp.

• **Richard P. Fierst** has been elected treasurer of Superior Steel Corp., Carnegie, Pa. For the past 15 years he has been connected with the Bureau of Internal Revenue, Treasury Department, Pittsburgh office.

• **Leon F. Miller** has been appointed sales manager of the Osborn Mfg. Co., foundry machine division, succeeding **R. F. Lincoln,** who has resigned to enter another field.

• **W. S. Bowser,** controller, has been elected director of the Blaw-Knox Co., Pittsburgh. **Frederick Baker,** assistant treasurer, was named treasurer, and **Albert L. Cuff,** secretary and treasurer, was elected a vice-president.

ALBERT L. CUFF, vice-president, Blaw-Knox Co., Pittsburgh, Pa.

GEORGE A. SLOAN, member of finance committee, U. S. Steel Corp.

•George A. Sloan of New York has been elected a member of the finance committee of U. S. Steel Corp. to fill the vacancy caused by the recent death of William J. Filbert. Mr. Sloan has been a member of the board of directors of the corporation since Jan., 1937. He was president of the Cotton Textile Institute from 1929 to 1935.

• **Hardy B. Reisfeld** has joined Allis-Chalmers Mfg. Co.'s general machinery export department in Milwaukee. He is prepared for his present position by many years of representing industrial firms in Turkey, Sweden, the Balkans and Belgium.

HARDY B. REISFELD has joined the general machinery export department of Allis-Chalmers Mfg. Co.

• **George D. Wick,** executive vice-president since August, 1939, has been elected president of Fort Pitt Bridge Works, Pittsburgh. He succeeds **James M. Straub,** who has been elected vice-president in charge of production and costs.

• **John F. Budke** has been elected president of the Parkersburg Iron & Steel Co., Parkersburg, W. Va. Since 1924 he has been vice-president, counsel and director. **Charles F. Niemann, Jr.,** formerly assistant to the president, was elected executive vice-president and treasurer.

• **James Thomson,** former cost analyst at Gary works, Carnegie-Illinois Steel Corp., has been appointed assistant supervisor of the Carnegie-Illinois statistics division. **James W. Kettle** succeeds him. Mr. Thompson began his association with Carnegie-Illinois in 1933. **Gaston Estep** has been promoted to the position of supervisor of the analytical cost bureau with headquarters in Pittsburgh, and **Charles C. MacDonald** has been promoted to district supervisor of the analytical cost bureau, succeeding Mr. Kettle.

• **Walter S. MacNabb** has been appointed division superintendent of blast furnaces, Gary works, Carnegie-Illinois Steel Corp. He has served continuously since 1910 with the Gary organization, heading various plant departments.

• **J. Paul Oliver** has been made administrative technical assistant of the Research division of Cardox Corp., Chicago. For the last two years he has been superintendent of the Cardox electrochemical plant at Claremore, Okla. **Dr. Laurence M. Liggett** succeeds Mr. Oliver as plant superintendent.

• **George L. Davis,** who was formerly vice-president of the Diamond Power Specialty Corp., Detroit, has joined the Carnegie-Illinois Steel Corp., Pittsburgh, as general staff manager, sales. In the past, he had been in the employ of the American Steel & Wire Co., Donora, Pa.; Pressed Steel Car Co., McKees Rocks, Pa., and the Oliver Iron & Steel Corp., Pittsburgh.

• **George D. Sells** has been appointed superintendent of blast furnaces of Pittsburgh Steel Co., Monessen, Pa., and **Charles D. Steele** has been appointed assistant superintendent. Mr. Sells was formerly connected with the American Steel & Wire Co., at Duluth, Minn., and Mr. Steele has been with the Pittsburgh Steel Co. in the capacity of blast furnace foreman for a number of years.

• **H. P. Munger** has been appointed plant manager at Olean, N. Y., of two of the plants of the Van der Horst Corp. of America. Before taking over his present responsibilities, Mr. Munger was superintendent of the new electrotinning plant of Republic Steel at Niles, Ohio.

• **Frank J. Hirner** has been appointed manager, St. Louis district, of the Harnischfeger Corp. Mr. Hirner has served in various capacities in engineering and sales at the company's plant and field offices.

• **J. D. Glatz,** chief of the crane and hoist section, tools division, WPB, for two years, has been appointed manager of the repair sales division, Harnischfeger Corp., Milwaukee.

OBITUARY...

• **D. J. Higgon,** superintendent at Canadian Furnace Ltd., died March 5. He was 59 years old.

• **Jesse S. Draper,** former Detroit representative for American Cable & Chain Co., died recently. Mr. Draper was one of the founders of Hudson Motor Car Co.

• **Newton S. Taylor,** 55, an executive in the switchgear and control division of the Westinghouse Electric & Mfg. Co., died Feb. 21 at his home in Wilkinsburg after an extended illness.

• **Marvin J. Steele** died at Detroit Feb. 29. He was assistant chief engineer of the Marine Engine division at Packard Motor Car Co., which he joined 32 years ago.

• **William E. Hyatt,** retired manager of U. S. Steel Export Co. of New York, a subsidiary of U. S. Steel Corp., which he served for 50 years, died March 6 at the age of 76.

• **Bert G. DeWitt,** superintendent of the enameling department of Geuder, Paeschke & Frey Co., Milwaukee, and with the firm 33 years, died March 2 at his home there.

Fatigue Cracks . . . .

BY A. H. DIX

Ingenious, Uninhibited

• • • A constant marvel to us is the inventiveness of the artist who illustrates *The Mainspring*, Wallace Barnes Company's house magazine, a Baedeker of spring lore.

While the text is serious, as befits the subject, the illustrations are not. The artist is given free rein in drawing sketches that will sharpen the points brought out in the reading matter, and he performs his assignment in an ingenious and highly uninhibited manner.

"Outdoor exposure and constant handling"

For example, when confronted with the job of illuminating the line, "Nickel plate will tarnish under outdoor exposure and constant handling," he produced the bathing beach love scene at the right. It seems to us a perfect fit.

Aptronyms

. . . The retiring president of the Canadian Jersey Cattle Club is Duncan O. Bull.

—*Robert Trowbridge, Arvida, Quebec*

How about "Air Surgeon," the new book by Frank G. Slaughter?

—*G. M. Swanson, San Francisco*

Head of the Toledo, Ohio, diocese is Bishop Karl Alter.

—*E. J. Ehret, Chicago*

Clean Hit

. . . As to the versank-versenkt controversy, since both John H. Van Deventer and Ingo Maddaus are old friends of mine, I cannot be accused of being partial when I tell you that Ingo is right.

In the sense used by John H., the announcement comes from the submarine captain who would report: "The ship was sunk (= wurde versenkt), while the captain of the victim would report the fact that his ship sank (= versank). In other words, it depends on the point of view.

—*G. H. Zimmer, Buffalo Forge Co., Buffalo 5, N. Y.*

He went Back 921 Years

• • • A "T" for Timeliness to whoever handles publicity for Detecto Scales, Inc., 1 Main St., Brooklyn, N. Y., for sending us this medieval painting of scales in use about a thousand years ago.

The timeliness comes from the fact that the painting is in an encyclopedia completed in 1023 by the monks of the Monastery of Monte Cassino.

No Esses

. . . We have a problem. For purposes of filing applications for allocations of copper oxide, we would like the plural of ship-bottoms paints.

I am putting the form through as "ships-bottoms" paints, but somehow it doesn't seem right, as it implies a ship has more than one bottom. But "ships-bottom paints" I translate to mean only one bottom for all the ships. Or should it be "ship-bottom paints"?

—*E. A. Bostrom, Pope Trading Corp., New York*

"Ship-bottom paints" wins by a 5 to 2 vote of the brains department's marine division, hull section. The minority opinion holds that the requisition should read "Enough paint to coat hull of a .....-ton ship." If several hulls are to be painted, follow the example of the tailor who solved the problem of ordering more than one tailor's goose by adding a postscript, "Better make it two."

Second Taker

• • • An English manufacturer writes us that he was threatened with violation of copyright because he drew upon data in an English publication in preparing some publicity material. Recalling vaguely that he had seen the same information some place before, he went through some old copies of your favorite family journal, and found that the English publisher had lifted the data almost bodily from us.

Inasmuch as so many of the industry's new developments are first published here, THE IRON AGE is a favorite source book, a situation we view more with satisfaction than alarm. So when we run across an echo of a shout of ours that broke the silence on a given subject, we are inclined to glow rather than glower.

A cry of anguish escapes us only when whole pages of the brains department's deathless prose are copied, complete with drawings, without even a fine type bow in our direction.

Blurb

• • • As an example of an uncommon information carrier's contribution to the literature on a given subject, we cite the 20-page report on direct casting in the Feb. 24 issue. This, together with the previous report that appeared in our Apr. 4, 1940, issue, constitutes practically the whole of published literature on this epoch-making development.

Stopper

• • • Buxom Bertha Knows Her Batch Control.—*Toledo Scale Co.*

Kremlin Favorite

• • • Knife-sharp, trim-figured, magnetic Eric Johnston, head of the U. S. Chamber of Commerce, says Russia will be a major postwar market for American goods. If so, those who are smart enough to advertise in your family journal will have a lead of many versts on their less astute contemporaries, for this is one of the U.S.S.R.'s favorite foreign industrial journals.

Back in the '20s, when that country's industrial program was just getting under way, we were one of the dozen or so American publications on the approved list, despite our frequent divagations from the straight party line. The Russians are hard buyers and their love for us is due solely to our high information-roubles ratio.

The love persists, for last year when we feared that paper rationing would force us to reduce the number of copies going to Russia, Moscow cabled us:

INSIST YOUR FILLING TOTAL QUANTITY REQUIRED. PLEASE WIRE CONFIRMATION.

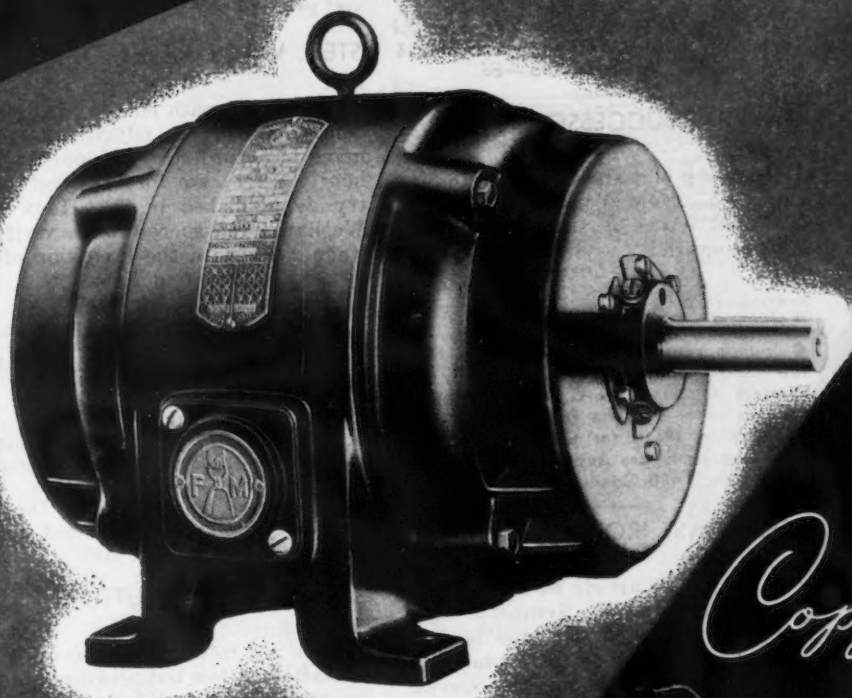
Puzzles

Last week's butcher uses these weights ½, 1½, 4½, 13½ and 40 lb.

You should get this in five minutes:

The owner of a small tool and die shop, having 13 employees, wishes to give an Easter turkey to all but one trouble-maker. But he does not want the trouble-maker to know he is being discriminated against, as that might cause trouble with the union. So he arranges the 13 in a circle and says "Every ninth man gets a turkey." As soon as a man gets a turkey he steps out of the circle. Where did he place the trouble-maker to keep him turkeyless?

A Challenge to the Future ...in Motor Design



Copperspun ROTOR

Here is the new Fairbanks-Morse general purpose, continuous duty motor—designed for the future—available now! Never have more stamina, versatility and protection been built into a motor housing!

BUY WAR BONDS

NOTE THESE FEATURES

- **It is a 40°C. motor.**
- **It is a protected motor.**
- **It has an optional conduit box assembly.**
- **It has cross-flow ventilation.**
- **It has ball bearings—sealed in cartridge type closures.**
- **It has exclusive Fairbanks-Morse *COPPERSPUN ROTOR.***

Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Motors

Dear Editor:

MUSLIN RUST PREVENTIVE

Sir:

Page 58 of your Feb. 3 issue states that clean iron surfaces protected by a muslin cage do not rust freely. We have been dipping these muslin cloths in oil. Have any experiments been made along this line? The thought that occurs is whether the oiling operation on our part is unnecessary.

JOHN C. KERR,
Chief Inspector
Wayne Pump Co.,
Fort Wayne 4, Ind.

● Our news item was based on a corrosion investigation made at the National Physical Laboratory, England. Whether or not immersion of the cloths in oil helps or hinders, we do not know. Has any reader had experience with this?—Ed.

WELDING STRESSES

Sir:

In regard to the locked-up stresses due to welding, the Lincoln Electric Co. has referred me to your Sept. 2 article, "Control of Residual Stresses Through Welding Sequences." Are reprints available?

L. S. BEEDLE,
Lieut., U.S.N.R.
Norfolk Navy Yard,
Portsmouth, Va.

● No reprints were made but a clipping is being sent.—Ed.

BRICKBAT

Sir:

I quit reading the editorials as they play only one tune, namely, labor strikes and business is holy and righteous, and professors are not practical. I happen to work for a living and as a sideline I even teach school (you know, long hair, New Deal, professor type), so I resent your aspersions as to my practicability just because I happen to be educated. Do you have to be a moron to be eligible for office in Washington? Also, by the way, does free enterprise consist of the right to sell defective materials to the Government if you can get away with it? A harp has many strings, why don't you play the low notes awhile? My ear is tired of the high notes. For every union there is a cartel. For every lousy leader there is an unscrupulous business executive, and I thank God there are a few long-haired guys with a grade of intelligence a little higher than a moron who can offset organizations like N.A.M.

ASST. CHIEF ENGINEER

● That all business is lilywhite and all unions uniformly black is no contention of ours. In both groups there are intermediate shades.—Ed.

HIGH CONDUCTIVITY PLATE

Sir:

We have read with a great deal of interest the article on page 47 of your Feb. 3 issue regarding the new metal plating process using ingots made of copper, tin and zinc for providing high surface conductivity.

Where can we get more information?

J. H. KRAEMER,
Superintendent
Brier Manufacturing Co.,
Providence, R. I.

● From Hendley Blackmon, Director of Technical Publicity, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.—Ed.

GARVIN'S SUCCESSORS

Sir:

How long is it since the Garvin Machine Co., New York, went out of business? Was it succeeded by another concern?

J. LOUIS SCHRADE,
President
Schrade Cutlery Co.,
Walden, N. Y.

● Garvin suspended business about 1923. The Garvin tapper is now made by the Western Machine Works, Holland, Mich., and the miller by John Frew Machine Co., Philadelphia. Parts for Garvin millers and screw machines are supplied by John B. Stevens, Inc., 480 Canal Street, N. Y.—Ed.

COLD-BLAST IRONS

Sir:

J. E. Hurst's article on "Cold-Blast Irons Duplicated by Synthetic Mixtures" in your Feb. 17 issue is very interesting but somewhat tantalizing, because the context does not reveal whether the "cold-blast" pig irons were made with charcoal, raw coal, or with coke. In this country all "cold-blast" pig irons were made with charcoal.

The author mentions "cold-blast" and "charcoal pig irons" in his second paragraph, apparently differentiating between cold-blast pig iron and charcoal pig iron. Throughout the balance of his article he refers only to "cold-blast pig irons" and "ordinary refined iron."

Until this question of what blast furnace fuels were used in producing the two kinds of pig iron which were tested by Mr. Hurst is answered, it would be futile to come to any conclusions as to what extent his interesting laboratory experiments can be used in discovering the "It" in charcoal pig iron referred to in the article on "Charcoal Pig Iron" in your July 1, 1943, issue.

RALPH H. SWEETSER,
Blast Furnace Consultant
7 Mitchell Place,
New York

● Will Mr. Hurst, to whom a marked copy of this page is being sent, please say what fuel was used?—Ed.

COMPARABLE TOOL STEELS

Sir:

Do you have a chart showing the comparative relationship of various steels? For example, if we have one brand of Ketos steel, with a chart of this sort we could determine what other brand would be relatively similar. We are trying to set up a chart whereby we can place our steels for instruction in speeds and feeds.

W. H. SKINNER,
Purchasing Agent
Perfect Circle Co.,
P.O. Box 331,
Richmond, Ind.

● See the "Chart of Comparable Tool Steel Grades," in our Aug. 28, 1941, issue. Reprints are available and one has been sent you.—Ed.

STEEL WAGE RATES

Sir:

A contract with one of our vendors calls for a price adjustment to be made in accordance with our average hourly wage rate for the steel industry as published in THE IRON AGE. We have been successful in verifying wage rates with the exception of the months of Jan. and Feb., 1943. Can you tell us what they are?

R. D. McCALL,
Chief Clerk,
Material & Supply Division
Hercules Powder Co., Inc.,
Sunflower Ordnance Works,
Lawrence, Kansas

● The American Iron and Steel Institute from which we obtain our data states the average hourly wage rate for Jan., 1943, was $1.107 and for Feb., $1.105. The average hours per week were 39.8 and 41.6 respectively.—Ed.

COLD TREATING CUTTING TOOLS

Sir:

We are interested in securing information on low temperature quenching and hardening of steels.

The process as described to us is as follows: take the steel article such as a drill and place in a refrigerator and cool to a low temperature and let remain for a few hours, remove tool from refrigerator and allow to come to room temperature. The tool is then supposed to be several points harder. In fact one heat treating shop claims that the effect is equal to that of nitriding.

Any data you can furnish us will be appreciated.

J. R. GAGE,
Research Department
Goodyear Tire & Rubber Co.,
Akron 16, Ohio

● Some information on the cold treatment of cutting tools is given in the article, "Cold Treatment of Metals," which appeared in our Feb. 25, 1943, issue. For further data see "Some Effects of Sub-Zero Cooling" in next week's issue.—Ed.

GALVANIZING

Sir:

Do you know of any good books on hot dip galvanizing?

RAYMOND MATTE,
Engineer
Canadian Tube & Steel Products, Ltd.,
P. O. Box 67,
Montreal, Quebec

● The best book we know of is "Galvanizing" by Heinz Bablik, a German engineer. The English translation has been published by the Chemical Publishing Co., 148 Lafayette St., New York, $8. Wallace G. Imhoff, Vineland, N. J., consultant on hot-dip galvanizing, has also published data on the subject.—Ed.

The Steel Age

MORE than ever, industry, people and governments realize the vast importance of steel—for matériel of war and for a better peace. Transue, too, places its faith in the future and finer things for living in America's utilization of steel. For strength, lightness and adaptability, Transue deep drawn steel stampings again will contribute to the superiority of many products for civilian use.

Designers and Makers of Deep Drawn Stampings

TRANSUE & WILLIAMS
ALLIANCE, OHIO

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, DETROIT, INDIANAPOLIS, CLEVELAND

This Industrial Week . . .

- **Steel Demand and Production at Frenzied Levels**
- **Loaded Order Books, Manpower Shortages Appearing**
- **Maritime Indicates Heavy Needs in Third Quarter**

DEMAND and production of steel for war are at such frenzied levels that problems of inadequate manpower, overburdened equipment and badly congested order books are returning rapidly and perhaps more forcefully than at previous periods in the past two years.

Deluged by plate and sheet orders, several flat rolled producers report that their carryovers of scheduled but unrolled tonnage have risen recently despite record output. In addition to forcing acceptance by mills of large tonnages of sheets and plates, WPB is giving mills large amounts of semi-finished products to be produced during second quarter for Lend-Lease.

The manpower pinch is growing tighter. The big drive by Selective Service, responding to the urging of the President, has resulted in cancellation of industry replacement schedules and other severe steps in some areas. The serious shortage is in common labor. With employee ranks being depleted, inefficiency, which is already estimated at 23 per cent above normal by at least one representative steel maker, will rise higher. Repairs are now taking longer to complete than was formerly the case, a situation which presents a threat if all-out production is to be required over any length of time.

In the Buffalo area, the manpower shortage is making it impossible for two large steel plants fully to meet schedules, particularly in the open hearth maintenance departments. Lack of labor also has hampered blast furnace repairs.

"WE have been able to produce as well as we have only by men working long hours, 16 hr. per day or seven days a week, but there is a limit to human endurance," said the manager of one Buffalo steel plant.

Foundries, struggling with the manpower stringency, are endeavoring to sublet castings contracts through the aid of pig iron salesmen, who are in touch with plants which might handle additional business.

OPA is reported to be drafting an announcement regarding carbon steel prices after a meeting held last week in New York with the Steel Advisory Committee. Apparently, both sides have exhausted discussions on what the confidential figures have shown, and it now appears that the possible slight downward revisions and some upward adjustments may have to be fitted into the general stabilization picture. OPA also is working on its alloy steel, merchant iron, and merchant ore studies.

WPB has decided to revoke its order stopping construction of the structural mill at Geneva, Utah. At the same time it is reported that completion of the South Chicago plant of Republic Steel Corp. has been approved. The first action is a source of good news to the western bloc in Congress, which has been exerting pressure against the stop order. The second action will give DPC a completed plant through expenditure of only a small amount of money, since the Chicago installation was almost completed, with its coke ovens consuming much gas.

Highlights include: Donald M. Nelson's statement of WPB reconversion policy in which he admitted that the services have not always consulted with WPB on contract cutbacks; the dragging on of the WLB steel wage hearings with little being accomplished from day to day so far; cancellation by the Navy of its 16 gage cold rolled sheet container program; the appearance of strong indications that 1945 airplane production will be larger than ever; and the Truman Committee report that magnesium output is at a point where its use in more civilian goods is warranted.

ADMIRAL Emory S. Land on March 9 said that this year's shipbuilding program will run into 1945, although it is yet uncertain what exact tonnage will be built in the first half of next year. While it is conceded by WPB officials that the Maritime Commission will have all of the steel needed for 20,000,000 tons of shipping, the production goal for 1944, by the beginning of July, tentative discussions with WPB indicate that the Commission will require about 475,000 tons of plate a month in the third quarter. This would indicate a shipbuilding program of at least 10,000,000 tons is in prospect for next year, provided Maritime succeeds in building 2000 ships this year. While first quarter allocations of plates to the Maritime Commission amounted to about 560,000 tons monthly, second quarter allocations were an estimated 525,000 tons monthly.

Latest information on the new all-metal shell container program currently being placed by Army Ordnance is that production may center in the Cleveland and Chicago areas. Four sizes of a tubular shell container which will be water-tight and reusable are being made in Cleveland and at least four additional sizes of a different type are reported being made in the Chicago area. The four tubular types

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will hold respectively 57 mm. and 81 mm. mortar shells, and 90 and 105 mm. high explosive shells. Steel specifications are calling for both hot and cold rolled SAE 1010-20 sheets and strip. A great deal of idle and excess steel is expected to be pressed into service. The tubes for the body are welded from formed sheet. It appears that approximately 70,000 to 75,000 tons of sheet and strip will be used in the Cleveland district. Estimates of the sheet tonnage by the entire program are said to exceed by 35 per cent the sheet requirements of the automotive industry for the comparable quarter of best peacetime year. Some 1732 miles of 6-in. welded sheet tubing will be required in Cleveland and 2763 miles of all size tubing in this area. Smaller mills not closely tied in with plate production are getting a majority of sheet orders.

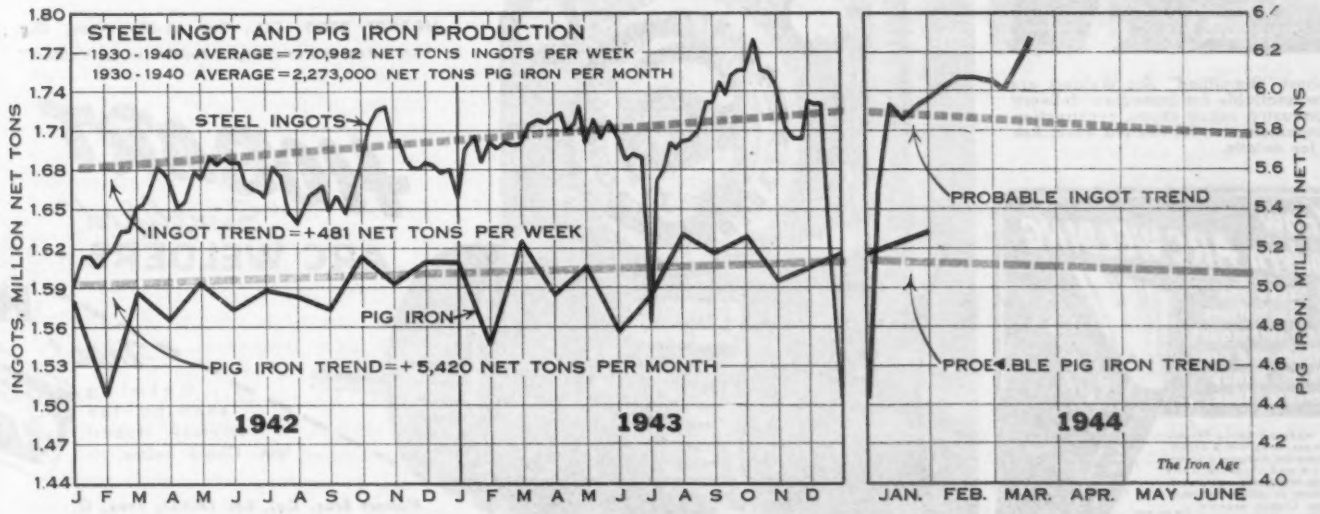
AFTER analyzing the Murray plan for assisting 20 of the smaller steel companies, opinion in the industry seems to be that legal problems concerning the use of DPC furnaces would be formidable, that shipments of such pig iron would be at the expense of other tonnage, and that the small steel companies still would have no guarantee of adequate orders. It is pointed out that the history of the steel industry shows that when supplies are in balance or in excess of demand, so-called premium prices cannot be realized. Some executives assert that the Murray plan might be an entering wedge for wide-scale government participation in the steel industry.

Several of the smaller steel companies in the Illinois-Missouri area, queried concerning their reaction to the Murray plan, denied that they were confronted with a disastrous scrap shortage and pointed out that increased labor rates had been as great a factor in raising their overall production costs as had the cost of raw material. An overall price increase would be a better solution than the Murray plan, it was said. Two of the mills mentioned by Murray are reported to have offered indirect price concessions recently on wire product sales.

Corrollary to the expected farm equipment boom which is leading many firms who have never before made farm equipment to consider entering the field as soon as possible, is the tremendous increase in farm demand for steel and particularly wire products. Priorities cut the farm market in half in 1942 but last year sufficient steel was released to farmers to enable close-to-normal sales. This year is expected to be 50 per cent better than 1943.

Sidelights of Week's Market Summary

• • • The WPB Steel Division is slated to have a new director, according to unofficial Washington gossip. . . . One of the large new plate mills was turned over for the first time recently but still lacks its shear . . . Several steel companies are showing distinct interest in Mexico as a postwar market . . . WPB is reported to have cracked down upon a steel company by installing a compliance officer at the main office . . . Trying to build 10,000 caterpillars proved far more difficult than a locomotive manufacturer ever imagined and some of the work may be farmed out . . . The U. S. is slated to furnish 73 per cent of the soldiers to be used in the invasion of Europe, Congress has been told . . . WPB is muttering about firms which haven't been making their full quota of repair parts for civilian appliances . . . DPC's magnesium smelter at Ford Motor Co. has been ordered closed . . . The entire matter of experimenting with civilian output in Philadelphia, Kansas City and Cleveland is a source of great embarrassment to WPB in view of the setbacks which the program has received . . . Trade sources expect that a billion beer cans will be made this year, mostly of electrolytic plate . . . Some of the most sensational material uncovered by the Truman committee investigating war production has never been made public . . . One question being asked unofficially in Washington is whether Great Britain might begin returning machine tools and other equipment under lend-lease provisions.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 9	95.5	101.5	98.0	91.5	99.5	104.5	99.0	99.0	99.5	95.0	94.0	92.5	101.5	97.0
March 16	96.0	101.0	98.0	91.5	99.5	104.5	99.0	99.0	99.5	84.0	96.0	92.5	106.5	97.0

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Time Rolls on; WLB "Hearings" Badly Mired

Washington

• • • No law, no reason, no logic—these are the rules governing the farcical travesty of the WLB hearings involving the United Steel Workers, the steel industry and other allied industrial unfortunates who have signed USWA contracts.

The panel which is supposed to clear all extraneous questions aside, has held practically a week of "hearings" since March 8 which to date have fostered only more questions. Panel members are: David L. Cole, chairman; N. P. Feinsinger, vice-chairman; Hugh Morrow and Edwin D. Bransome, industry members; and John Despol and Stephen Levitsky, labor members. "Procedures" are so confused the hearing on the merits has been postponed from March 14 to March 22.

These are the questions to which there has been no answer or substantial agreement from the panel, USWA, nor from the heterogeneous hundreds of companies included in CIO's basketed demands.

How many panels shall consider the case, and what are the divisions of industry before each panel?

Has WLB the authority to consider a wage demand which will wreck the "stabilization program," and bury the "Little Steel" formula already killed by the bituminous coal case? This point was raised at a "procedural" hearing on March 9 when Attorney John C. Gall, representing Youngstown Sheet & Tube Co., startled the panel and USWA counsel by suggesting that the 17c. an hour wage increase be excluded because it would violate the stabilization policy.

Should panels consider the case from a plant or company basis?

What is the definition of the "basic" steel industry, and if an acceptable definition is arrived at through industry and union agreement, what difference will it make in WLB policy?

What instructions, if any, shall be given to the Regional Boards concerning steel cases now before them?

What issues or groups of issues shall the panel consider and in what order?

The reason for all of the confusion is the panel's failure to establish its own procedure as all other administrative tribunals do. Instead, these questions have been thrown open to a series of so-called hearings which at best have turned into declamation contests with the panel as a group of too-puzzled onlookers.

The union would like to have one panel hear all of the issues involving 1000 companies and several scores of issues. So far CIO-USWA has confined its idea of issues to its demands and the demands industry may make have not had any place in discussion. It is assumed that mere disagreement with some issues which CIO has batted at a miscellaneous group of industries will not satisfy many industrial groups which may have issues of their own to present.

Imagine the futility of a crowd of 500 sitting together for days playing the game of "What is the question?"

Thus far, the formula is something like this: WLB sends out telegrams to various companies which have USWA contracts to come to Washington to discuss procedures because CIO said so. About 500 people turn up representing hundreds of conflicting industrial concerns and industrial conditions. CIO General Counsel says it should have been 128 and Steel Panel Chairman Cole allows it should have been about 900 to discuss the procedures WLB has said will be discussed.

At the opening of each day's hearing, union representatives exchange glances confidently; steel men look at each other knowingly and at the panel members expectantly. Panel members either look quizzical or poker-faced.

Then comes a weary several hours of speaking by industry groups who do or do not want to be included in the "basic" steel industry's case. Thousands of words of testimony are put into a record which when finished promises to be as voluminous as an encyclopedia. Time staggers on, and when the day is over, 500 men have accomplished exactly nothing.

Utah Steel Plant May Be Completed, WPB Says

• • • **WPB** has made a new decision on the structural steel mill at Geneva, Utah. Because the supply of structural shapes had exceeded demand, WPB decided last December not to permit the completion of this plant of the Geneva Steel Co., but on March 13 WPB said that construction of the structural mill is being permitted to proceed to completion.

This mill has a rated capacity of 200,000 tons annually. The total cost was estimated at $17,250,000, of which the work remaining to be done should come to approximately $1,350,000. It is believed that it will take approximately three months to complete the work remaining, WPB officials said.

Completion of the Republic Steel Corp. plant at South Chicago has also been approved. See page 109.

Murray's Plan Seen by Some Persons As Inducing Government Participation

By TOM CAMPBELL
Pittsburgh Editor

o o o

• • • **No matter** which way you cut it, Phil Murray's plan to "save small steel" still means a combination of government subsidy, possible government control, lack of realistic planning, and forced support from larger steel producers, according to a cross-section of opinion in Pittsburgh.

The Steelworkers' Union plan, to aid 20 or more small integrated steel plants by suggesting a lower price for pig iron and scrap than now constitutes the going price, is symptomatic, according to reliable opinion here, of a problem which goes far deeper than the more or less superficial program set forth by Philip Murray.

For the past several years, wherever steel men gathered, a major point of discussion has been: "How will the little fellows hold on?" Just as timely a subject has been the question: "How long will the big fellows continue to sell raw materials or raw steel to smaller firms, which compete on the finished steel basis?" The latter question is not involved in Mr. Murray's plan, except that he overlooked the fact, apparently, according to authorities here, that any iron produced in DPC plants would have to come out of the hide of either larger steel companies or small merchant blast furnaces, who previously had been furnishing such iron. This viewpoint, it is said, is predicated upon public statements by WPB that sufficient pig iron is available, so that the operation of five DPC blast furnaces is not necessary.

Mr. Murray, as well as steel companies, big and small, have all been of the opinion that if war demands did not completely utilize iron and steel making facilities, then WPB should take up the slack by expanding civilian requirements.

If the above situation is true, as all reliable reports from Washington indicate, then the steel companies, which Mr. Murray is championing, would probably not obtain any more orders than they are now obtaining; and if his plan were adopted, these companies would obtain special operating cost concessions, not available to other steel makers. In the meantime, the producer of the pig iron made in DPC plants would ship such pig iron either at the expense of tonnage from his own blast furnaces, or at the expense of small merchant furnaces who may have been supplying the iron. The latter, who have been clamoring for higher prices, would then, it is said, be in a precarious position themselves. If the supplier of the DPC pig iron happened to be a larger steel company, it would not make any difference whether it came from their own furnace or the DPC unit. But it would mean that if it came from their own furnace they would be denied a profit on the iron, which they had been obtaining, and if it came from the DPC plant they would have to use their own raw materials, pay a royalty tonnage figure to the government, and pass out the iron at practically no return to themselves.

On the question of supplying battlefield scrap at lower than ceiling prices to the small steel companies mentioned, it is recalled that such scrap is being handled entirely through dealers, who have taken on the momentous job of segregating it. Even though these dealers were ordered by WPB to follow Mr. Murray's plan of selling at lower prices, the difference, theoretically, would have to be made up by a government subsidy. Practical scrap observers know, however, that higher scrap prices for any item last just long enough for buyers to find a cheaper price.

Some steel people, and they do not all come from large companies, see in Murray's plan an entering wedge for governmental participation in steel industry.

Critical Analysis of Portions of Murray's Small Steel Plan

Pittsburgh

The pig iron should be sold at that discount below the current OPA ceiling prices as is found necessary to enable the small producers to be competitive, but not less than the cost of production to the DPC.

If the DPC agents sell this pig iron, it is they who are selling it and not the DPC, since they pay the latter a stipulated amount per ton of pig iron produced as rental for utilizing equipment. Their cost is their cost of making pig iron, plus the per ton royalty paid to the DPC. The latter, in most cases, runs from $3.00 to $4.00 a ton.

Reference is to huge steel corporations "whose plants have benefited from the addition of modern government-built low-cost producing facilities during the war."

Most of these facilities are still owned by the government, and the steel companies pay a royalty for using them. Steel companies are now trying to get higher steel prices because of increased costs.

Of the 20 small steel producers confronted with disaster, one is on the verge of suspending steel producing operations, another is operating at only 40 per cent, and several others are confronted with having to abandon operations before the war is won.

Apparently, WPB is powerless to expand civilian requirements at this time. Lower costs might not enable these companies to obtain any more business than they now have, but would better their financial position, even though not adding to actual operations. Ingot supplies are now more than plentiful and seem to be balanced with finishing facilities, under present restrictive WPB measures.

Reference is made that jobs of 27,000 wage earners are possibly endangered, due to the inability of these small firms to compete with larger companies.

Under present WPB restrictions, orders which might be shifted to other steel companies would still mean less man hours at the plant from where the orders were shifted.

Small companies, which had been granted price relief by OPA at above the ceiling price, are losing business now because material can be purchased elsewhere at the ceiling price. These companies have had to reduce their selling prices, or lose the business to huge steel corporations who can sell for ceiling prices.

The history of the steel industry has been that when supplies are in balance or in excess of demand, so called premium prices cannot be realized.

Reference is made that the employees of the 20 small producers have given the companies an annual wage subsidy of more than $4,000,000. The workers of these small producers have straight-time hourly earnings of 94c., compared with straight-time hourly earnings of the entire steel industry of $1.02 an hour.

This situation could result from the steel union either granting a lower basic rate to these companies than to the steel industry generally, or it could be due to a greater number of higher skilled workers in the industry than was proportionate in the small companies, or it could be due to both.

In submitting entire cost of production figures to the Small Steel Commission (one steel man, one government representative, labor representative), the participating producer must meet the following set of standards:

1. ***No executive officer shall receive total compensation that, after taxes, nets him more than $25,000 a year.***
2. ***Dividend payments to stockholders should not be above a reasonable level.***
3. ***All outstanding federal laws and regulations affecting labor shall be adhered to by the participating producer.***

1. None is believed to even reach this standard, but would like to.
2. All steel stockholders claim they have not reached a reasonable level.
3. The answer to this is obvious.

Smaller Midwest Companies Indicate Murray's Argument Errs

Chicago

• • • **Smaller** steel companies in this area named by Philip Murray as "confronted with disaster" because of a scrap shortage were not consulted before being taken under the CIO wing and moreover deny that any scrap shortage exists.

Most of the companies named by Murray depended chiefly upon low cost local scrap for sustenance before the war, and are using a larger proportion of pig iron in their overall melt than in the prewar period. However, the higher operating rate has to some extent offset the higher production costs engendered by the necessity for larger iron purchases. In recent months the scrap situation has become easier rather than more diffcult for most mills mentioned by Murray, and in no case have operations suffered for lack of scrap. The general trend now is toward an increasing scrap ratio in melting. The St. Louis area shared in recent scrap shipments from the West Coast but because of shipment on government bill of lading delivered costs were not excessive. It is emphasized universally that these shipments were not necessary to carry the mills through the winter. It is pointed out that shipments from the West Coast had the effect of bolstering the market there; yet Murray expressed concern for an independent mill there whose scrap costs must have been bolstered by these government shipments while inferentially endorsing them.

One independent mill named by Murray said that his statement had "aroused our curiosity" for its workers are represented by an independent rather than a CIO union.

Although a St. Louis mill recently was forced to shut down, other small midwestern mills show no signs of being on their last legs. In fact, indirect price concessions have been offered on wire product sales by two of the mills Murray mentions.

None of the mills named expressed eagerness for the plan proposed by Murray, pointing out that increased labor costs had been as great a factor in raising their overall production costs as had the cost of raw material. It was generally felt that an overall price increase would be more desirable.

• • • **Commenting** upon the Murray plan for small steel companies (THE IRON AGE, March 9, page 96) which included a proposal that the government should sell returned battlefield scrap to certain steel mills in order to make them more competitive with the larger producers of steel, Edwin C. Barringer, president and executive secretary of the Institute of Scrap Iron & Steel Inc., Washington, said:

"Whether the government subsidizes any steel mills is entirely a matter of government policy, but the scrap industry is concerned over the implication in Mr. Murray's statement that the mills he would have subsidized can no longer buy low cost scrap. . . . It is incorrect to state that any mill faces disaster because of a shortage of scrap, as some mills have been restricting their intake of scrap recently. . . . Returned battlefield scrap is only a fraction of 1 per cent of the total of open market scrap now being consumed, and certainly has no great influence on the supply problem. Whatever may be the merit of subsidizing one group of steel mills, the scrap industry regrets that it should be drawn into the picture and the supply situation distorted."

o o o

H. K. Porter Co. Buys Illinois Freight Car Firm

Pittsburgh

• • • **Entering the freight** car manufacturing field and greatly expanding its Process Equipment Division, H. K. Porter Co., Inc., Pittsburgh, has purchased Mt. Vernon Car Mfg. Co. and its subsidiary, J. P. Devine Mfg. Co., Inc., both with plants at Mt. Vernon, Ill.

Acquisition of Mt. Vernon Car Mfg. Co., representing approximately 10 per cent of the nation's freight car manufacturing capacity, is said to make Porter the largest independent in this industry. J. P. Devine Mfg. Co. is a maker of heavy chemical, food, and oil refinery equipment.

An active expansion program is planned for Mt. Vernon Car Mfg. Co., with new types, including a line of tank cars, being added to its present line of box cars, gondolas, refrigeration cars and cabooses.

LABOR GETS THE SUNSHINE: *Management and labor welcome Mrs. Roosevelt on her study of women in war industry as Packard president Geo. T. Christopher (left), and Norman Matthews (right), president of Packard Local 190, UAW-CIO, greet the first lady on her arrival recently at the Packard Motor Car Co.*

Navy Contract Termination Bill Introduced; Bars GAO Interference

• • • **Proposed** legislation which would give the Secretary of the Navy major authority in settlements of Navy war contracts was introduced in the House March 13.

Chairman Vinson (D., Ga.) of the House Naval Affairs Committee called it "the Navy Department's bill." He said his committee would start hearings on it this week with Navy officials the first witnesses.

The bill would authorize the Navy Department to make prompt and final settlements of claims on termination of its contracts. It would bar the general accounting office from Navy termination settlements except to determine whether fraud existed and whether payments to contractors carried out terms of agreements.

The Secretary could authorize interim payments to contractors or the government could guarantee private loans.

As to disposal of surplus property —a classification from which ships, aircraft and real estate would be specifically excluded—the Secretary would determine methods of selling with a view to avoiding glutting markets or promoting monopolies.

In establishing standards for settling claims, the bill would direct:

1. Full payment at contract price for all completed items accepted, cost of work done and materials acquired, less specified adjustments.

2. No costs would be allowed for expense of conversion to uses other than the performance of the contract of for losses except normal spoilage.

3. Claims would be barred unless filed with the Secretary within one year after the contract termination date unless the time was extended for not to exceed six months by the Secretary.

4. Contractors would be given 180 days in which to appeal decisions of the Navy negotiators to an appeals board established by the Secretary.

5. Settlements in excess of $50,000 would have to be approved by a settlement review board of three or more members named by the Secretary; those in excess of $500,000 would have to be approved by the chief of the settlement bureau, and those exceeding $1,000,000 by the Secretary of the Navy.

Appeals could be taken to courts as well.

90,000 Planes Made by Britain, Report Discloses

• • • **Britain** has produced more than 90,000 planes from the beginning of the war to the end of 1943, it was disclosed recently in a report by British Production Minister Oliver Lyttleton, who also gave hitherto secret figures of British war production. Combat type planes mainly were produced and naval construction, he said, has more than replaced losses.

The Production Minister said that from the beginning of the war to the end of 1943 "we have made for the army alone 83,000 tanks, armored cars and carriers; over 115,000 guns of cal. larger than 20 mm.; 150,000,000 rounds of gun ammunition; nearly 5,500,000 machine guns, rifles, submachine guns and automatic pistols and nearly 7,000,000,000 rounds of small arms ammunition."

Agricultural Machinery Programmed by U. N. R. R. A. for European Distribution

• • • Perhaps the most interesting thing about the proposed distribution of farm machinery to Europe, shown below, is that delivery of portions of this equipment was set for Aug. 1, 1944, according to Calvin Johnson, Illinois Congressman, who introduced these data before Congress. He says some of the equipment, which includes 13,000 tons of spare parts, is scheduled to be sent to areas where machinery of this kind never before has been seen. Later, Senator Reynolds of North Carolina, protested against the U.N.R.R.A. plans. Committees of both Houses indicated they would clamp down on the general plans.

	Belgium and Luxemburg	Czechoslovakia	Denmark	France	Greece	Netherlands	Norway	Poland	Yugoslavia	Albania	Baltic States	Italy	Total
Plows (other than tractor moldboards)	350	1,000	1,200	19,115	2,600	3,800	650	13,200	10,500	200	1,750	635	55,000
Plows: Moldboard, tractor (total)													30,000
Extra shares—2 per bottom	1,540	4,700	5,400	68,500	450	7,000	2,600	46,200	2,500		8,500	2,930	150,320
1-way disk plow, seed attachment				3,600								100	3,700
Grain drills	100		250	4,900	158	300	200	11,575	200	25		100	17,800
Planters, hand	250												250
Fertilizer distributors	500					1,250							1,750
Harrow sections	350	1,200	1,200	14,600	300	1,500	900	8,200	2,300	50	1,750		32,350
Harrow, disk with tandem	100	200	400	2,475		715	325	3,000	50		250	635	8,150
Binders	1,025		3,750	4,945	150	700	200	415	500			315	11,910
Rollers								1,200					1,200
Cultivators, 1-horse								2,000					2,000
Field cultivators	200	350	800	5,102		300	250	1,048	50				8,100
Mounted toolbar		150		800	75		75		100		250		1,450
Sprayers	2,300				4,500	3,500			13,500	200			24,000
Reapers								6,500					6,500
Potato diggers	50			400		50	50	175					725
Beet lifters	150			500		150		350					1,150
Mowers, ground-drive	5,000	1,965	4,000	26,400	200	4,000	2,000	2,000	800		3,000	635	50,000
Tractors:													
Under 30 h.p.	280	650	900	8,280	75	1,000	650	3,000	250		1,000	500	16,585
30 h. p. and over	70	350	300	5,520	25	500		5,200	250		750	450	13,415
Trailers, farm, 2-wheel	350	1,000	1,200	13,800	100	1,500	650	8,200	500		1,750	950	30,000
Seperators		2,000	1,000	15,800	200	3,000	2,000	3,000	1,000			2,000	30,000
Incubators							150		300				450
Parts for—													
New machinery (tons)	230	253	492	4,063	49	540	219	2,597	289	1	430	258	9,421
Present machinery (tons)	297		45	3,331		230	7					45	3,955
Rakes	1,200	485	800	15,900		1,500	1,000		200		1,500	315	22,900
Reaping attachments—mowers	1,000		535	2,399	50	100	200	450	50			315	5,000
Threshers	120				50		100	250	3,100		50	100	3,770

"Patman to Maverick to Jones" Newest Play by Small Business Group

Washington

• • • The report of the Patman (House) Small Business Committee on surplus property can be described as a new all-Texas triple play of "Patman to Maverick to Jones."

Legislation recommended by the report would give: To Texan RFC chief Jesse Jones, the job of Will L. Clayton as Surplus Property Administrator; to Texan Smaller War Plants head, Maury (lame duck) Maverick, a place on the new Surplus Property Policy Board; to Texan House Small Business Committee chairman, Wright Patman, the political credit for sponsoring a bill which provides for the lease or sale on terms of war surpluses to returning service men.

While agreeing with the Baruch report in general, the Committee makes the following recommendations:

1—Studies should be made before sale of the government-owned plants as to possibilities of sub-dividing the very largest units to make them available for acquisition by small business.

2—An easement to the patent right covering the products manufactured in any government-owned plant during wartime shall accompany the sale of the plant or any parcel thereof when the plant and its manufacturing facilities have been established for some specialized manufacturing use.

3—Provision shall be made for the "temporary enjoining" of surplus sales through appeal to the Surplus Property Board in those cases where it may be held that the holding of such sales would prove detrimental to the best interests of any firm in the industry in question or where "large interests were apparently about to be given undue preference over small firms through the holding of such sales."

4—The patents and other properties now held by the Alien Property Custodian for which there is no obvious military use shall be declared surplus and transferred as to title to the central disposal agency and treated in the same manner as other surpluses.

The aims of the Committee are captured in the following summary:

"The House Committee on Small Business feels that the time has come for a careful review of all pending legislative proposals relating to surplus property disposal. It feels that such review should be taken not only in the light of the Baruch report and its accompanying executive action but especially from the viewpoint of the small businessman. The committee feels that it would be delinquent in its appointed duty at this time if it did not point out that it feels that much of the proposed legislation on this subject fails to provide adequate guarantees designed to protect the small businessman and assure him proper consideration in the disposal of these surpluses.

"Further, with not intended reflection on either the integrity or the ability of the one just appointed to the post of Surplus Property Administrator, the committee feels that it has not yet seen visible evidence that the Administrator has been provided with or has prepared any book of procedures designed to give adequate protection to small business. He is working under an implied mandate in the Baruch report which says, 'the Surplus Administrator should sell all he can as early as he can.' Much of the physical detail of selling is apparently still to be vested in some of those Federal agencies which have shown definite evidence of ineptness and disregard of small business interests in the past. The very magnitude of the problem precludes the personal supervision of all sales and their statements of justification by the Administrator."

ASU Chief Warns Against Unnecessary Changes in Forge Shop Schedules

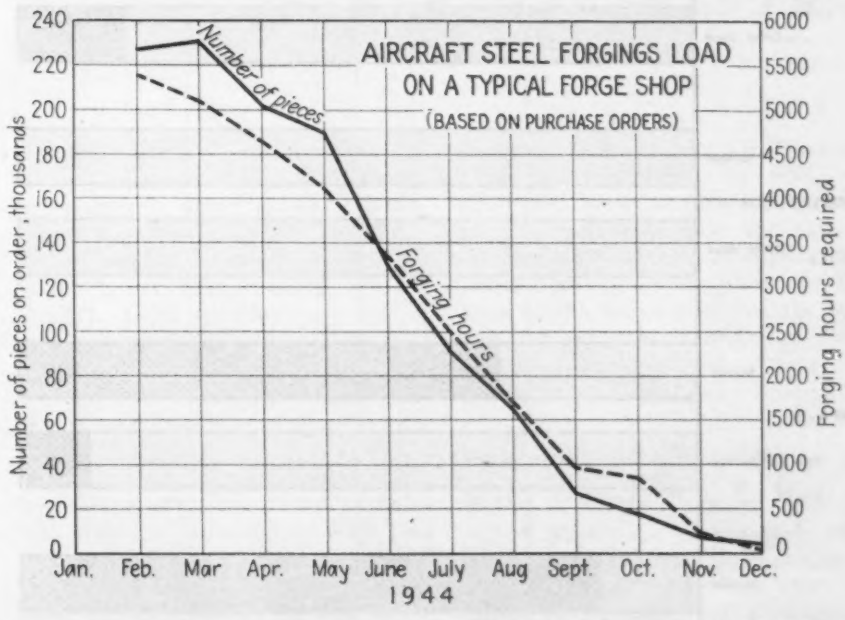
Dayton, Ohio

• • • **Satisfactory** delivery of aircraft steel forgings will become increasingly difficult to obtain unless aircraft manufacturers take steps to avoid unnecessary changes in forge shop schedules. This fact was emphasized by Col. E. W. Rawlings, Administrator of the Aircraft Scheduling Unit, in a recent interview.

Steel forging shops are being asked to break all existing production records during the coming months. This load is the result of substantial increases in various programs. Aircraft needs alone in 1944 will be up 33 per cent.

Manufacturers can take the following steps to forestall time-consuming changes in forge shop schedules, Col. Rawlings points out:

1. Extend purchase orders to the full extent of all contracts.
2. Indicate, wherever possible, what forgings will be needed beyond present contracts. (The accompanying load chart on an actual forging shop shows graphically the scheduling problems engendered by manufacturers' failure fully to extend their purchase requirements.)
3. Check—in the case of prime contractors—the ordering procedure of subcontractors.
4. Set up proper inventory and material controls for insurance that clerical errors do not cause changes in requirements.
5. Confirm all verbal instructions by letter.
6. Allow forge shops sufficient flow time.



• The scale units on this chart are in terms of "forging hours" and "number of pieces" in a typical forge shop and the scale unit on the aircraft steel forgings requirements chart is in net tons. The two cannot be compared directly, but the trends are comparable and show that immediate placement of aircraft steel forging orders to the full extent of all contracts is required if 1944 aircraft requirements are to be met.

Note: Chart is based upon Forgings for following planes:

A-20, A-30, A-35, B-17, B-24, B-25, B-26, B-29, B-32, C-47, F-6-F, F-7-F, J-2-F, P-38, P-40, P-47, P-51, P-61, PBM, PV-1, PV-2, PV-4, SB-2D, TBF, TBM

Even Broader Decentralization of Priority Applications Believed Likely

By D. C. MacDONALD
Cleveland Editor

• • • **A review** of the degree of decentralization of WPB authority to its field offices and a check of the attitude displayed by the field office representatives reveals not only that decentralization has progressed satisfactorily so far, but also that much broader decentralization is in view. Industry, which has long been handicapped with delays caused by the necessity to forward applications to Washington for various types of approval, now appears to have a bright outlook in broader authority of individual district and regional offices which have gained stature rapidly within the last year and promise to take on new powers from month to month.

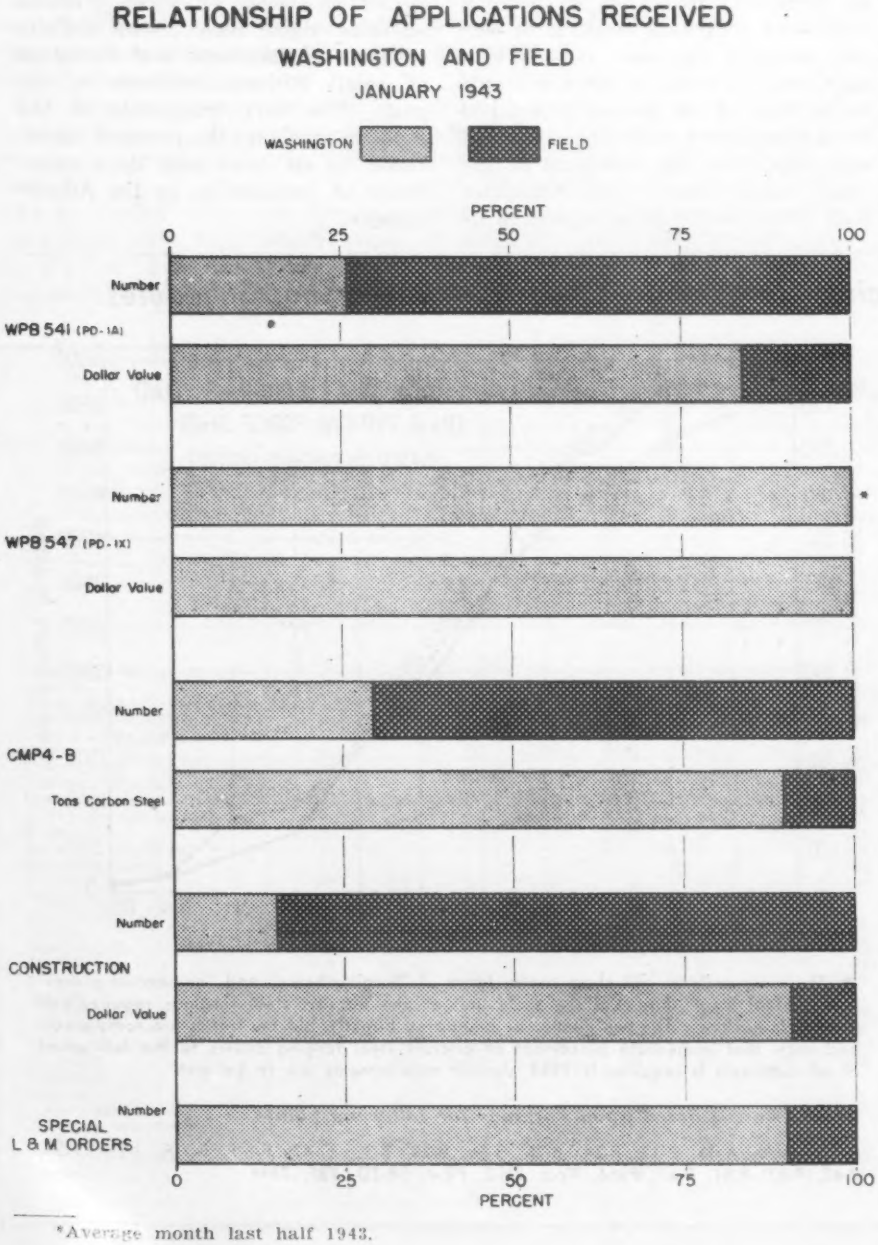
An analysis of the degree of decentralization which has been achieved by WPB since the planned inception in March of 1942, when the humble power to process PD-1-a applications valued up to $100 was permitted, reveals that the bulk of processing as measured by both number of applications and dollar volume still remained with Washington at the beginning of 1943. During 1943 many of the major decentralization steps have been taken. The continuing trend and aims of the field offices is toward an ever enlarging field of authority, a goal which seems likely of achievement and highly beneficial to industry.

As a measure of the balance between field offices and Washington receipt of all types of priority applications, WPB statistics show that during January, 1943 Washington received applications at the rate of 208,000 as compared with 84,000 at field offices. These figures include all types of applications.

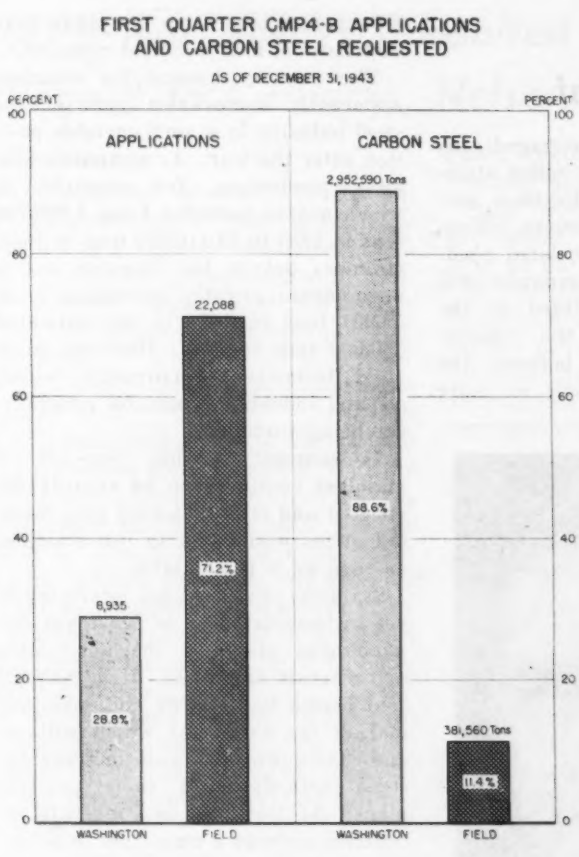
During this same month Washington was receiving and processing approximately 29 per cent of all PD-1-a applications totaling nearly 85 per cent of the dollar value, all of the PD-1-x applications, approximately 30 per cent of the CMP 4-b applications controlling at least 95 per cent of the carbon steel allotments on this form, about 18 per cent of the construction applications controlling 95 per cent of the dollar value and probably 90 per cent of the special applications applying to L and M orders.

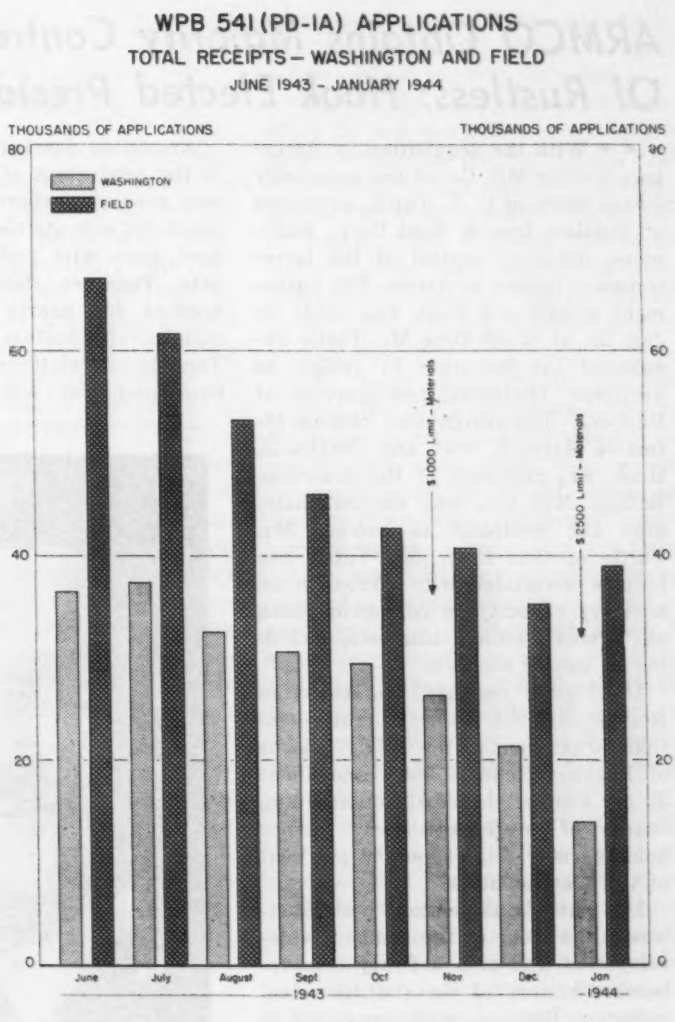
Although the general trend in the receipt of PD-1-a applications is generally predominantly downward, by January of 1944 the ratio between the two sources of receipt had changed to Washington receipts of only about 14,000 applications as compared with 39,000 applications by field offices during the month. At this point the limits of PD-1-a applications had been increased from $100 to $1000 and later to $2500, a limit which was in effect during January, 1944. Because of this low top limit on PD-1-a applications suitable for field application, the dollar value still overbalanced in favor of Washington for the month with a total of $118,000,000 processed at Washington as compared with about $21,000,000 processed in the field.

An estimate as to the possible effect of an increase to $25,000 as a top limit for field processing of the PD-1-a applications is estimated to change the ratio per month to about 400 cases valued at $59,000,000 for Washington compared with 52,600 cases valued at about $80,000,000 which would be processed in the field. A further value increase to $100,000, which is not considered unlikely, could boost the ratio to an all-time low of 70 applications per month at Washington totaling only $11,000,000,



*Average month last half 1943.





while nearly 53,000 cases valued as high as $128,000,000 could be processed in the field. Thus the aim and ultimate goal of the field offices for further decentralization are within reach if these limits can be increased.

First quarter CMP-4-b applications for carbon steel as of Dec. 31, 1943 show that 8935 or 28.8 per cent of the applications were handled by Washington. This, however, controlled 88.6 per cent or 2,952,590 tons of the carbon steel involved. Field processing of the applications, which handled 71.2 per cent or 22,088 applications, controlled only 11.4 per cent of the steel involved or 381,560 tons.

The report on PD-1-x applications indicates that approximately 33,000 applications per month are now being directed to Washington. All these, the field offices contend, could and should be processed in the field. However, it is pointed out that the field offices would favor a simplification of both the forms and the routine of processing before wishing to take on the task. Local rating would also be asked.

On construction permits Washington handles about 91 per cent by dollar volume but probably only 15 to 16 per cent by count.

Special applications applying to operations under the L and M orders are overwhelmingly handled by Washington in view of December, 1943 statistics recently revealed showing at least 90 per cent handling by the Capitol. Local estimates are that a ratio of about 96,000 in the field against 20,000 per month in Washington could be attained if decentralization is permitted to expand sufficiently during this year.

Summarizing the goals for decentralization which are being mentally established in the minds of WPB field offices the following aims are being set up: The limit on PD-1-a applications for field processing should be increased from the present $2500 to $25,000; PD-1-x which is considered essentially a local problem where decentralization would materially aid distribution for the wholesaler and retailer should be totally handled in the field; the limit on construction permits should be advanced to $100,000 except for increased production facilities in which Washington should take the lead; the handling of all war and non-war housing by NHA through FHA thus eliminating the WPB entirely and broad and distinct powers to pass on customary applications having to do with special applications under L and M orders. These are the aims of the field offices and the outlook for government controlled business.

Finished Steel Shipments Break Records at U. S. Steel

• • • **Shipments** of finished steel products by subsidiary companies of United States Steel Corp. for the month of February set a record at 1,755,772 net tons.

February shipments compare with 1,730,787 net tons in January, an increase of 24,985 net tons, and with 1,691,592 net tons in February, 1943. For the year 1944 to date, shipments have set a record at 3,486,559 net tons against 3,377,585 net tons in the comparable period of 1943, an increase of 108,974 net tons.

ARMCO Obtains Majority Control Of Rustless; Hook Elected President

• • • **With the acquisition** by American Rolling Mill Co. of the personally owned stock of C. E. Tuttle, president of Rustless Iron & Steel Corp., Baltimore, majority control of the latter company passed to Armco. The agreement to sell this stock was made on Jan. 28, at which time Mr. Tuttle announced his intention to resign as president, chairman, and director of Rustless. The resignation became effective March 6, 1944, and Charles R. Hook, Sr., president of the American Rolling Mill Co., was elected chairman and president to succeed Mr. Tuttle at that time. Mr. Tuttle has become associated with Armco in an advisory capacity in connection with all Armco stainless interests, including of course Rustless.

Until quite recently, the American Rolling Mill Co. owned slightly less than 50 per cent of the 926,547 shares of Rustless common stock and about 22 per cent of the 36,512 outstanding shares of preferred stock. Armco holdings now total about 60 per cent of the common stock.

Mr. Tuttle's association with Rustless is the story of the company's development and also a fairly comprehensive history of the stainless steel industry. Rustless, while organized in 1924, was non-operating for a number of years. Mr. Tuttle became associated with the company in 1929 and its president in 1930.

Rustless now accounts for nearly 25 per cent of the nation's annual stainless steels in the United States. With a national stainless steel output of about 430,000 tons in 1943, it can readily be observed that Rustless capacity of 114,000 tons played an important role in this record-breaking achievement.

As pointed out, Armco's interest in Rustless is not a new venture, Armco having made its original investment in 1935 and having owned a controlling interest since 1936. Armco representatives have predominated on the Rustless board of directors, but Rustless management has had complete freedom in the management of the company and execution of policies.

Mr. Hook indicated that aside from normal coordination of efforts of the two companies, no changes in the Rustless plans or policies are contemplated nor in the executive or managerial staffs of the organization except that of Mr. Hook assuming the post of president and chairman.

Armco at present is engaged only in the production of flat rolled stainless products, whereas Rustless produces for sale stainless ingots, billets, bars, rods, wire and associated products. Together, these companies will account for nearly a third of the stainless production in the country. The closer relationship between the two companies will result in more effective collaboration in production, distribution, and technical research.

CHARLES R. HOOK, SR., *president of American Rolling Mill Co., was elected president of Rustless at the March meeting of stockholders.*

C. E. TUTTLE, *president and chairman of Rustless Iron & Steel Corp., since 1930, resigned his posts but will remain in an advisory capacity with the company.*

The pent-up demand for stainless apparently leaves this part of the steel industry in a very enviable position after the war. As compared with alloy production, for example, in which output mounted from 1,805,748 tons in 1934 to 13,116,000 tons in 1943, stainless output has likewise had a phenomenal growth, increasing from 55,907 tons in 1934 to an estimated 430,000 tons in 1943. However, alloy steel demands are currently falling off and industry expansion programs are being curtailed.

In contrast to this, the use of stainless continues to be sharply restricted and it is indicated that many industries would like to use stainless as soon as it is available.

Stainless producers are interested in yet unformulated or at least yet unannounced plans of the automotive and aircraft industries. It is believed that herein lies a large and sustained market the extent of which will remain unknown until auto builders become articulate on their postwar plans. As the auto and aircraft industries undergo a transition to peacetime production, the metal manufacturing industries will likewise go back to making the grades and types of metals required by these industries. This transition will not prove difficult for steel producers, as a whole, but specifically Rustless has no serious reconversion problems because the products made for the war are the same as those made before the war and as will be required for peace.

An important contribution made by Mr. Tuttle has been in connection with the development of domestic supplies of chromium ore concentrates. Early in 1934 he undertook exploration of this country's chromite resources and personally financed the development and acquisition of certain properties. Later, Rustless Mining Corp. was formed and acquired Mr. Tuttle's interest in these developments. A mining and beneficiating plant has been in operation in northern California producing substantial quantities of higher grade material.

In 1939 an English subsidiary company was formed, the British Stainless Steel Co., Ltd. A plant site and some equipment were obtained to build this stainless plant in England, but plans were halted by the war.

If these plans had materialized, they would have made a vital contribution to the war effort because substantial quantities of stainless have been exported to England.

WPB Not Always Consulted in Regard to Cutbacks, Nelson Asserts

Washington

• • • Answers to questions affecting WPB's reconversion policy were made public by Donald M. Nelson on March 9. The questions were made in writing earlier in the week by Senator Francis Maloney, Democrat of Connecticut.

Highlights of Mr. Nelson's reply were:

Cancellations—"Up to the present the services have consulted WPB on cutbacks only to a limited extent. The following procedure is being put into effect: The military services determine their requirements and when our rate of production is in excess of requirements, they consult with WPB to determine the advisability of cutbacks in the program."

Cancellation Priority—"So far as possible we attempt to guide the cutbacks in the critical labor areas—to ease the manpower situation in these areas."

Civilian Production Timing—"The availability of manpower, materials and component parts determines the extent to which civilian production can be expanded in concerns whose military production has been cut back. The military services also are concerned over possible adverse effects of an expansion of civilian production at this time on morale both at home and among the fighting men abroad.

"With these factors in mind, our policy is to expand civilian production as it becomes possible to do so without interference with the overall war program, and particularly in concerns whose war orders have been cut back.

"The Office of Civilian Requirements has prepared a number of programs for expanded production of civilian items and has listed their relative order of importance to the economy.

"It is our purpose to put these programs into effect whenever the military outlook and the situation with respect to manpower, materials and parts indicates the advisability of such action."

Maintenance of prewar competitive status—"If without interference with the war effort, we can give a manufacturer in a non-critical manpower area materials and parts to resume production of things the civilian economy needs, I think it is to the public interest that we do so without waiting until another concern in a critical area is permitted to resume production. This policy may seem hard on the manufacturer in the critical area, but it would be at least an equal hardship on the manufacturer in the non-critical area if he were prevented from resuming production, just because a manufacturer in a critical area could not do so.

"Until that happy period when we can resume civilian production on a much broader scale than will be possible so long as direct military production must be maintained in large volume there will be many shortages of civilian products whose importance to the economy demands their production and scheduling with the same certainty as must be applied to war items.

"Repair and maintenance parts, supplies for the service industries and some consumer items whose depletion has left critical shortages in the life of the American household, must be assured production.

"The only way that I can see to do this is to fit them into production schedules wherever it is possible to do so, even though the effects on competitive situations may be painful.

"This is the same method that we apply to war production for military items, where we do not consult the convenience or the competitive interests of the firms involved. I can see no escape from applying the same method to the most essential civilian production so long as we are forced to meet the military requirements of a quick victory."

New Competition—"This question touches the roots of national policy. If the government were to attempt to prevent new competition, there would be clearly grave danger of shackling the country with a regimented economy for a long while to come. Such action would require detailed planning of all production by a government group, a development which I would strenuously oppose.

"In my judgment, it is all important to maintain a competitive economy. I do not believe you can have a democracy and at the same time forbid new competition.

"If with the return of peace, we were to start out with the policy of planning our peacetime economy in detail, as we would have to do to prevent new competition, we would do irreparable injury to the free enterprise system in the United States.

"Restrictions on 'new' companies which want to enter an industry for the first time will undoubtedly be needed until the now critical components and materials are in easy supply. Certainly so long as wartime controls are retained, materials and components should not be allocated to these 'new' firms until firms already established in the affected industries, and which are in position to resume production of their former products, have received their just allocations."

Relaxation of Controls—"It is my view that controls should be relaxed whenever they cease to be necessary to war production. However, the need for controls is obviously going to continue for some time.

"Even in the case of material which is in good supply today, if suddenly the controls were relaxed another shortage would be likely to occur, injuring production for war.

"As for component parts, I would estimate that in the consumer durable goods field there are 20 to 30 industries which require components which are now very critical, such as ball bearings, fractional horsepower motors, heavy castings and engines."

EYE SHIELD ADDED—*Rubber covered eye shields prevent U. S. tank gunners from getting black eyes while peering through telescopes in tanks rumbling over rough terrain. A Westinghouse worker at the Electric Appliance plant, Mansfield, Ohio, is pictured here attaching an eye shield to a three-power telescope.*

Specialty Scraps Sales Made at Prices Substantially Under Ceilings

• • • **Specialty steel scrap** is undergoing marked price deflation and in many areas the demand has dropped off completely, with no sales to amount to anything being made. Demand in virtually all categories of tool and stainless steel scrap, declining since late in the past Summer, is now at very low levels and prices in many cases are at fractions of official OPA ceilings that were standard a year ago. An analysis of open market quotations in the Midwest area substantiate these remarks.

The price of type 1 tool steel scrap is a good example. Ceiling price for solids is $1.80 per lb. of contained tungsten in this class, which embraces tool steels with 12 per cent minimum tungsten and 1 per cent maximum molybdenum. On this basis the ceiling price for 100 lb. of 18-4-1 tool steel scrap is $32.40. Actual sales in the market are at no more than 20c. per lb., or $20 per 100 lb. Type 2 solids, containing from 5 to 12 per cent tungsten, are obtaining about half of the official OPA ceiling of $1.60 per lb. of contained tungsten. Molybdenum tool steels are going for almost any offer.

Tool steel scrap experts explain the slackness in demand in that category by pointing out the immense volume of tool steel ordered in the early stages of the war and made up into blacks. Heavy stocks were thus accumulated at consumer points, and these were backed up by large stocks of bars in warehouses, which are said today to be at disproportionately high levels.

One reason for disinclination to stock up in the light of today's soft prices is the belief that as time goes on tool steels will be specified more and more directly in line with use. This, say scrap authorities in this field, makes indiscriminate stockpiling inadvisable, due to the possibility of continued lack of demand in many classes which might be accumulated. Also looked upon as a factor of some scope in the picture is the increasing importance of powdered metal parts production, which eliminates the need for machining and thereby reduces somewhat the cutting tool market.

Stainless steels scrap grades are also selling substantially under ceiling prices. Steel scrap of the 300 series of stainless, which cluster around a proportion of 18 per cent chromium and 8 per cent nickel, are off 50 to 60 per cent of their ceiling prices, which scale from $80 per gross ton upward. Some sellers report getting only 30 or 35 per cent of ceiling prices. Similarly poor conditions are manifested in the 400 series of stainless steels.

One reason for the weak price condition of stainless scrap is uncertainty as to what the automobile industry will do after the war in its choice of stainless specifications. In the absence of any conclusive information or theories along this line, practically no stockpiling is being done beyond the present substantial inventories.

February Ingot Output Totals 7,188,482 Tons

Production of Open Hearth, Bessemer and Electric Steel Ingots, and Steel for Castings. Source: American Iron & Steel Institute

Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production

Period	Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,776,733	97.3	439,424	85.4	379,045	83.6	7,595,202	95.7	1,714,493	4.43
February	6,408,879	98.4	409,786	85.2	369,817	87.3	7,188,482	96.9	1,736,348	4.14

1943

Period	Open Hearth Net tons	Open Hearth Percent of capacity	Bessemer Net tons	Bessemer Percent of capacity	Electric Net tons	Electric Percent of capacity	Total Net tons	Total Percent of capacity	Calculated weekly production all companies (Net tons)	Number of weeks in month
January	6,576,524	97.8	478,058	85.9	369,395	95.4	7,423,977	96.8	1,675,841	4.43
February	6,031,363	99.3	447,843	89.1	344,532	98.6	6,823,738	98.5	1,705,934	4.00
March	6,787,630	100.9	503,673	90.5	381,219	98.5	7,672,522	100.0	1,731,946	4.43
1st Quarter	19,395,517	99.3	1,429,574	88.4	1,095,146	97.5	21,920,237	98.4	1,704,529	12.86
April	6,510,563	99.9	481,810	89.4	382,532	102.1	7,374,905	99.3	1,719,092	4.29
May	6,669,436	99.1	483,024	86.8	398,057	102.9	7,550,517	98.4	1,704,406	4.43
June	6,202,640	95.2	453,599	84.1	384,645	102.6	7,040,884	94.8	1,641,232	4.29
2nd Quarter	19,382,639	98.1	1,418,433	86.7	1,165,234	102.5	21,966,306	97.5	1,688,417	13.01
1st 6 months	38,778,156	98.7	2,848,007	87.6	2,260,380	100.0	43,886,543	98.0	1,696,426	25.87
July	6,556,531	96.8	466,288	90.6	393,342	94.0	7,416,161	96.3	1,677,864	4.42
August	6,699,850	98.7	484,957	94.0	407,224	97.1	7,592,031	98.3	1,713,777	4.43
September	6,646,702	101.4	480,635	96.4	391,241	96.6	7,518,578	100.8	1,756,677	4.28
3rd Quarter	19,903,083	99.0	1,431,880	93.6	1,191,807	95.9	22,526,770	98.4	1,715,672	13.13
9 months	58,681,239	98.8	4,279,887	89.5	3,452,187	98.5	66,413,313	98.1	1,702,905	39.00
October	6,891,753	101.6	513,521	99.5	413,787	98.7	7,819,061	101.3	1,765,025	4.43
November	6,542,942	99.6	440,941	88.2	390,564	96.2	7,374,447	98.6	1,718,985	4.29
December	6,509,923	96.2	390,930	75.9	364,924	87.2	7,265,777	94.3	1,643,841	4.42
4th Quarter	19,944,618	99.1	1,345,392	87.9	1,169,275	94.0	22,459,285	98.1	1,709,230	13.14
2nd 6 Months	39,847,701	99.0	2,777,272	90.8	2,361,082	94.9	44,986,055	98.3	1,712,450	26.27
Total (year)	78,625,857	98.9	5,625,279	89.1	4,621,462	97.4	88,872,598	98.1	1,704,499	52.14

Note—The percentages of capacity operated in the first six months are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943, as follows: Open hearth, 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

Eastern Aircraft Firms Will Show Excess Material

• • • **Millions** of dollars worth of fabricated items, component parts and materials that have become excess inventories of large eastern aircraft manufacturers because of change in design of aircraft now being made for the armed forces will be offered for sale at an exhibition to be opened at the McAlpin Hotel in New York on Monday, March 27. The exhibition, in which the aircraft companies have joined voluntarily, is to be conducted under the auspices of the WPB New York Regional Office. It will continue two weeks, through April 8.

More than 5000 different items, covering aluminum, steel, copper, hardware, perishable tools, miscellaneous industrial supplies and materials, and component parts, will be exhibited in the booths and panels to be set up by the aircraft companies.

Completion of Republic Mill at South Chicago Reported Approved

• • • **It was learned** from authoritative sources here March 14 that Washington has approved completion of the 32-in. rolling mill of the South Chicago steel mill under construction by the Defense Plant Corp. for operation by Republic Steel Corp. N. E. Goetz, district manager, was unable to estimate the amount of money involved in the further construction but stated that this project would round out the plants rolling facilities. DPC officials are reported to have instructed James Stewart & Co., general contractors, who hold contracts for the bulk of the construction, to proceed with the work at once.

Construction of the Geneva structural mill also will be resumed. *See page 99.*

Construction of the plant had been ordered suspended early this year by WPB although the plant was then considered 90 per cent completed. Consideration is now reported being given by DPC to the completion of what little work may remain to be done after the present rolling mill project is completed.

The 36-in. and 44-in. mills are known to have been completed. The 32-in. mill will be completed with this project. The blast furnace is completed but awaits lighting and the coke ovens are lighted but not operating. Six of nine electric furnaces are in operating condition and part of them are in operation. Three other electric furnaces are believed to require only wiring. Operation of the plant by Republic Steel Corp. rather than purchase by some outside interest is definitely indicated.

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Chicago

• • • **Upon completion** of the 32-in. bar mill the Republic plant will be ready to go into fully integrated operation. Some work remains to be done on the sintering and slag handling equipment, but this is insufficient to delay operations once the rolling mill is complete. It is unofficially estimated that the remaining construction now approved amounts to between three million and four million dollars.

Kaiser Made Member of WPB Steel Advisory Committee

Washington

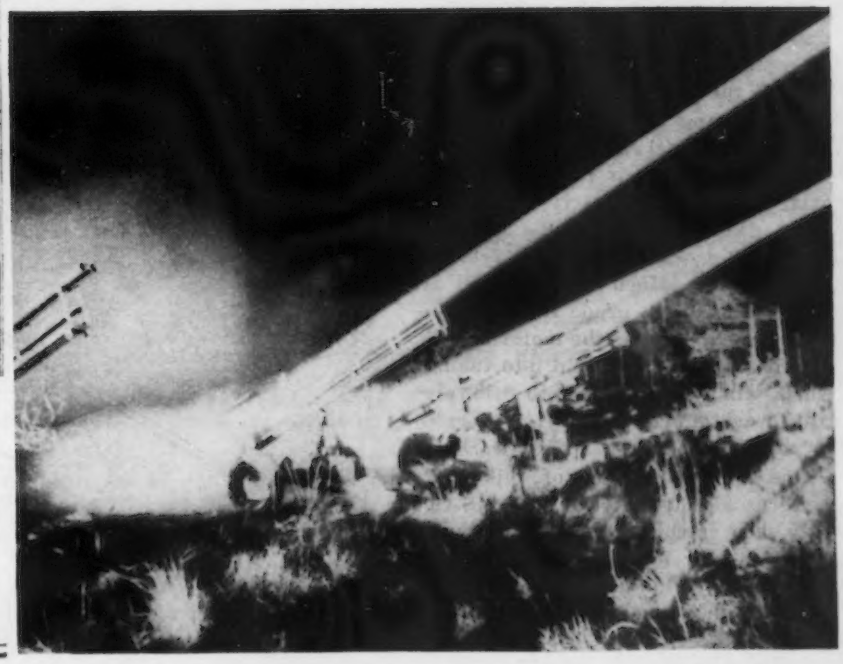
• • • **Henry J. Kaiser** was recently made a member of the WPB Steel Industry Advisory Committee, thus satisfying a demand of west coast interests who had insisted that the west coast steel industry was not adequately represented at board deliberations. However, it is reported that Mr. Kaiser, despite his appointment, is dissatisfied because other engagements will prevent his attendance at the next committee meeting on March 16.

Civilian Tractor Output Not to Be Increased in 1944

Washington

• • • **WPB reported** March 9 that there is little possibility of increasing civilian tractor production in 1944, according to reports given by members of the Tracklaying Tractor Industry Advisory Committee at its recent Washington meeting, although facilities are being prepared to increase production of one model for the Army.

The increased need for repair and spare parts for use by the military overseas was discussed and recommendations were made for assuring an adequate supply of parts for the armed services. Committee members recommended that military requirements by items be determined over a long-term period. The production cycle for parts, it was pointed out, runs from 9 to 12 months and military needs can be filled only if orders are placed far enough in advance to permit proper production scheduling.



ROCKET TARGETS: *A new angle for training anti-aircraft gunner is the rocket target. Above, the launching carriage that fires the targets is being loaded while the photo to the right shows the trail of the rockets traveling more than 450 miles an hr. through the night at Camp Davis, N. C.*

Cleveland and Chicago Share Heavily in New Shell Container Project

Cleveland

• • • **The facts** of the Ordnance Department container program, which has been credited generally with requiring enormous amounts of sheet, came to light March 8 when the collective evidence of several authoritative sources revealed that the prime contracts were let already in the majority of cases, that steel was being ordered and that production soon would be under way.

It has been disclosed that most of the production may center about the Cleveland and Chicago areas, with four sizes of a tubular sheil container being made locally and at least four additional sizes, of a different type, to be made in and around Chicago.

The four sizes to be made in Cleveland will hold 57, 81, 90 and 105 mm. shells and will be tubular in shape. (See illustration). The 57 and 81 mm. sizes will use 4-in. o.d. tubes welded from 16 gage sheet; the 90 mm. container will use a 5½-in. o.d. tube welded from 14 gage sheet and the 105 mm. container will use a 6-in. o.d. 14 gage sheet tube. Some 10 gage and 12 gage sheet is also required by the program for caps and components. Also, a few screw machine products.

Steel specifications are calling for either hot rolled or cold rolled sheet of SAE 1010 or 1020 grades with little or no preference being shown between either finishes or grades, since rush delivery is the foremost consideration. It has been learned on good authority in this connection that the entire container program is scheduled for completion in the first half of the year.

One of the most interesting features of the steel supply in connection with the program is that due to the extreme urgency of early delivery, a great deal of so-called idle and excess steel is expected to be pressed into service. Much of this steel is not of the exact grade or gage required but so long as the material will re-process, form and weld into tubing which will withstand a 2 to 3 lb. air test, every effort is going to be made to absorb this stock.

One known instance of this kind concerns a 1000 ton lot of 8 gage SAE 1025 sheet in coils which is being held by a mill due to a cancellation after processing. This is expected to be rolled to one of the lighter gages required and utilized.

Despite previous estimates of vast tonnages of sheet which would enter into the program, it appears now that approximately 70,000 to 75,000 tons will be used in the Cleveland district's share of the national program. All of this tonnage will be for sheet with the exception of a small amount in bars which will go into certain small screw machine products used with the containers.

Estimates of the sheet tonnage required nationally by the container program are said to exceed by 35 per cent the sheet requirements of the entire automotive industry for the comparable quarter of its best peacetime year.

It is interesting to note that the 6-in. tubing that will be required for the 105 mm. shell cases alone in this area would lay a pipeline approximately 1732 miles in length. About 2763 miles of tubing of all sizes will be used on the area's contracts. The tubing sizes up to 6 in. will be furnished by the steel producers ready for the prime contractors. The 6-in. size, however, is too large for this capacity and is being produced by five sheet metal fabricators in the district.

A check of the steel sources supplying the program indicates that smaller mills not closely tied in with the plate production facilities of the nation are being most heavily relied upon.

Steel orders from this region are reported being placed with American Rolling Mill Co., Weirton Steel Co., Ford Motor Co., Griffin Steel Co., and McLouth Steel Co. in as large quantities as possible with proportionately lesser amounts to Youngstown Sheet & Tube Co., Bethlehem Steel Co., and Jones & Laughlin Steel Corp. All orders are understood being placed in the form of the top urgency rolling directives requiring almost immediate delivery.

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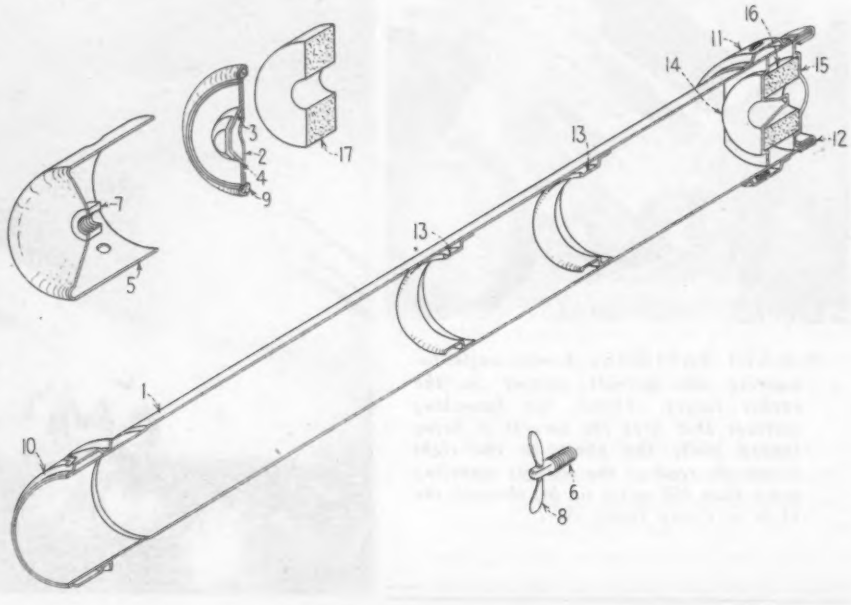
Screw Machine Products Advisory Committee Formed

Washington

• • • **The WPB Office** of Industry Advisory Committees on March 9 announced the formation of the Screw Machine Products Industry Advisory Committee. O. F. Fancey, of the Building Materials Division, is the government presiding officer. The membership is as follows:

Robert Chestnut, Aluminum Co. of America, Edgewater, N. J.; C. P. Dewey, American Screw Products Co., Indianapolis; J. S. Elsby, Screw Machine Products Co., Milwaukee; W. J. Finn, Chicago Screw Co., Chicago; Paul M. Hershey, Hershey Metal Products Co., Derby, Conn.; N. A. Hewitt, the Couche-Uthe Co., Elyria, Ohio; Charles H. Hyde, David Bell Co., Buffalo; W. C. Knight, Knight Screw Products Co., Inc., Detroit; Robert Olson, Olson Mfg. Co., Worcester, Mass.; Ernest W. Schneider, Hudson Screw Products Co., Inc., Chicago; Earl W. Stewart, Federal Screw Works, Detroit; Jesse Robbins, Arpee Products Co., Glendale, Cal., and T. A. Dear, Automatic Screw Machine Co., Los Angeles.

THIS DRAWING *is an isometric view of the new all steel water-tight shell container being produced for the Ordnance Department on the double quick. This is the 75 mm. size container of the tubular type constructed with welded tubing formed from sheet. Certain inaccuracies in the drawing are for the enemy's benefit.*



Foundry Will Study Price Order At Rallies in Boston and New York

• • • **Problems** of the gray iron castings industry, wartime and postwar, will be discussed by eastern foundry executives and many from the east north-central states, at one-day management-marketing conferences, sponsored by the Gray Iron Founders Society and endorsed by eastern groups, to be held at Hotel Statler in Boston March 22 and at Hotel Pennsylvania in New York City March 24. Executives of more than 1400 gray iron foundries have been invited, according to W. W. Rose, executive vice-president of the society.

Both conferences will focus attention sharply on the six recent changes in the provisions of the order governing maximum prices of gray iron castings with an analysis from both government and industry viewpoints. W. W. Welfling, new chief of the gray iron and malleable castings section of the OPA will review and interpret the amendments, designed, according to the agency, "to strengthen and clarify the ceilings and aid in their enforcement."

Industry discussion of the price order and its amendment will be opened at the Boston meeting by A. B. Root, vice-president of Hunt-Spiller Mfg. Corp., South Boston, and at the New York conference, by H. L. Edinger, president of the Barnett Foundry & Machine Co., Irvington, N. J. Mr. Edinger, vice president of the society, is chairman of the recently appointed gray iron castings industry advisory committee of OPA, and Mr. Root, a director of the society, is a member of the advisory group.

Principal speaker at the complimentary luncheon session of the Boston meeting will be J. H. Van Deventer, president and editor of THE IRON AGE, whose subject is the future of the foundry industry. Sights will also be set on postwar potentials at the New England gathering by H. B. McCoy, chief of the industrial economy division of the Department of Commerce, who will discuss after-the-war markets.

Luncheon speaker on the New York program will be Brig. Gen. William C. Rose, chief, executive services, War Manpower Commission.

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Court Action Hits At Hillman Interest In National Supply

Pittsburgh

• • • **National Supply Co.** and Morgan B. Schiller, holder of 1950 shares of National Supply stock, have entered suit in a Federal Court at Pittsburgh, in an effort to separate Hillman interests from the National Supply Co.

The suit demands that Pittsburgh Steel Co. and Pennsylvania Industries, Inc., divest themselves of stock interests in the National Supply, and that J. H. Hillman, Jr., be enjoined from holding simultaneous directorates in the company.

The action, it was said, was filed under sections 7 and 8 of the Clayton Act and the Sherman Anti-Trust Law. Section 8 of the Clayton Act prohibits an individual from serving as a director of two companies, where one has a capitalization of more than a million dollars.

The suit asks that Pittsburgh Steel be enjoined from acquiring stock of National Supply as long as both companies remain in competition. Both companies are large manufacturers of steel pipe and tubular products.

Mr. Hillman is a director of National Supply and Pittsburgh Steel, and is president and a director of Pennsylvania Industries. He is also a director or an officer of many other companies, including Pittsburgh Coke & Iron, Hillman Coal & Coke, Pittsburgh Steel Foundry, First National Bank, and Alan Wood Steel Co.

The court was asked, also, to prevent Pittsburgh Steel and Pennsylvania Industries, pending any divestment of their stock interests in National Supply, from voting their present stock holdings.

This particular suit, it is said in financial circles here, brings to the surface differences of opinion which have existed between the principals for some time.

Price Briefs

• Amdt. 5 to MPR 314 places magnesium powder, magnesium dust, and similar magnesium materials under coverage of the order which provides ceiling prices for magnesium and magnesium alloy ingot. (Release No. OPA-T-1805)

• Amdt. 102 to SR 14 provides specific dollars-and-cents prices for sales to retail dealers and sales at retail by all sellers of approximately 4700 specially-built motorcycles, which the U. S. government will initially sell as surplus commodities. (Release No. OPA-4026)

• Amdt. 2 to MPR 465 adds all vessels listed to the provisions of the regulation setting maximum prices for used storage vessels which allows sellers to charge a portion of the original installation cost when in excess of $100. (Release No. OPA-T-1812)

• Amdt. 11 to RPS 41 establishes ceiling prices for magnaflux and radiographic inspection of steel castings. (Release No. OPA-T-1800)

OPA Railroad Specialties Advisory Committee Formed

Washington

• • • **Appointment of an** Industry Advisory Committee on Railroad Specialties was announced by OPA. Railroad specialties are such items as side frames, bolsters, couplers, and yokes used in the construction of railway cars. The committee is composed of eight steel castings company executives whose concerns together turn out 98 per cent of all railroad specialties.

Members of the committee are:

Frank Cordes, president, Pittsburgh Steel Foundry Corp., Glassport, Pa.; George T. Johnson, vice-president, Buckeye Steel Casting Co., Columbus, Ohio; George E. Scott, vice-president, Scullin Steel Co., St. Louis; James Suttie, vice-president, American Steel Foundries, Chicago; Harold Dunbar, vice-president, McConway and Torley Corp., Pittsburgh; J. A. Sauer, vice-president, Symington Gould Corp., Buffalo; James A. Slater, vice-president, National Malleable and Steel Castings Co., Cleveland; and Russell A. Cannon, vice-president, Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa.

OPA Sets Price Ceiling On Stamped Metal Parts

Washington

• • • **Metal stampings** have been added to the list of articles covered by the regulation establishing maximum prices for machines and parts and machinery services. This OPA action, which becomes effective March 18, 1944, will simplify the determination of maximum prices by the industry by placing all stampings under coverage of a single regulation. Formerly, three price regulations applied to different types of metal stampings. The transfer will mean no change in prices. This action is incorporated in amendment 110 to MPR No. 136.

Indium Prices Reduced

• • • **The Indium Corp.** of America, New York, announced the following price adjustments, effective March 11, 1944.

	Per Troy Oz.
Electrolytic grade (high purity) indium	$12.50
Commercial grade (99.9 per cent indium	7.50
Indium trichloride	4.40

Other indium products are reduced proportionately.

Bearing Production Is Concentrated

• • • **To attain** greater efficiency and save manhours in the production of the larger sizes of anti-friction bearings used in heavy military and industrial equipment, WPB has concentrated production of many sizes in the heavy series of ball bearings in the plants of 10 producers. These producers will manufacture single-row, double E row and angular contact series ball bearings. Authorization was granted by the addition to schedule A of L-145.

The authorized producers for one or more of the specified additional bearing sizes are the Marlin-Rockwell Corp., Jamestown, N. Y.; SKF Industries, Inc., Philadelphia; Fafnir Bearing Co., New Britain, Conn.; New Departure division of General Motors Corp., Bristol, Conn.; Hoover Ball and Bearing Co., Ann Arbor, Mich.; Norma-Hoffmann Bearings Corp., Stamford, Conn.; Bearings Co. of America, Lancaster, Pa.; Torrington Co., Bantam Division of South Bend, Ind.; Ahlberg Bearing Co., Chicago, and McGill Mfg. Co., Valparaiso, Ind.

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WPB Boiler Specifications Altered to Save Steel

Washington

• • • **Restrictions on** specifications for power boilers that may be produced were brought up to date by WPB by amending limitation order L-299. The amended order provides that no person shall produce, fabricate, or deliver any power boiler (except boilers for locomotives, marine service, or miniature boilers) having a greater metal thickness or quantity of steel than needed to meet the minimum thickness requirements of section I (Edition 1943) of the American Society of Mechanical Engineers Boiler Construction Code, and Addenda and Interpretations (including Case 968) issued prior to Jan. 15, 1944.

The restrictions previously were based on the 1940 edition of the ASME Boiler Construction Code and Addenda and Interpretations issued prior to July 1, 1943, the date order L-299 was issued. Case 968 defines the safety factor required in the design of power boilers. Exceptions to production and delivery restrictions are continued unchanged in the amended order.

WPB Pipe Specifications Conform with ASTM

Washington

• • • **Specifications for the** manufacture of steel pressure pipe have been modified by WPB to bring them into conformity with recent changes in basic pressure pipe specifications. These changes are made in an amendment to schedule 11 of the limitation order L-211. This order contains the specifications for steel pressure pipe which in turn are based on specifications established by the American Society for Testing Materials. The ASTM recently amended the basic specifications upon which L-211 standards are based, and, consequently, the order has been amended to bring it up to date.

The permissible specifications for steel pressure pipe for general and government use are shown in the amended order, along with the titles of these specifications. Also included with the order is a table of steel pressure pipe sizes permissible for general use.

Idle Government Owned Tool Study Planned by WPB

Detroit

• • • **WPB announced** here last weekend a new plan to make fuller use of idle government-owned machine tools. All equipment worth $500 or more that is "idle" must henceforth be reported every 30 days, starting April 1, on a new WPB form 3475. Idle, for purposes of this report, applies to any tool not working on government jobs or which is not scheduled for work within 30 days. This definition would make machines idle that are at work on civilian goods or farm implements, however essential they might be considered.

WPB regional and main offices will study this information to determine whether idle equipment is such that existing available contracts might be put into the plants housing the unused equipment. That failing, efforts will be made to pair up the excess equipment with requirements for those specific facilities. WPB officials emphasized that they had no intention of going on a "tool grabbing spree," and pointed to the fact that contracting war agencies must give their permission before any plant moves out any of their facilities.

The order does not apply to privately-owned machine tools.

Firth Sterling Reduces Carbide Tool Prices

McKeesport, Pa.

• • • **Firth-Sterling** Steel Co., announced that effective March 1, 1944, the special 10 per cent war discount that has been part of the company's price plan would be discontinued. Prices for Firthite sintered carbides will be based on new lists that the company released. These lists are more than 10 per cent lower than the lists upon which the war discount applied. Quantity discount allowed on the new list is 5 per cent of the carbide value.

Priority Changes

L-41—Dir. 3 provides that blanket authorizations used to permit owners of substantial industrial and commercial establishments to carry on miscellaneous routing construction during a fixed period, will no longer be issued generally. (3-6-44)

L-79—Dir. 1 rules that AA-3 rated orders for plumbing, heating, and cooking equipment placed prior to Jan. 15, will take precedence over lower rated orders which have been rerated AA-3. (3-7-44)

L-107—Sched. I, as amended, further eases restriction on the manufacture of extended surface heating equipment although in the main the former limitations will remain. (3-7-44)

L-126—Sched. II which provided specifications for refrigeration condensing units for industrial and commercial refrigeration, and air conditioning machinery and equipment, has been revoked. Prohibition on the use of steel in the construction of bases for refrigeration condensing units having over 20 h.p. motors has also been removed. (3-10-44)

L-145-a—Sched. A provides a list of sizes in the heavy series of ball bearings with the names of authorized producers of these items. (3-11-44)

L-157—Amended order permits alloy steel to be used in the manufacture of hand tools and other items covered by Sched. I, II, IV, and V. (3-10-44)

L-182—Amended commercial cooking, and food and plate warming equipment order makes several minor clarification changes. (3-11-44)

L-192—Amended order eases restrictions on construction machinery repair parts. (3-7-44)

L-211—Amended Sched. II modifies specifications for the manufacture of steel-pressure pipe to bring them into conformity with recent ASTM changes. (3-11-44)

L-248—Amended commercial dishwasher order makes several minor clarification changes. (3-11-44)

L-292—Amended order permits resumption of limited production of brewery and winery machinery and equipment. Dairy machinery quotas have been shifted and other food processing equipment restrictions are eased. (3-11-44)

L-299—Amended order changes specifications on metal thickness of power boilers to conform with ASME Code. (3-10-44)

M-11-b—Amended order adds a number of items to list of exceptions to limitations on the use of zinc imposed by the order. (3-9-44)

P-43—Amended order clarifies conditions under which priority assistance is given laboratories. (3-6-44)

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*C. S. M. *Milwaukee*

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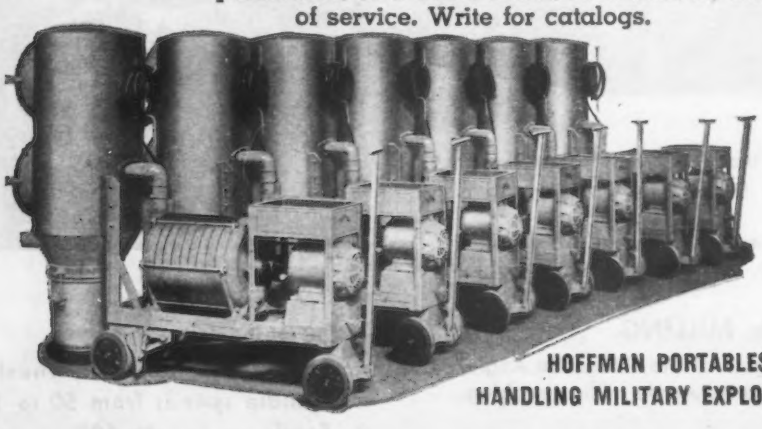

HOFFMAN PORTABLES FOR HANDLING MILITARY EXPLOSIVES

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Purchase Orders Frozen by WP

Washington

• • • Purchase orders which hav been frozen under the provisions Priorities Regulation 18 remain fr zen in the delivery sequence that established for them regardless of t fact that order M-293 has been mod fied. The same rule applies to d liveries of Class Y products for whic purchase authorization has bee granted by WPB. Class Y produc are those components and parts ove which WPB exercises purchase orde control. Persons desiring to purchas such products are required to obtai specific authorization from WPB t replace orders for them and for pro ducers of such products to accept suc orders.

A product which has been froze under PR18 remains a part of a fro zen schedule despite the fact that th product itself may be removed fro control of the order under which i originally became a part of the froze delivery schedule. These rules ar explained in Direction 1 to Genera Scheduling Order M-293.

At the same time, WPB announce with the issuance of Direction 2 t order M-293, that the tables appende to it will remain in effect under th amended procedure until such time a they are revised to conform to th new rules. However, the Direction indicates that products which have been Class Z will become unclassifie products for the purpose of the amend ed regulation. This change is in lin with the elimination of the Class Z product procedure from the schedul ing order.

The Class Z product procedure was designed to require users of certain components and parts in products, which in turn were to be used in specific end products for specific claimant agencies, to indicate realistic

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Army-Navy "E" Award received Jan. 12, 1943. White Star, for continued high production, received Oct. 30, 1943.

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delivery requirements on their purchase orders for such components and parts. This was accomplished by a vertical chain of reporting delivery requirements to the claimant agency concerned with the end product programs.

Unclassified products are certain components and parts manufactured by an industry only part of the output of which is subject to scheduling procedure. The plants which are subject to the scheduling procedure are notified by WPB.

Direction 2 also provides that where a manufacturer has, in the past, filed a form for Class X products, he may continue to file the same form in the future for those purchase orders already reported, despite the fact that the required reporting form may be changed by order M-293.

Class X products are those critical components and parts on which WPB requires manufacturers to file monthly order boards showing proposed delivery sequences. When these monthly reports are filed, the delivery sequence becomes a frozen delivery schedule.

Cancellation of Tungsten Contracts Brings Protests

Washington

• • • **WPB's order that** Metals Reserve Co. cancel domestic "eligible producer" tungsten contracts as of March 31 was attacked on March 7 by Senator James E. Murray of Montana, chairman of the Senate Small Business Committee and Senator James G. Scrugham of Nevada.

Under one option, the tungsten producer has the choice of continuing to sell to Metals Reserve at $30 per unit for 60 days and at $24 for a further 60 days, or until June 30. Thus, Senators Murray and Scrugham said, tungsten prices will not parachute as rapidly as mercury prices did immediately subsequent to cancellation.

"The net result will be, however, that after July 1, 1944, the bottom will drop out of the domestic tungsten market and prices will doubtless fall to the foreign level unless Metals Reserve continues to support the $24 price thereafter," said a joint statement issued by the Senators.

"Elimination of the $30 per unit price will close up most of our tungsten mines. If the price falls much below $24, it is likely that the handful of major producers will have to fold up as well."

ARCOS ELECTRODE ANALYSIS AND COLOR CHART

GRADE	Popular Name	Core Wire Type No. A.I.S.I.	Core Wire Type No. Arcos	Typical Analysis Cr. %	Ni. %	C. %	Others	Coating Type	Coating Color	Stub End Color End	Stub End Color Side	Diameter and Lengths 1/16-5/64-3/32	1/8-5/32-3/16	1/4	5/16	Magnetic
CHROMEND K	19/9	308	308	19.0	9.0	.07		Lime	Green	Yellow		9"	14"	14"		No
STAINLEND K	19/9	308	308	19.0	9.0	.07		Titania	Brown	Yellow		9"	14"	14"		No
CHROMANG	19/9 Mn.	307	307	19.0		.10	Mn. 4.0%	Lime	Green	Black		9"	14"	18"	24"	No
CHROMEND 19/9 Cb.	19/9 Cb.	347										9"	14"			No*
CHROMEND K Mo.	18/12 Mo.	31										9"	14"			No
STAINLEND K Mo.	18/12 Mo.	3										9"	14"			No
CHROMEND K Mo. Cb.	18/12 Mo. Cb.	31										9"	14"			No
CHROMEND 18/8 Mo.	19/14 Mo.	317										10"	15"	15"		No
CHROMEND KS	18/8 Si.	302										9"	15"			No
CHROMEND 16/7	17/7	30										10"	15"			No*
CHROMEND HC	25/12	309										9"	14"	14"		No
STAINLEND HC	25/12	309										9"	14"	14"		No
CHROMEND 25/12 Cb.	25/12 Cb.											9"	14"			No*
CHROMEND HCN	25/20	310										9"	14"	14"	18"	No
STAINLEND HCN	25/20	310										9"	14"	14"	18"	No
CHROMEND 25/20 Cb.	25/20	31										9"	14"			No
CHROMEND 25/20 Mo.	25/20	310										9"	14"			No
CHROMEND HN	17/25	311										10"	15"	15"		No
CHROMEND 8/18	8/18	325										10"	15"			No
CHROMEND 25/3 Mo.	25/3 Mo.	329										10"	15"			Yes
CHROMEND 29/9	29/9	312										10"	15"	15"		No*
CHROMEND 15/35	15/35	330										9"	14"			No
CHROMEND 13/60	Nichrome	—										9"	14"			No
CHROMEND 14/75	Inconel	—										10"	15"			No
CHROMEND 15/85	Nichrome III	—										9"	14"			No
CHROMEND 20/80	Nichrome V											10"	15"			No
CHROMEND 2M	2% Cr.-Mo.											9"	14"	14"		Yes
CHROMEND 2M(S)	2% Cr.-Mo.											9"	14"	14"		Yes
CHROMEND 5M	5% Cr.-Mo.											9"	14"			Yes
CHROMEND 12	12% Cr.	41										9"	14"	14"		Yes
CHROMEND 16	16% Cr.	43										9"	14"			Yes
CHROMEND 18	18% Cr.	442	442									10"	15"			Yes
CHROMEND 28	28% Cr.	446	446									10"	15"			Yes
MANGANEND 2M	Mn.-Mo.	—	132									9"	14"	14"		Yes
MANGANEND 2M(S)	Mn.-Mo.	—	101										14"	14"		Yes
MANGANEND 13	13% Mn.	—	139	Mn. 13						Orange	Red	9"	14"	14"		No
NICKELEND	Nickel	—	210						Black	Black	Orange	10"	15"			No
MIXEND	Monel	—	207	For Ma			On Cast Iron	Special	Brown	Orange	Blue	10"	15"			No
REFORMEND	Mild Steel	—	101	For Strength Welds on Cast Iron				"	Grey	Orange		9"	14"	14"		Yes
CAREND	Armco Iron	—	100	For Sheet Metal Welding				"	Black			9"	14"			Yes
BRONZEND E	Everdur	—	910				Si. 3%, Mn. 1% Cu. 96%	"	Black			9"	14"	14"		No
BRONZEND P	Phosphor Bronze	—	920				Sn. 5% Cu. 95%	"	Black			9"	14"	14"		No

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Buffalo, N. Y.....Root, Neal & Co.
Chicago, Ill.....Machinery & Welder Corp.
Cincinnati, Ohio.....Williams & Co., Inc.
Cleveland, Ohio.....Williams & Co., Inc.
Columbus, Ohio.....Williams & Co., Inc.
Detroit, Michigan....C. E. Philips & Co., Inc.
Erie, Penna.....Boyd Welding Co.
Fresno, Calif.....Victor Equipment Co.
Ft. Wayne, Ind..Wayne Welding Sup. Co., Inc.
Honolulu, Hawaii..Hawaiian Gas Products, Ltd.
Houston, Texas..Champion Rivet Co. of Texas
Kansas City, Mo..Welders Supply & Repair Co.
Kingsport, Tenn.....Slip-Not Belting Corp.
Los Angeles, Calif.....Victor Equipment Co.
Milwaukee, Wis. ...Machinery & Welder Corp.
Moline, Ill. .....Machinery & Welder Corp.
Montreal, Canada..G.D.Peters & Co. of Canada, Ltd.
New Orleans, La.....Wm. D. Seymour Co.
New York, N. Y.....H. Boker & Co., Inc.
Oklahoma City, Okla..Hart Industrial Supply Co.
Pampa, Texas.....Hart Industrial Supply Co.
Pittsburgh, Pa.....Williams & Co., Inc.
Rochester, N. Y.....Welding Supply Co.
San Diego, Calif.....Victor Equipment Co.
San Francisco, Calif.....Victor Equipment Co.
Seattle, Wash. .....Victor Equipment Co.
St. Louis, Mo. .....Machinery & Welder Corp.
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"QUALITY WELD METAL EASILY DEPOSITED"

Flexible handling equipment

will load, move or store multiple numbers of heavy

items in one operation with savings in

time, space, money and manpower . . .

e.g., **TOWMOTOR**

THE 24-HOUR ONE-MAN-GANG

TOWMOTOR CORPORATION • 1230 E. 152ND STREET, CLEVELAND 10, OHIO

STRAIGHT-GAS POWERED INDUSTRIAL TRUCKS EXCLUSIVELY—SINCE 1919

Disposing of Work In Process Jigs, Delay Termination

New York

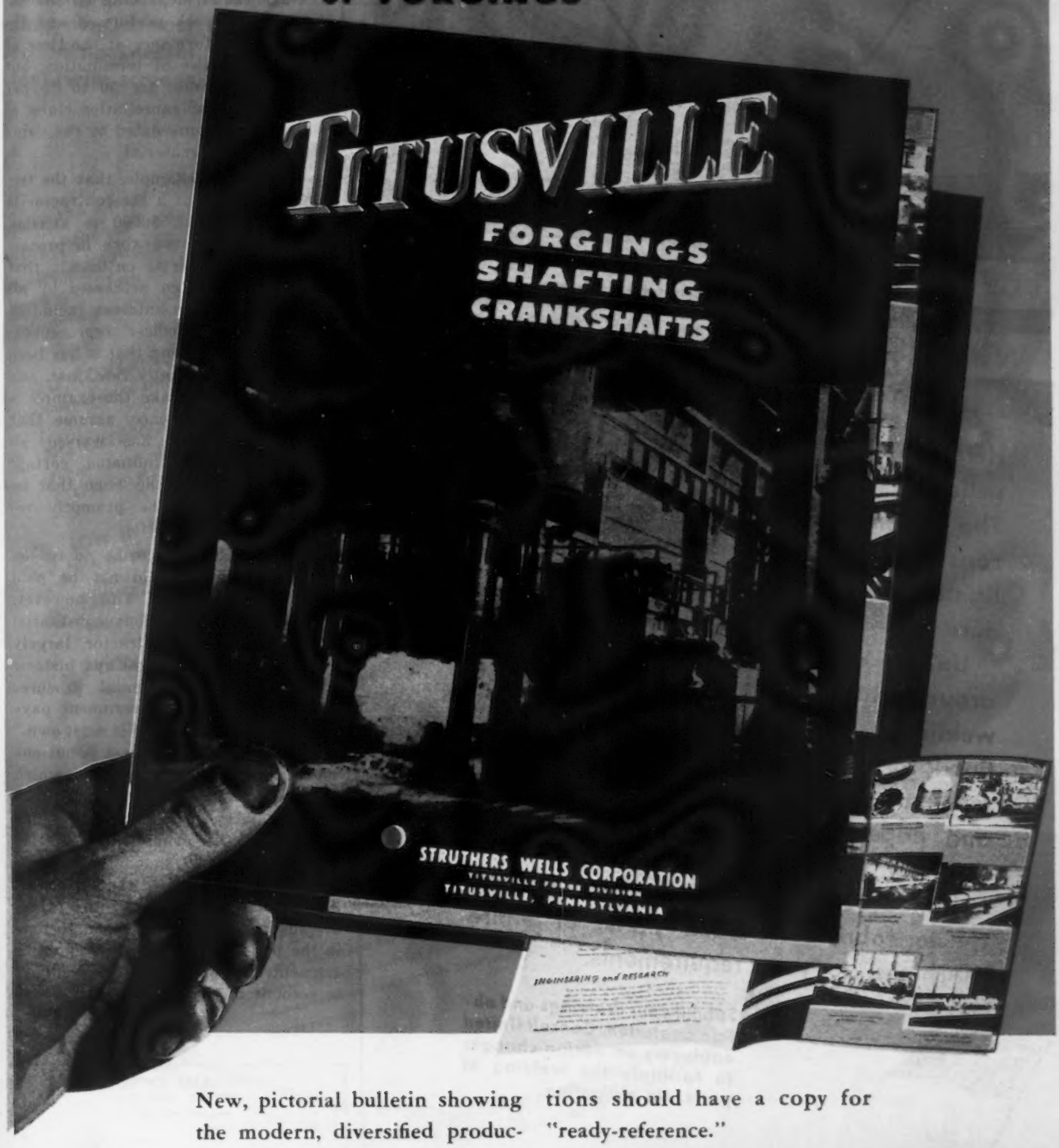
• • • **In addressing** the American Management Association at its Financial Management Conference on March 2, J. Tyson Stokes, vice president of Baldwin Locomotive Works analyzed the settlement of termination claims, particularly those of subcontractors. He pointed out that the prime source of delay is in the matter of disposing of work in process, completed but excess component parts, and such production aids as jigs, tools, and fixtures. The Baruch-Hancock report, the George-Murray Bill (S. 1370), Executive Order 9425 of the Surplus War Property Administration, and the appointment of William J. Clayton as administrator are attempts to solve the termination problem. Mr. Stokes' discussion dealt mainly with the matter of delays in contract termination, including the following remarks in his analysis.

Nearly every claim for reimburse-

FOUNDRY CONTROLS: *Two calibrated vibratory feeders shown here automatically add Graphidox and ferrosilicon to the iron pouring from the cupola spout. Recently installed in the Westinghouse foundry at Trafford, Pa., these feeders are supplied by gravity from hoppers on the charge floor.*

A New Publication

THAT SHOULD BE IN THE FILES OF EVERY IMPORTANT USER OF FORGINGS



New, pictorial bulletin showing the modern, diversified production facilities of this experienced organization. Every executive interested in quality FORGINGS for present or post war applications should have a copy for "ready-reference."

STRUTHERS WELLS CORPORATION
Titusville Forge Division
TITUSVILLE, PENNA.

CERTAINLY, IT CAN BE WELDED

WHAT'S MORE, IT WILL BE BETTER

Here we show the parts of a spiral impeller for a blower with a diesel engine. The assembled unit, being of welded construction, will be stronger although lighter in weight—and less costly to produce.

United Welding Company is working around the clock on a wide range of welding assignments—on equipment destined for the armed forces—on machine tool frames, bases, levers, etc.—on pulp and paper making machinery—on other essential work.

United would appreciate the opportunity to fabricate welded parts, or entire machines, to your requirements.

Submit your drawings and obtain quotation. Consult United engineers on design changes to facilitate the welding of parts. No obligation.

ARMY NAVY

WELDING ENGINEERS · MIDDLETOWN, OHIO · UWCO

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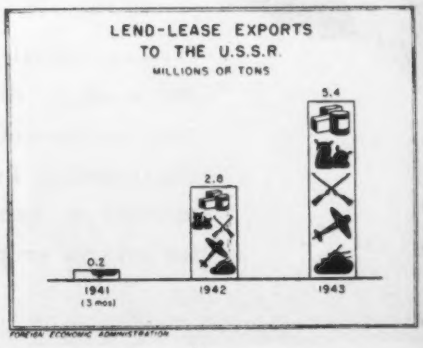
MIDDLETOWN, OHIO

WELDING FABRICATORS OF MODERN DESIGNS

ment of termination charges and expense will, regardless of the method of computation, involve the element of value of special tooling expense, uncompleted work in process, excess components or all three. The percentage varies, depending on the nature of the work performed and the status of performance at the time of receipt of notice of termination, but it is not unusual for 50 to 75 per cent of the total cancellation claim in dollars to be represented by the value of this type of material.

Assume, for example, that the termination claim of a sub-contractor is $10,000 of which $6000 is attributable to the cost of work in process and excess material on hand; that the claim has been processed by all of the parties in interest including the contracting officer representing the government; and that it has been approved as eminently fair, just, and reasonable. To make the example a particularly good case, assume that the sub-contractor has waived all profit and has eliminated certain doubtful items in the hope that by so doing he will be promptly reimbursed.

There would seem to be no reason why this claim should not be paid promptly and in full. This, however, cannot be done without substantial risk to the prime contractor, largely because one fundamental and historic principle of governmental procurement, is "what the government pays for directly or indirectly it must own." Also, this hypothetical case is but one of hundreds of similar ones which will be presented to the prime contractor if a large prime contract is involved. If the prime finally settles and pays $10,000 to the sub while this material is still in the sub's possession and control and if the prime intends to include this disbursement in the prime's claim against the government, the prime will be obliged to account to the government for the



his versatile 250 KVP Jib Crane X-Ray Unit, er presents a soundly engineered apparabased on exhaustive study of the heavyy radiographic requirements of many dise industries.

wide scope of operational efficiency proes comprehensive radiographic facilities ending over a vast spread of materials d section thicknesses, from light alloys to " steel (with screens).

PX

This is the Picker 250 KV self-contained transformer-tubehead. Sixty-four years of experience in the manufacture of high voltage apparatus have gone into its design, which incorporates the following outstanding features:

1 **SELF CONTAINED.** Rayproof X-Ray tube and transformer oil-immersed in sealed, shockproof tank.

2 **NO EXTERNAL HIGH TENSION CABLES.** Improved Picker design eliminates need for high tension leads through U. S. Patent No. 1,334,936.

3 **LOW INHERENT FILTRATION.** Assures increased radiation output.

4 **FLEXIBILITY.** Trunnion-mounted tubehead swings freely in all planes, permitting universal angular positioning.

5 **CONTINUOUS OPERATING CYCLE.** Continuous operation at 15 milliamperes.

6 **HIGH EFFICIENCY COOLING.** Circulating oil pressure system requires no outside water supply.

7 **POSITIVE POSITIONING.** Jib boom is raised or lowered with positive control, by motor-driven chain hoist. Entire assembly locks firmly at any angulation.

8 **WIDE OUTPUT RANGE.** Output range from 30 KV to 250 KVP, with time voltage control, is adapted to radiography of variety of materials, from light alloys to heavy steels.

9 **INSTANT TUBE ACCESSIBILITY.** X-Ray tube is readily accessible for examination or replacement by simply removing special leak-proof access cover. No time-consuming disassembly necessary; no operational tieups required.

instant tube access

no disassembly . . . no operating delays

First "E" Award in the X-Ray Industry

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ANUFACTURERS OF HIGH VOLTAGE ELECTRICAL APPARATUS SINCE 1879

STEEL FOR DUCTILITY PLUS STRENGTH

Assembling airfield landing mats—clips made of Thomastrip have ductility, strength, and uniformity for high speed production.

Thomas Strip

COLD ROLLED STRIP STEEL

FOR UNIFORM QUALITY

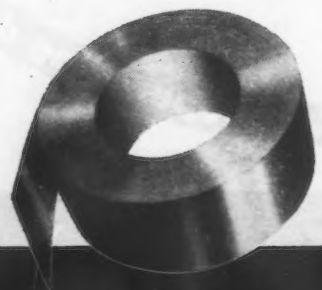
● The combination of ductility and strength found in steel makes it a most logical answer to many design and production problems. Since Thomas cold rolling, subsequent operations, and inspection are executed with great care, you'll find that Thomas adds uniformity, finish, and other product qualities to those other benefits which are inherent in the steel itself.

A few Thomastrip features are:

(1) accuracy to gauge
(2) finishes for painting and plating
(3) uniform tempers from dead soft to hard
(4) non-ferrous and lacquer finishes

Investigate with Thomas engineers the possibility of improving your product and reducing your production costs with Thomastrip. We will gladly send you a book "Classification of Extras—Cold Rolled Strip Steel." Write today.

BRIGHT FINISH NOT COATED, SOLDER COATED, ELECTRO-COATED WITH NICKEL, ZINC, COPPER, BRASS, AND LACQUER COATED—IN COLORS



THE THOMAS STEEL CO. • WARREN, OHIO

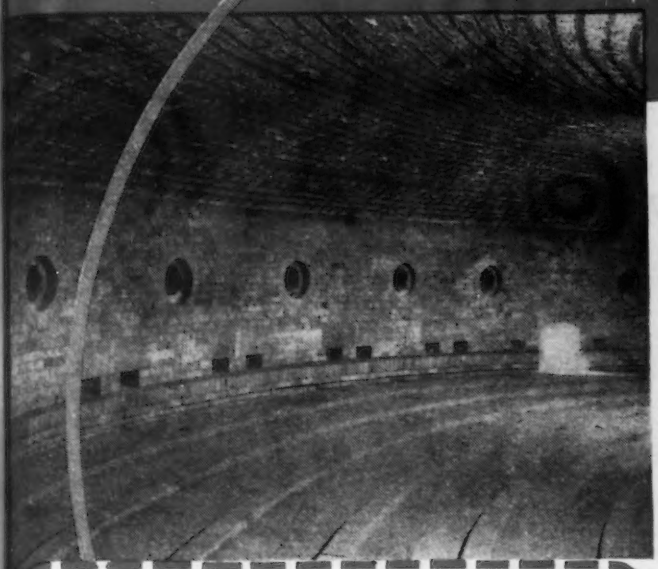
material and to have it available for delivery to the government on demand. If, as is often the case, the excess material is located a thousand miles or more away from the prime contractor's plant, there is no practical way for the prime to inspect it or to check the actual quantities with the inventory submitted. In a busy plant still engaged in war production, material of this type is easily lost, destroyed, or otherwise disposed of, assuming the best of good faith and orderly control on the part of the sub-contractor. The risk to the prime contractor is therefore apparent since if the material is not in fact available for any number of reasons several months after the claim has been settled and the sub-contractor paid in full, the government will refuse to reimburse the prime contractor for so much of his claim as is represented by the value of this material.

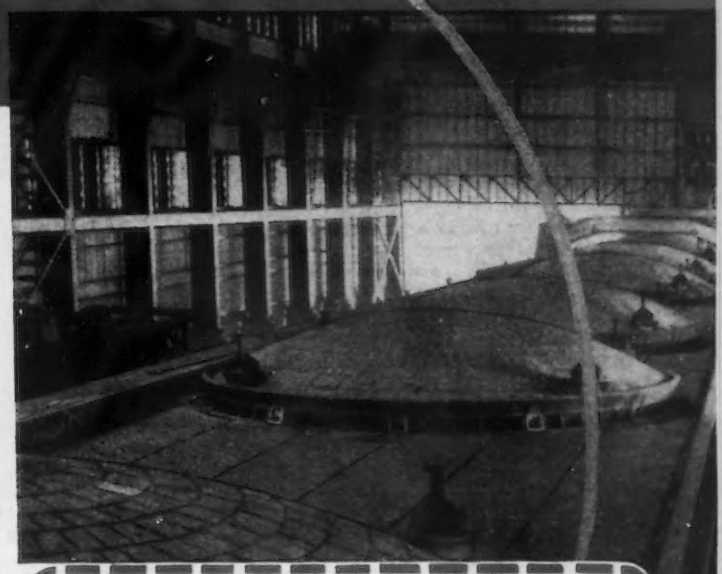
There are two principal procedures whereby, theoretically, the desired result could be accomplished. First, the sub-contractor can be authorized to sell (or buy for his own account) the excess material upon such terms and at such prices as are approved by the contracting officer, and the amount realized by such disposition can then be used as a credit against the termination claim before final settlement is effected. Second, the material can be shipped to a government warehouse where it can be checked, inspected, and thereafter remain in the possession and control of the government. Both of these procedures have apparently involved practical difficulties of administration which tend to delay final settlement for an unconscionable period of time.

As nearly as can be determined no uniform and controlling policies have yet been formulated with respect to surplus items having little or no "market" value. It is believed that contracting officers feel impelled to approach the problem too much from the standpoint of 100 per cent efficiency. The attempt to force the producing contractor constantly to adjust his own requirements in order to absorb material reported from week to week as surplus involves practical difficulties impossible to overcome in spite of the fact that this "economy" appeals to the theorist. In the case of jigs and fixtures, there appears to be a reluctance to authorize a courageous scrapping program because of the great apparent loss in dollars involved and the fear of

ONLY SALEM BUILDS ROTARY HEAT TREATING FURNACES AND CIRCULAR SOAKING PITS . . .

THE WORLD'S LARGEST, IN BOTH CASES, ARE SALEM-MADE





● The inside surface of the outside wall on the world's largest rotary furnace shows the firing and exhaust ports as well as piers of the rotating hearth (effective area of 2100 sq. ft.) on which billets rest.

The temperature for each of the five zones in the furnace is automatically recorded on a dial chart which in conjunction with a loading record chart enables the operator to determine the temperature and locate the position of any billet at any time during the heating period. The hearth is equipped with a variable speed mechanism which gives a range of 2 to 8 hours per revolution.

● These two installations were designed for heavy tonnage—the rotary for heating billets and the soaking pits for heating ingots. Both have these points in common—burn the same type of fuel (gas with oil standby), operate in same temperature range, have finger-tip controls, and a multiplicity of burners. Both installations have been in places long enough to prove our original operating economy claims. In each instance, the customer is enthusiastic about the results.

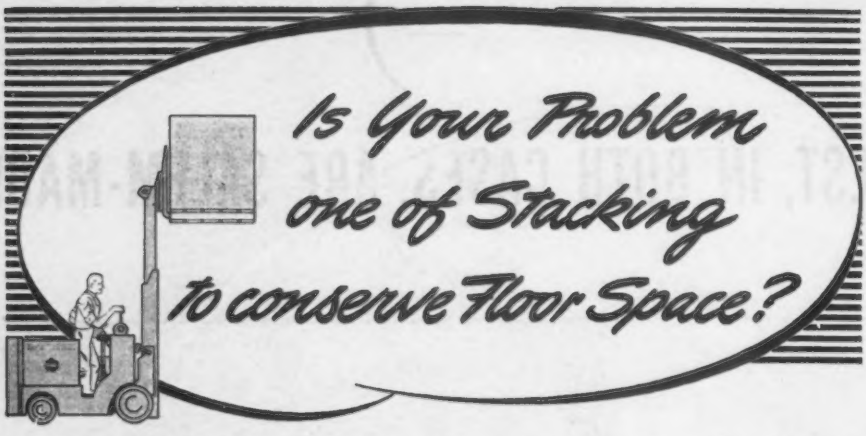
Perhaps you should consider a Salem rotary furnace or a Salem circular soaking pit for your next installation. Our engineers can supply the data.

Write SALEM for Complete Data

● The circular design in a soaking pit provides these sixteen advantages: (1) faster heating rate; (2) remarkable heat uniformity; (3) better rolling; (4) better steel; (5) less scale; (6) less chipping; (7) 1% higher yield; (8) a very minimum of cinder; (9) less fuel consumption; (10) no flame impingement on ingots or the furnace wall; (11) no washing of ingots; (12) less maintenance; (13) lower fuel expense; (14) foolproof cover for greater safety; (15) higher production in a given area; (16) lower over-all production costs.

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. · SALEM, OHIO



Hundreds of plants and warehouses have solved this and other material handling problems with Baker Trucks. So that you may profit from their experiences, a large part of our new catalog has been given over to actual installation stories. A few cases in point are listed below:

★ ★ ★

A leading industrial engineer was given the job of designing a large model warehouse for the world's largest paint manufacturer. Baker Trucks and Tractors were specified to bring about top efficiency in the sorting, storing and shipping of the more than 10,000 items handled in this warehouse. Illustration shows one of their fork trucks stacking pallet loads of drums three-high.

One of the problems confronting the planners of this warehouse was to find a way of getting at "buried" loads with a minimum of time and effort. This was solved by steel racks—permitting the fork truck to remove the lower pallet without disturbing cartons above.

A large west-coast processing plant saves thousands of dollars annually through the use of telescoping lift trucks. The Baker Fork Truck illustrated is tiering heavy pallet loads three- and four-high to conserve warehouse space.

In paper mills, print and publishing shops, Baker Trucks have more than doubled the value of warehouse space by permitting stacking to the ceiling. Reductions up to 80% in handling costs are reported. One publisher paid for his truck in 18 months' rental savings alone.

A Baker Material Handling Engineer was called in to make a survey of a large food warehouse. Upon his recommendations, a fork truck plus a conveyor system was installed. Operating costs were reduced from 6.68c to 4.98c per ton, a saving of 25.4%. Gross savings amounted to $153 per week or $7956 per year.

The problem of stacking steel sheets has been successfully met in steel mills and metal working plants through the use of heavy duty fork trucks, handling sheets on pallets—or equipped with rams for handling heavy rolls. A special roll-over attachment tiers rolls either vertically or horizontally.

WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION

of The Baker-Raulang Company

2175 WEST 25th STREET • CLEVELAND, OHIO

In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

destroying an article of some potential future value.

The second solution, that of creating government controlled warehouses, has not as yet been tried to any great extent, but in any event the warehousing method should be resorted to only as a last resort in special cases and after every possible attempt has been made to dispose of material by scrapping. The cost of shipping and storing may involve far greater cost to the government than could be justified.

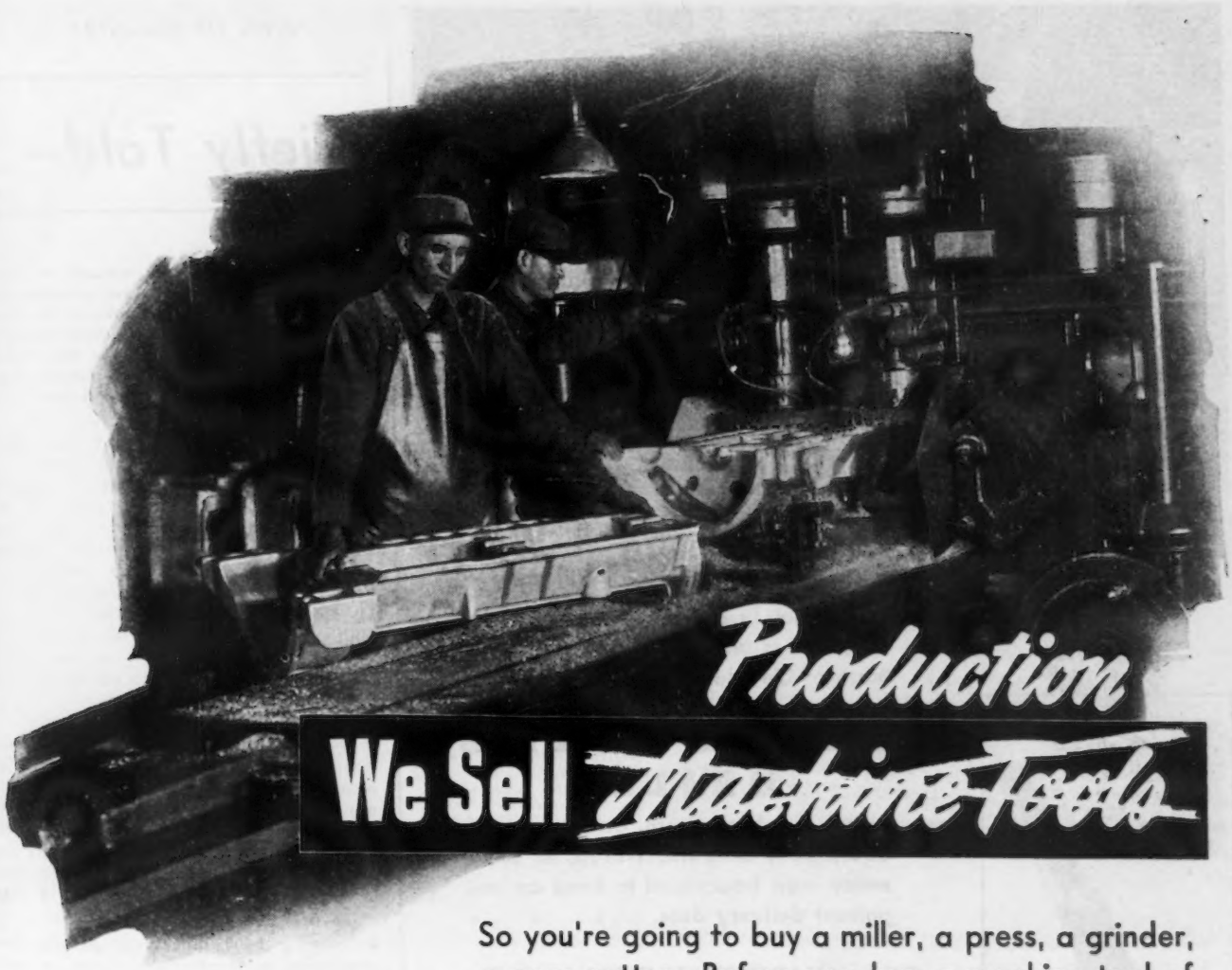
In order to get things moving, the following suggestions are offered as a starting point: 1—Let the agencies responsible for disposition of surplus materials differentiate more clearly between that which must be done to dispose of material of the type referred to, particularly jigs, fixtures, and work in process, and that which should be done to dispose of the durable goods and production facilities owned by the government. A ruthless approach should be made to the former to the extent that termination settlements are delayed by the desire to obtain a disposition price bearing a close relation to cost.

2—All other sources of informed opinion should by concerted effort educate the public to the view that semi-processed and "excess" material should be considered expendable, largely to the same extent as an exploded shell or bomb, and that its cost must be absorbed and written off as a necessary cost of waging total war. It seems unrealistic to assume that government contracting officers will, in fact, carry out the salvage program in a courageous and effective manner if the results accomplished by them are to be tested and criticized in the light of normal industrial, business, or even governmental procurement practices.

3—The passage of legislation of the type recommended in the Baruch-Hancock report should be pushed with all possible speed so that the procurement agencies will have a statement of Congressional policy to back up their efforts. Senate Bills 1718 and 1730, particularly the latter and if certain clarifying amendments are made, deal with this and seem to cover the ground in all essential respects.

Cooper with WPB

• • • **Stanley M. Cooper** has been appointed an assistant director of the Tools Division, WPB announced. Mr. Cooper has joined WPB to handle problems relating to anti-friction bearings.



We Sell *Production* Machine Tools

So you're going to buy a miller, a press, a grinder, a gear cutter. Before you buy a machine tool of any kind—find out if there's a used tool that would serve your purpose.

For the answer to these and many other machine tool requirements—see an MDNA dealer first before you buy. He will make every effort to find you the right machine for the right job at the right price. Invite an MDNA dealer into your shop—so that he may become familiar with your production problems—and catalogue your needs when he is shopping around for available used machine tools. Your MDNA dealer is interested in you as a permanent customer. Hence he doesn't sell just machine tools. He tries to service your production problems. So before you buy any machine tools—new, used or rebuilt—see what an MDNA dealer has to offer.

LOOK FOR THIS SEAL OF INTEGRITY

MDNA

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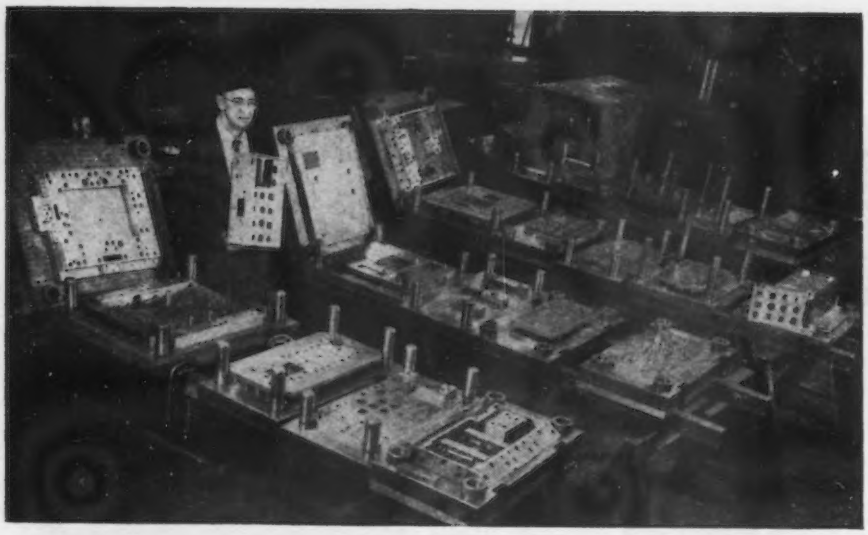
WHEN BUYING USED OR REBUILT MACHINERY

When you see the MDNA seal in the advertising of a used machine tool dealer you have reason to feel unusual confidence in the values which he offers . . . because his display of that seal is public notice that he has subscribed, both in spirit and in letter, to the code of ethics adopted by the National Machinery Dealers Association, an organization of dealers in used and rebuilt machinery.

MACHINERY DEALERS NATIONAL ASSOCIATION

20 NORTH WACKER DRIVE CHICAGO (6) ILLINOIS



From Parts Prints to Press in 8 Weeks

—No small task in these days of priorities, delays and last minute changes. Barth of Cleveland gives high credit to

"HARDSTEEL" DRILLS

which enabled them, on the signal equipment dies illustrated, to save many man hours and to keep an important delivery date. « « «

With a "HARDSTEEL" Drill in an ordinary drill press and following simple instructions regarding speed and pressure, any mechanic can easily drill clean holes through steel hardened by any process—40 Rockwell "C" or harder.

A time saver when last minute emergency changes come through on hardened dies and parts. And the only way to assure matching of hardened parts at assembly—drill after hardening.

Used throughout industry for parts recovery and for production work—made in all sizes ⅛" to 1".

BLACK DRILL COMPANY
1400 EAST 222nd STREET • CLEVELAND 17, OHIO

"YOU HARDEN IT... WE'LL DRILL IT" *with HARDSTEEL*

Complete information and practical operating suggestions in the "HARDSTEEL" Operating Manual.
Copy free on request.

"HARDSTEEL"
DRILLS · REAMERS · TOOL BITS · SPECIAL TOOLS

Briefly Told—

• 12,000 tons of copper, enough for more than 1,200,000,000 machine gun cartridges and the equivalent of 1,100,000 miles of telephone wire, was returned to the national stockpile from the telephone plant of the Bell System during 1943, says the Western Electric Company, supply organization of the System.

•

• "Guarantee certificates of re-employment" are being mailed to every employee of Stokes Industries, Covington, Ky., lathe manufacturers, now in the armed forces. According to officials of the company, these certificates declare that the man in military service "is hereby guaranteed, upon presentation of his Honorable Discharge papers from the United States Armed Forces, that he will be re-employed by Stokes Industries at the prevailing wage scale at the time of his re-employment."

•

• Leo A. Sweeney, USES district superintendent, Buffalo, estimates 21,000 workers will be needed in Buffalo war plants in the next six months and that only about 8000 can be expected from all sources, leaving a potential shortage of 12,000. Sweeney says there are more people employed in non-essential lines in the district today than there were in 1940.

•

• Covering 5000 office and professional employees in its Buffalo plants, a contract has been signed by Curtiss-Wright Corp. and the United Office & Professional Workers, CIO. . A pay increase schedule, jointly agreed upon, will be submitted to the WLB for approval. Other provisions relate to vacations, grievance and arbitration machinery, seniority rights, and joint job-evaluation.

•

• About 50,000 employees of Youngstown and Mahoning County were placed under a mandatory 48-hr. week on March 1 by order of the WMC. April 1 has been set as the deadline when all plants employing more than eight workmen must comply with the order. About 2800 plants are affected.

•

• For January, Canada's external trade, excluding gold, was valued at $372,359,000, a gain of $66,000,000 over the corresponding month of 1943. During the month Canadian imports were valued at $126,369,000, down from $127,299,000 a year ago. Exports, excluding gold, in the same month were up 36 per cent over the corresponding month a year ago to $242,011,000.

•

• The James H. Hunter Machine Co., North Adams, Mass., filed an application with the National WLB for permission to grant a wage increase of 10 per cent and one week each year vacations with pay to employees who have been with the firm a year or more. The company filed a similar application with the board Nov. 24, 1943, but was turned down.

•

• The AFL Molders Union and Springfield Bronze & Aluminum Co. have signed

RUBBER CUSHIONED COUNTERSHAFT* and 3-POINT SUSPENSION

BRIEF SPECIFICATIONS

Swing over bed, 10½"... bed length, 43⅛"...spindle hole, $\frac{25}{32}$"...capacity, ⅝" with push type collet...6-position automatic indexing turret... stroke of turret, 4¼"...12 spindle speeds from 30 to 1450 r.p.m.... moving parts protected by ball bearings or self-lubricating bronze bearings.

No. 840
Quick Change Gear Turret Lathe with automatic apron

motor vibration absorbed

In Logan Lathes the smooth operation essential to finely finished precision work is doubly assured... first, by rubber cushioning at vital points... second, by carrying the countershaft on a three-point suspension. To absorb the motor's vibration, to prevent its transfer to the lathe proper, the patented Logan countershaft is rubber cushioned at all three of its main supporting points... the pedestal red and the two hinge pins. In addition, the cone pulley guard, which covers both countershaft and headstock, rests on rubber buttons. *The entire Logan countershaft assembly is so designed that at no point is there a direct metal-to-metal contact between countershaft and headstock.* Furthermore, the three-point suspension steadies the whole countershaft assembly so that it cannot rock. This combination of rubber cushioning and three-point suspension is another example of the advanced design that assures sustained accuracy, safe operation, long life, and high-speed, low-cost production in all models of Logan Lathes. Write today for your copy of the latest Logan Catalog.

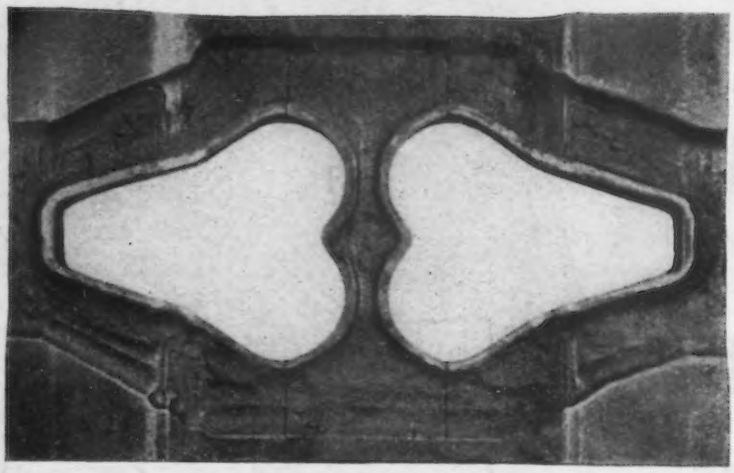
LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

*One of a series describing the finer features of Logan Lathes . . . Look for the next of the series

THIS DIE WILL LIVE!



Hard-Facing with Wear-Resistant Coast Metals Enables it to "Consistently Trim 100,000 Forgings..." Time after Time

There, in a word, you have the story of this trimming die for forming tank tread end connectors.

Made of ordinary carbon steel, 3" thick, it is constructed with a 3/16" x 3/16" ledge, cut into the top edge of the trimmer. This cut-out is protected with a wear-resistant Coast Metals Hard-Facing, and then the overlay is ground to the correct size and shape. When the die needs reworking, another Coast Metals overlay, requiring only 4 or 5 ounces of weld rod, makes it good as new, ready for another life of genuine service.

Coast Metals can be welded either by the electric arc or the acetylene torch to all ferrous metals, including manganese steel, alloy steel, cast iron and chilled iron. New booklet, "Your Best Protection Against Wear" contains full details. Write for your copy today.

COAST METALS, INC.
Plant and General Offices: 1232 Camden Ave., S.W. Canton 6, Ohio
Executive Offices: 2 West 45th Street, New York 19, N.Y.

COAST METALS *hard-facing weld rods*

MAKE YOUR EQUIPMENT LAST LONGER

a contract that stipulates that any employee found "agitating trouble" in the plant will be discharged. All grievances will go through regular channels so they may be dealt with fairly and speedily. In other words, the union agrees to support management when an agitator is discharged, and management agrees to back the union when it reports an agitator for discharge. The contract calls for a wage increase of 10c. per hr., contingent upon Regional WLB approval.

●

• Washington draft controversies have stirred up a hornet's nest of organized charges of indiscriminate drafting by local boards, and as a result industrial plant interest in the fate of manning or replacement tables is decidedly alive. Records show that draft boards generally have stuck to manpower ratings as listed on industrial replacement tables. There have been a few exceptions in special cases when draft boards have questioned the priority rating of a worker. In such cases, however, rulings by draft boards have been appealed and rejected almost 100 per cent.

●

• Approximately half of the firms coming under the 48-hour work week ordered by WMC, which went into effect in Boston March 6, have applied for at least partial exemption from the ruling. Some 4000 industries are listed as essential and are affected by the order. Of that number, 1225 requests for exemption have been tabulated, and the WMC office staff still has many more to list. A large majority of requests for exemption are for special groups of workers whose jobs do not bring them under the ruling.

●

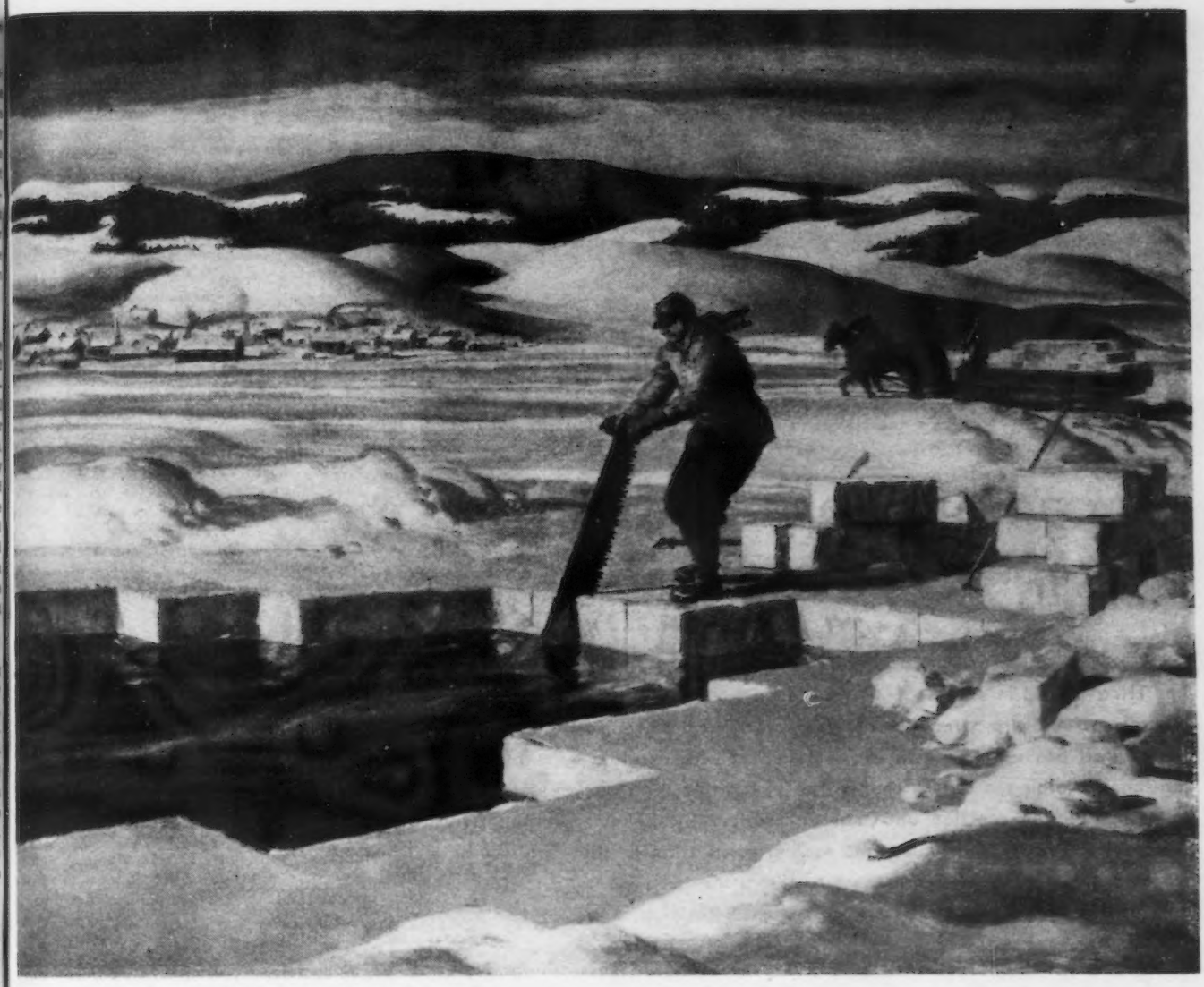
• Consolidated net profit of $4,341,200 for 1943 after all expenses and taxes is reported by the M. A. Hanna Co., coal, ore, dock and vessel operators. The profit compares with $4,254,663 in 1942. Total tonnage of all kinds handled in 1943 was 27,500,000 tons compared with something over 25,000,000 tons in 1942. The company handled 7,545,000 gross tons of iron ore in 1943, comparing with the all-time record of 8,570,000 gross tons in 1942.

●

• Auditors of the Air Forces Materiel Command are checking inventory records in the Buffalo plants of Curtiss-Wright Corp., as the result of a mixup in bookkeeping. The company is building several types of airplanes under both cost-plus-fixed-fee and flat-price contracts. It has been discovered certain materials may have been charged to cost-plus contracts when they should have been charged to flat-price contracts and vice versa. This situation is attributed to failure of bookkeeping methods to keep up with production expansion. There is no question of shortages in parts inventories, but only a clouded picture of where and how the parts have been entered on the books according to best authority.

●

• The last of 1200 triple-deck troop sleepers built for the DPC rolled off the Pullman-Standard Car Mfg. Co., assembly line on March 6, just four months after production began. In turning out these three-tier sleeping cars Pullman-Standard maintained an average production rate of 12 a day, which it set when it tackled the order. The plant is now busy on another



Ice Cubes of Yesterday

TURN back the clock to yesterday. Across the years comes the ring of biting saws. The crickety squeak of sled-runners and bundled feet, on crispy snow. The laughter and banter of toiling men. The blowing of frosted breath. Grunting! Clanking! — *It's ice-cutting time!*

In those days, it wasn't easy to keep next summer's food from spoiling.

HOW TIMES HAVE CHANGED!

Look at that gleaming white refrigerator of yours. Contemplate its contributions. More than just a 24-hour-a-day servant; more than just a stimulus to the family appetite; more than just a beautiful piece of furniture—it is literally a guardian of human lives — *your family protector!*

Other inventions have been more spectacular, more talked-about; but none has added so much to the happiness and comfort of so many people.

A grateful nation pauses to give thanks to American inventive, engineering and manufacturing genius for the blessings and conveniences of *the mechanical refrigerator!*

HOUDAILLE* is proud to have contributed to the dependability and excellence of modern refrigeration—proud to have worked hand-in-hand with the producers of mechanical refrigeration and other kindred household appliance industries.

We will continue, increasingly, in the postwar period, to cooperate and counsel with these important industries, in their efforts to put still further comforts and conveniences into your home.

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Executive Offices — Detroit

Manufacturers of precision parts and equipment for the automotive, aircraft, railway, maritime, mechanical refrigeration, radio, and other industries

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WITH a Speed in excess of 400 miles an hour, this fast-climbing, heavily armed and armoured Corsair F4U is one of the great combat planes of the United States Navy. In every detail the Corsair is a superb fighting machine. Nothing is left to chance; no part of its construction is too small to escape rigid inspection and thorough testing by the builders and pilots. This calls for expert machining and tooling so that the finished job will be a masterpiece of precision workmanship. From the Fenn Plants, a steady flow of precision built parts and assemblies go to the manufacturers of the famous Corsair.

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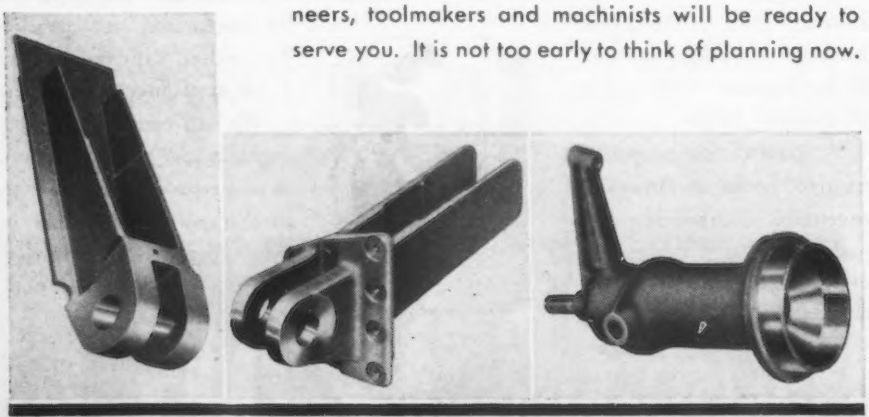
Fenn Plants have built their reputation over the years by building special machinery and handling difficult engineering jobs. They have the plants, facilities and experience for designing and building special machinery and they welcome inquiries regarding work of this special character.

ARE YOUR FUTURE PLANS IN THE BLUEPRINT STAGE?

When the time comes for reconversion to peace time production, Fenn engineers, toolmakers and machinists will be ready to serve you. It is not too early to think of planning now.



THE FENN MANUFACTURING CO.
HARTFORD, CONNECTICUT

NEWS OF INDUSTRY

U. S. Army order for low-side gondola cars. is also producing freight cars for domes railroads.

●

● Prefabrication of an all-steel pil house for the ore carrier *Troy H. Brow ing* has saved half the time normally re quired to build one aboardship. Built b Oldman Boiler Works at a cost of $10 000, the pilot house weighs 5¼ tons. Th *Browning* is to be renamed the *D. J Maloney* before entering service this sea son.

●

● Stockholders of Miller Mfg. Co., Detroi special tool makers, held a vote on March 1 on an increase in stock to provide funds fo purchasing of a 51 per cent controlling intere in the Rieke Metal Products Co., Auburn, Ind producers of fittings for metal containe Price of the Rieke shares is $712,500. Durin 1943 the Miller Co. acquired Precision Mfg Co. and Economy Valve Co., both of Detroi

●

● What is claimed to be one of the long est litigations in law annals was close recently when the long since disbande Gordon Form Lathe Co., Milwaukee, re ceived a check from the Ford Motor Co Detroit, for $237,621.17 representing United States Supreme Court award plu interest for infringement on the patent rights of a lathe invented in 1918. The money will be distributed among 14 stock holders.

●

● The Weirton Steel Co. reports new rec ords in daily production of finished stee for shipment, strip mill production, and blooming mill production, during Febru ary. The new daily average record for production of finished material of 5198 tons compares with the previous record of 5103 tons. Strip steel was produced at the rate of 4116 tons per day against a previous record of 4023 tons. The average daily blooming mill production was 4859 tons against a previous record of 4715 tons.

●

● Stafford Iron Works, Worcester, Mass. has increased output of landing barge decks and hulls 50 per cent over 1943.

●

● Reed-Prentice Corp. says a potential demand for metal die-casting machines from manufac turers of automobiles to vacuum cleaners is evident. Current make of these machines is going to plants making war munitions.

●

● Pullman-Standard Car, Worcester, Mass., shops have just shipped railroad coaches to Mozambique. The company so far this year has booked more freight and passenger car business than it pro duced in the whole of 1943.

●

● Norton Co. has instituted a business planning and development section under the direction of Wallace T. Montague, vice-president. Myron N. Smith is busi ness research manager; Allan F. Hardy, Jr., is in charge of production planning, while Robert P. Anderson, in addition to his regular advertising department duties, will take over public relations work.

●

● Seven New England firms and named officials have been indicted by the Fed eral grand jury, charged with conspiring to restrain trade and commerce in the manufacture, sale, and distribution of

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coke for heating purposes in the six New England states in violation of Section 1 of the Sherman Act. The indictment charges that for the purpose of manufacturing and sale of coke, New England has been divided into two zones, an eastern and western; that coke manufactured in the eastern zone was sold only in that area and that coke manufactured in the western zone was sold only in that area; that coke manufactured in the eastern zone was sold only to dealers who agreed to purchase their entire supply from the manufacturers in the eastern zone; that a similar situation existed in the western zone; that dealers in each zone agreed to sell at prices and upon terms and conditions and to such classifications of purchasers as those concerns manufacturing coke in each zone dictated.

•

• United American Metals Corp., Brooklyn, N. Y., is issuing to users of babbitt metal a folder describing Stonewall coppered babbitt. The folder contains an indicator diagram which shows the amount of the babbitt required to line certain bearings.

•

• Analysis of commercial and industrial statistics for January, 1944, by the Chicago Association of Commerce, shows building construction materially increased over the previous year. Building permits increased in number from 31 to 294, involving projects costing $1,500,76

AMBULANCE JEEP: *How easily a Jeep can be converted into an ambulance is illustrated here. The little arrangement leaves room for the driver and attendant.*

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With W·A·B Controls, you can govern all functions of one or more Diesel engines from a central point. Speeds can be precisely established, and varied in small increments. Simple and positive interlocks make it impossible to damage equipment by accidental changes in sequence of control operations. Synchronization or load balancing of engines in parallel is simple and easy. And control may be readily extended to related functions of the driven machines.

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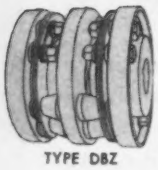
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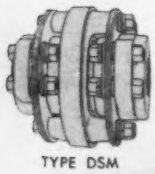
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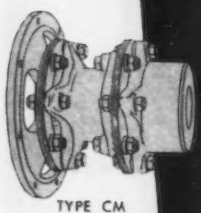
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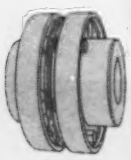
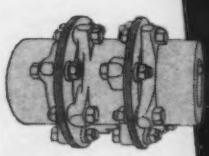

TYPE ST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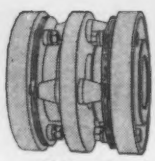
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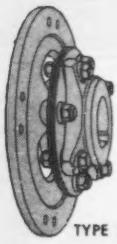
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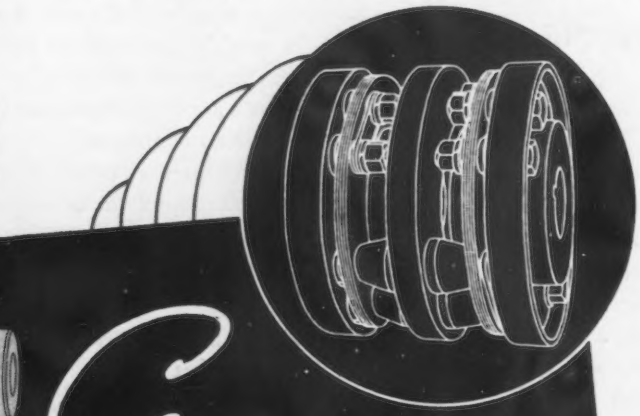

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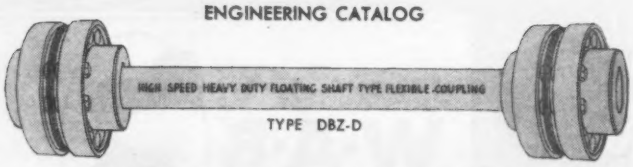

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compared to $712,730 in 1943. Building contracts awarded in Cook County numbered 578 valued at $3,971,000 compared to 304 valued at $2,177,000 a year ago. Factory payrolls rose 29.5 per cent and the number of workers 8 per cent. Electric power consumption was up 8.7 per cent.

•

• Warning that the steel cylinder supply situation is becoming critical was contained in an appeal by the National Ammonia Division of E. I. du Pont de Nemours & Co. to industrial consumers to empty and return the cylinders in which they receive ammonia promptly. Cylinder manufacturers right now are hard pressed making torpedo housings, bombs, shells and other war materials. The supply of cylinders is adequate to handle all requirements if they are kept moving between consumer and producer. It is unnecessary for users to maintain large inventories of ammonia stored in the shipping containers.

Surplus Property Policy Board Meetings

Washington

• • • **Surplus Property** Administrator W. L. Clayton held the first meeting of the Surplus War Property policy board on March 2 at which time organization plans were discussed.

The following agency heads were invited to membership with the option of choosing representatives of their agencies:

Maj. Gen. Philip Fleming, administrator of Federal Works Agency; Leo T. Crowley, administrator, Foreign Economics Administration; Maury Maverick, chairman, Smaller War Plants Corp.; Sam Husband, director, Reconstruction Finance Corp.; Admiral Emory S. Land, War Shipping Administrator; Donald M. Nelson, chairman, WPB; Harold D. Smith, director, Bureau of the Budget; Marvin Jones, War Food Administrator; Charles P. Taft, chief, Wartime Economic Affairs, State Department; John Sullivan, assistant secretary, Treasury; Maj. Gen. Lucius Clay, director of material, War Department, Army Service Forces; Capt. Lewis L. Strauss, assistant chief of procurement and material for industrial readjustment, Navy Department; Francis Biddle, Attorney General; and L. W. Pogue, chairman of the Civil Aeronautics Board.

Marketers Plan Fact Forum

Newark, N. J.

• • • **The Industrial Marketers** of New Jersey have planned a Fact Forum for the Future, with an all day meeting on March 21, at the Essex House in Newark.

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A prominent manufacturer of gears and axles prefers and specifies Follansbee's PRE-Forged steels for such jobs as this ring gear. The reason for Follansbee's selection is the ability to deliver the same high quality steel required—*shipment after shipment.*

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Seized Patents Deal With Non-Ferrous Metals

• • • This is the eighteenth list of seized enemy patents available on license from the Alien Property Custodian. These patents are grouped in classes. In the following lists, subclass numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationality, and the date the patent was issued.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time rules and procedures for obtaining the patents were described along with full information about their usage and possibilities. Seized patent applications were listed in THE IRON AGE on July 8.

Class 75—Metallurgy

(133) 2,241,742. Process of producing alkaline-earth molybdates in lumps. G. Schuphaus, Germany. 5-13-41.

(134) 2,270,594. Soldering alloy. J. Leuser, Germany. 1-20-42.

(135) 2,143,217. Process for reducing the grain in precious metals and their respective alloys. W. Truthe, Germany. 1-10-39.

(135) 2,149,257. Method for production of beryllium-copper alloys. H. Gruber, Germany. 3-7-39.

(135) 2,251,088. Process for the production of alloys containing beryllium. H. von Zeppelin, Germany. 7-29-41.

(135) 2,251,089. Process for the production of alloys containing beryllium. H. von Zeppelin, Germany. 7-29-41.

(136) 1,742,417. Production of metal alloy and of articles made thereof. W. Schrobsdorff, Germany. 1-7-30.

(136) 1,803,882. Metal composition partially produced by a process for condensing or consolidating a powdered metallic aggregation or coherent mass of powdered particles, or sintered metal body. R. Walter, Germany. 5-5-31.

(136) 1,811,068. Alloys characterized by great resistance to wear and adapted for use on tools for cutting. R. Walter, Germany. 6-23-31.

(136) 1,840,457. Method of making the carbides of the relatively infusible metals. H. Lohmann, Germany. 1-12-32.

(136) 1,847,617. Hard alloy. K. P. zu Lowenstein and W. Muller, Germany. 3-1-32.

(136) 1,864,567. Alloy of azotized character. R. Walter Germany. 6-28-32.

(136) 1,992,372. Hard metal alloy. J. Holzberger, Germany. 2-26-35.

(136) 2,018,752. Alloy of tungsten carbide with some other metal of lower melting temperature or with a plurality of metals of the iron and chromium groups respectively. R. Walter, Germany. 10-29-35.

(136) 2,036,245. Metals and alloys of the iron and chromium group in association with previously unknown nitrogen compounds. R. Walter, Germany. 4-7-36.

(136) 2,056,604. Process for increasing the resistance against corrosion of aluminum and aluminum alloys. W. Guertler, Germany. 10-6-36.

(136) 2,059,041. Hard metallic alloys for implements and tools. K. Schroter and K. Moers, Germany. 10-27-36.

(136) 2,077,239. Hard metal alloys produced by melting or sintering and adapted for the manufacture of tools and working implements. J. Hinnuber, Germany. 4-13-37.

(136) 2,116,400. Hard substance alloy. P. Marth, Germany. 5-3-38.

(136) 2,121,448. Hard metal compositions comprising in preponderating amount one or more highly refractory carbides and which are manufactured by pressing and sintering a pulverized mixture. G. Ritzau, Germany. 6-21-38.

(136) 2,123,046. Sintered hard metal alloys. J. Hinnuber, Germany. 7-5-38.

(136) 2,128,146. Sintered hard metal alloys. J. Hinnuber, Germany. 8-23-38.

(136) 2,162,574. Hard metal alloy. W. Dawihl, and K. Schroter, Germany. 6-13-39.

(136) 2,166,795. Sintered hard alloy for machining hard castings. R. Chelius, Germany. 7-18-39.

(136) 2,169,090. Sintered hard metal alloy. W. Dawihl and K. Schroter, Germany. 8-8-39.

(136) 2,246,166. Sintered hard-metal alloy

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NEWS OF INDUSTRY

for implements and tools. W. Dawihl and K. Schroter, Germany. 6-14-41.

(136) 2,265,909. Cutting and grinding tools. W. Dawihl, Germany. 6-9-42.

(136) 2,317,786. Plates and bodies to be applied on iron tools and machine members. H. Lubbe, Germany. 4-27-43.

(137) 1,740,009. Manufacture of tools of tungsten. O. Diener, Germany. 12-17-29.

(137) 1,800,122. Process for producing articles of refractory metal alloys. H. Voigtlander and O. Kaufels, Germany. 4-7-31.

(137) 1,829,950. Process for the manufacture of difficult melting heavy metals. H. Voigtlander and O. Kaufels, Germany. 11-3-31.

(137) 1,855,994. Process for manufacturing shapes from nomogeneous alloys of great hardness. E. Schnebel, Germany. 4-26-32.

(137) 2,056,708. Process of producing hard metal alloys. G. Boecker, Germany. 10-6-36.

(137) 2,116,399. Process for making shaped bodies from hard substances. P. Marth, Germany. 5-3-38.

(137) 2,224,595. Method for producing cutting tools. W. Dawihl and K. Schroter, Germany. 12-10-40.

(138) 1,899,465. Aluminum alloy with a percentage of silver, or silver and copper, essentially characterized by a percentage of thallium. O. Kamps, Germany. 2-28-33.

(138) 2,257,988. Process of producing aluminum alloys. R. Suchy and H. Seliger, Germany. 10-7-41.

(139) 2,076,281. Aluminum alloy and article made therefrom. H. Steudel and H. Wiechell, Germany. 4-6-37.

(141) 2,109,117. Aluminum alloy. Y. Matuenaga, Japan. 2-22-38.

(141) 2,116,273. Aluminum alloy. Y. Matuenaga, Japan. 5-3-38.

(141) 2,116,275. Aluminum alloy. Y. Matuenaga, Japan. 5-3-38.

(141) 2,118,686. Aluminum alloy containing, besides aluminum, copper and zinc as alloying metals. H. Steudel and H. Wiechell, Germany. 5-24-38.

(141) 2,166,495. Aluminum alloys. I. Igarashi and G. Kitahara, Japan. 7-18-39.

(142) 1,831,584. Light metal alloy. J. Weiss, Austria. 11-1-31.

(142) 2,039,458. Aluminum alloys. J. Schulte, Germany. 5-5-36.

(142) 2,090,894. Aluminum alloy. Y. Matuenaga, Japan. 8-24-37.

(142) 2,166,496. Aluminum alloys. I. Igarashi and G. Kitahara, Japan. 7-18-39.

(142) 2,228,013. Light metal alloy parts. K. Matthaes, Germany. 1-7-41.

(142) 2,252,361. Aluminum alloy rivet. H. Bothmann, and W. Mannchen, Germany. 8-12-41.

(143) 2,215,444. Aluminum alloy as bearing metal. E. Vaders, Germany. 9-17-40.

(146) 2,116,274. Aluminum alloy. Y. Matuenaga, Japan. 5-3-38.

(146) 2,184,693. Free cutting alloys. A. Beck and H. Bohner, Germany. 12-26-39.

(146) 2,261,210. Aluminum base alloy. A. Beck, G. Siebel and H. Vosskuhler, Germany. 11-4-41.

(147) 1,747,796. Non-corrodible aluminum alloy. H. Schorn, Germany. 2-18-30.

(147) 1,870,732. Anto-corrosive aluminium light alloy. I. Iytaka, Japan. 8-9-32.

(147) 2,090,895. Aluminium alloy. Y. Matuenaga, Japan. 8-24-37.

(147) 2,112,703. Process for making alloys of magnesium and aluminum. A. Luschenowsky, Germany. 3-29-38.

(147) 2,137,639. Light metal alloy. H. Steudel and H. Wiechell, Germany. 11-22-38.

(147) 2,139,246. Castings of aluminium alloys. P. Spitaler, Germany. 12-6-38.

(147) 2,184,692. Free cutting alloys. A Becka and H. Bohner, Germany. 12-26-39.

(147) 2,186,394. Castings of aluminum alloys. P. Spitaler, Germany. 1-9-40.

(148) 1,691,532. Solder for aluminum. O. Spengler, Germany. 11-13-28.

(148) 2,196,236. Aluminum alloy as bearing metal. E. Vaders, Germany. 4-9-40.

(148) 2,215,442. Aluminum alloy as bearing metal. E. Vaders, Germany. 9-17-40.

(148) 2,215,443. Aluminum alloy as bearing metal. E. Vaders, Germany. 9-17-40.

(148) 2,215,445. Aluminum alloy as bearing metal. E. Vaders, Germany. 9-17-40.

(149) 1,939,890. Structural material capable of withstanding halogen hydracids. H. Frischer, Germany. 12-19-33.

(150) 2,025,614. Process for producing beryllium alloys. W. Rohn, Germany. 12-24-35.

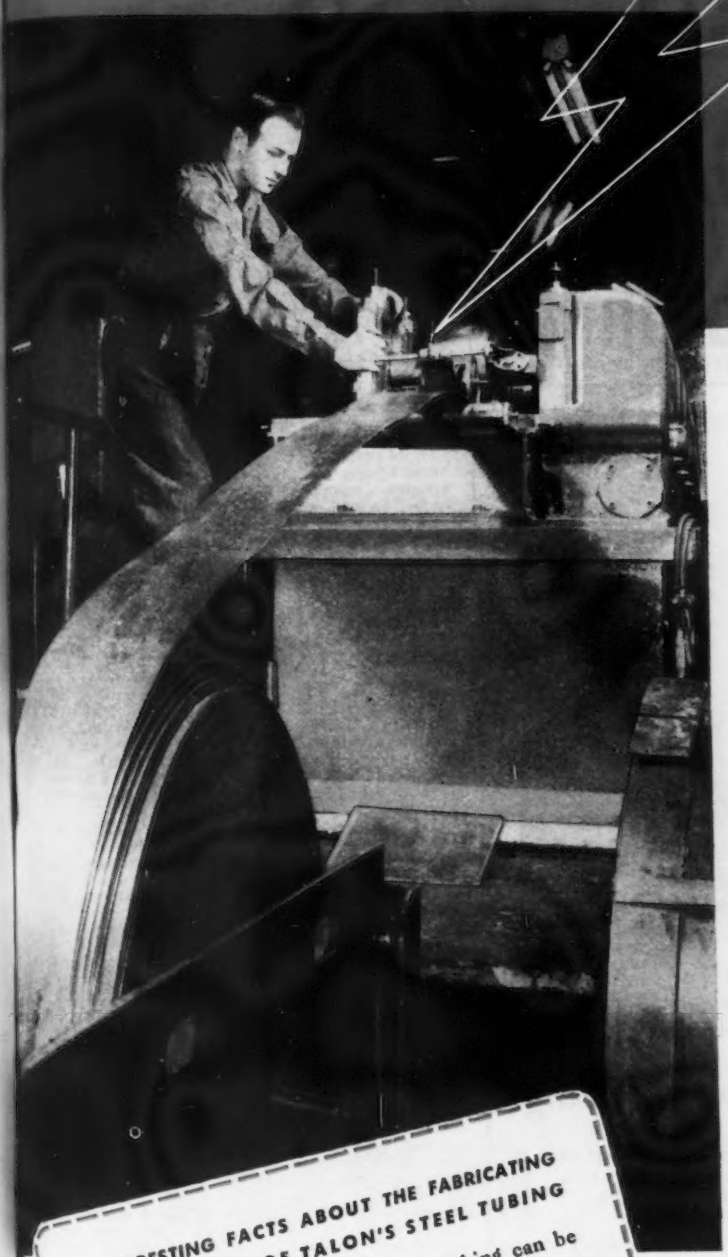
(150) 2,025,615. Process for producing beryllium alloys. W. Rohn, Germany. 12-24-35.

(150) 2,025,616. Process for producing beryllium alloys. W. Rohn, Germany. 12-24-35.

(153) 1,675,008. Process for the manufacture of copper alloys. O. von Rosthorn, Austria. 6-26-28.

(153) 2,170,431. Alloy and a composite body containing this alloy, which is in particular

Photograph—Operator checks position of strip as it enters forming rolls. In a matter of seconds, it will emerge at the other end as a welded piece of uniform Talon's Tubing.



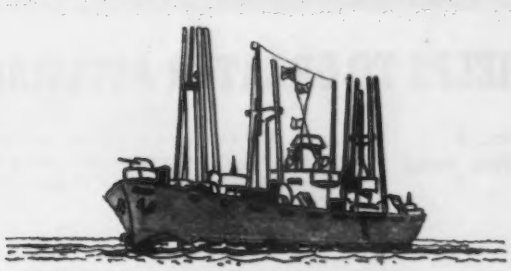
Uniformity of TALON'S Electric Welded Tubing Assured By Careful Selection of Strip Steel

● In the manufacture of Talon's Electric Welded Steel Tubing, coiled, flat stock feeds continuously through forming rolls which shape the strip into a round. Then the butted edges pass under the electric resistance welding unit to form a continuous tube wall.

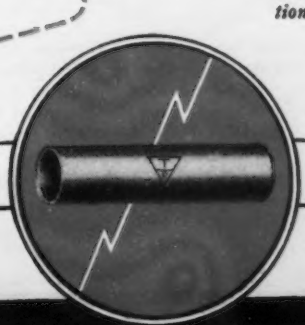
Careful selection of strip assures correct wall thickness, concentricity, and accurate size in the finished tubing. Talon checks each coil for accuracy of gauge and width and condition of surface. The analysis, hardness, and microstructure of the steel are also checked at regular intervals. That is why Talon's Tubing will meet the requirements of your particular application. Your inquiries will receive immediate and careful attention.

INTERESTING FACTS ABOUT THE FABRICATING ADVANTAGES OF TALON'S STEEL TUBING

Change of Section . . . Talon's Tubing can be beaded, expanded, swaged, spun, flanged, upset, grooved, rolled, fluted, flattened, tapered, and otherwise changed in cross-section to meet an endless variety of design requirements.



Talon's Tubing is equal to the tough jobs for which it is used. It is dependable in our ocean-going vessels where long tie-ups for tube replacements must be avoided as much as possible. And remember, Talon's rigid inspection assures this long tube life and less maintenance.



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STEEL TUBE DIVISION **OIL CITY, PENNA.**

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LUBRICATOR

Positive, never-failing force-feed bearing lubrication. Design flexibility also enables power takeoff from machine to front, rear, side or bottom by ratchet or rotary means. For complete information write, stating number of feeds and drive desired.

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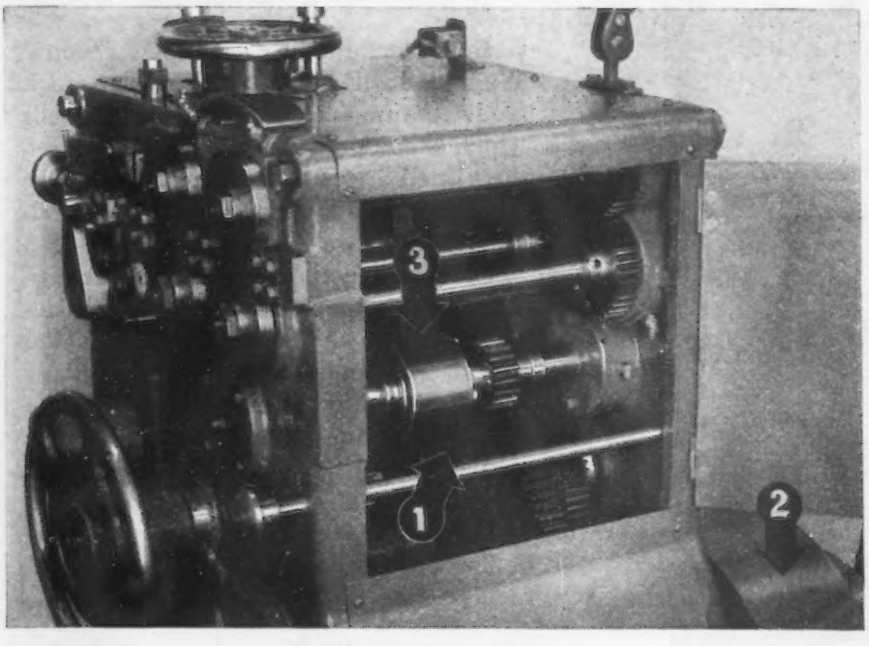

HELPS TO GREATER ACCURACY *in Spring Coiling*

No. 1 Wire Feed

Possession of a Torrington Spring Coiler is the first step to greater accuracy in Spring Coiling. Then comes correct operation and maintenance of your Torrington Coiler.

So that our customers may get the full benefit of the precision built into these coilers, we will publish during 1944 a series of advertisements incorporating suggestions for preventive maintenance and important operating hints. The first of these follow:

1. Movement of the crank gear adjustment block will cause inaccuracy. Always be sure to lock the feed adjustment.

2. Make certain that the start and stop clutch on the machine is not slipping, as this causes irregular operation. Slippage is easily remedied by pulling a spring loaded pin and turning up the clutch adjusting ring to tighten. Adjustment is made from outside the clutch without the use of any tools.

3. A gummy free wheeling clutch, excessive wear in this clutch, or wear in the segment or crank gear, are prime causes of inaccuracy.

April 20th—More about *Wire Feed*

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

suitable as electrical contact material. H. Schwarzkopf, Austria. 8-22-39.

(153) **2,172,639.** Copper base alloys, particularly a copper-beryllium alloy containing an addition element adapted to give the copper-beryllium alloy a number of improved characteristics. W. Hessenbruch, Germany. 9-12-39.

(153) **2,228,310.** Method of producing beryllium alloys. H. Gruber, W. Hessenbruch, and W. Rohn, Germany. 1-14-41.

(154) **1,718,502.** Copper-aluminum alloy. E. Vaders, Germany. 6-25-29.

(154) **1,903,192.** Alloy of nickel, silver, tin, and copper. R. Ozlberger, Austria. 3-28-33.

(155) **1,699,665.** Brass composition and process of producing the same. O. Junker, Germany. 1-22-29.

(155) **1,792,944.** Copper-silicon alloy. E. Vaders, Germany. 2-17-31.

(155) **2,144,993.** Copper-zinc alloys. W. Muller and M. Niessner, Austria. 1-24-39.

(155) **2,156,348.** Copper-zinc alloys. W. Muller and M. Niessner, Austria. 5-2-39.

(155) **2,206,109.** Copper-zinc alloys. W. Muller and M. Niessner, Austria. 7-2-40.

(155) **2,245,459.** Copper alloy, the composition of which while being similar to that of brass alloys, special brass alloys or aluminum bronzes, respectively, differs from the said known alloys both by its contents of phosphorus and by the fact that its quality is improved by a cold working operation. G. Buhler, Germany. 6-10-41.

(158) **1,876,262.** Alloy with copper as primary metal. G. Pemetzrieder, Germany. 9-6-32.

(159) **1,975,216.** Copper base alloy. J. Wecker, Germany. 10-2-34.

(168) **2,226,549.** Magnesium alloy of the class containing aluminium, cadmium, and a third element, which may be bismuth. A. Burkhardt and R. Knabe, Germany. 12-31-40.

(168) **2,226,550.** Magnesium alloy of the class containing aluminium, cadmium, and a third element, which may be bismuth. A. Burkhardt and R. Knabe, Germany. 12-31-40.

(160) **2,192,495.** Beryllium-copper alloys. W. Hessenbruch, Germany. 3-5-40.

(160) **2,192,496.** Beryllium-copper alloys. W. Hessenbruch, Germany. 3-5-40.

(160) **2,192,497.** Beryllium-copper alloys. W. Hessenbruch, Germany. 3-5-40.

(164) **2,030,921.** Copper-beryllium alloys. W. Hessenbruch, Germany. 2-18-36.

(165) **1,607,245.** Manufacture of metal alloys. E. Duhme, Germany. 11-16-26.

(165) **2,200,050.** Alloys, especially gold alloys, to be used for the manufacture of jewelry and rings. M. Auwarter and K. Ruthardt, Germany. 5-7-40.

(165) **2,216,495.** Manufacture of gold alloys with a content of gold below 50 per cent. O. Loebich, Germany. 10-1-40.

(165) **2,243,023.** Manufacture of purple colored gold alloy containing thorium besides aluminum and gold. L. Weiss, Germany. 5-20-41.

(165) **2,243,177.** Manufacture of purple colored gold alloy containing thorium besides aluminum and gold. L. Weiss, Germany. 5-27-41.

(165) **2,274,863.** Tarnish resistant soldering alloys which are of yellowish color and are particularly suitable for soldering yellow gold alloys. J. Leuser, Germany. 3-3-42.

(166) **1,632,604.** Bearing metal. P. Kemp and T. Kittl, Austria. 6-14-27.

(166) **1,691,931.** Bearing-metal alloy. K. Muller and W. Sander, Germany. 11-20-28.

(166) **1,691,932.** Bearing-metal alloy. K. Muller and W. Sander, Germany. 11-20-28.

(166) **1,731,021.** Bearing-metal alloy. K. Muller and W. Sander, Germany. 10-8-29.

(166) **1,754,364.** Bearing metal of the ternary lead-tin-antimony system containing a high percentage of lead. P. Kemp, Austria. 4-15-30.

(166) **1,795,633.** Lead-bearing alloy containing copper and nickel. E. Abel, Austria. 3-10-31.

(166) **1,807,788.** Alloy of lead and antimony. P. Kemp, Austria. 6-2-31.

(166) **1,939,799.** Lead of high resistance against the action of hot sulphuric acid. T. Wallis and O. Falek, Germany. 12-19-33.

(166) **2,212,178.** Alloy suitable for use as bearing metals. P. Kemp, Germany. 8-20-40.

(167) **1,804,883.** Alloy metal for bearings. W. Mathesius and M. Neufeld, Germany. 5-12-31.

(168) **1,941,039.** Magnesium alloy. A. Luchenowsky, Germany. 12-26-33.

(168) **2,159,964.** Magnesium alloy. A. Burkhardt and R. Knabe, Germany. 5-30-39.

(168) **2,204,567.** Magnesium alloy of high strength. A Burkhardt and R. Knabe, Germany. 6-18-40.

(168) **2,231,881.** Magnesium alloy. A Burkhardt, and R. Knabe, Germany. 2-18-41.

(168) **2,251,266.** Magnesium alloy. A. Burk-

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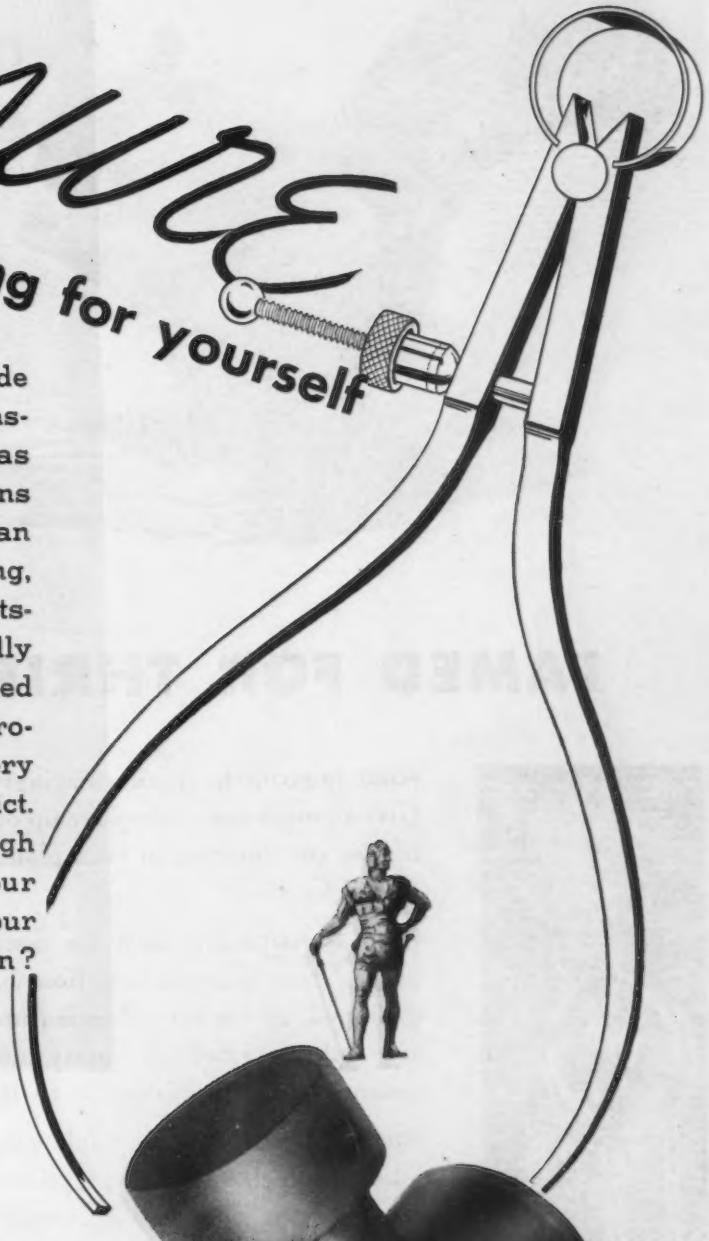
the machine time saving for yourself

These photographs were made in the same focus. It is easy to measure how very little machining was required, easy to see that thin sections and intricate shapes can be had in Titan Hot Pressed Parts. Titan Engineering, Titan metallurgical control, Titan craftsmanship, Titan personalized, friendly service combine to make hot pressed parts that will help you increase production, decrease your costs and very likely improve your finished product. Titan will deliver parts in the rough or entirely machined ready for your assembly line. Why not send us your blueprints—you'll get quick action?



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WELDING RODS

hardt and R. Knabe, Germany. 8-5-41.

(168) 2,273,831. Magnesium alloy. A. Burkhardt, R. Knabe and K. Riederer, Germany. 2-24-42.

(168) 2,305,825. Magnesium alloy. A. Burkhardt and K. Riederer, Germany. 12-22-42.

(169) 2,218,755. Composition of matter and method of preparation. H. Kaufmann, Germany. 10-22-40.

(170) 1,772,771. Magnetic alloy. B. Fetkenheuer and H. Neumann, Germany. 8-12-30.

(170) 1,857,970. Magnetic alloy of high permeability. H. Neumann and H. Kuhlewein, Germany. 5-10-32.

(170) 2,062,130. Heat treatable nickel-beryllium alloys. W. Hessenbruch, Germany. 11-24-36.

(171) 1,942,150. Alloy for surgical needles. W. Rohn, Germany. 1-2-34.

(171) 2,067,569. Heat resisting implements. W. Hessenbruch, Germany. 1-12-37.

(171) 2,075,718. Heat-resisting implement. W. Hessenbruch, Germany. 3-30-37.

(171) 2,090,044. Alloys which are especially suitable for the cutting edges of tools for lathes. W. Hessenbruch, Germany. 8-17-37.

(171) 2,104,835. Heat-resisting implement. W. Hessenbruch, Germany. 1-11-38.

(171) 2,104,836. Heat-resisting implement. W. Hessenbruch, Germany. 1-11-38.

(171) 2,190,781. Alloys resistant to burning and scaling. W. Guertier, Germany. 2-20-40.

(172) 2,123,330. Palladium alloy. O. Feussner, Germany. 7-12-38.

(173) 1,863,612. Chemically resistant silver alloy. P. Assmann, Germany. 6-21-32.

(173) 1,863,645. Chemically resistant silver alloy. P. Assmann, Germany. 6-21-32.

(173) 2,259,668. Tarnish resistant silver alloy. J. Spanner, Germany. 10-21-41.

(176) 1,652,027. Process for the manufacture of very hard metallic alloys. H. Lohmann, Germany. 12-6-27.

(176) 2,072,368. Tungsten-base alloy for points of gold nibs. A. Jedele, Germany. 3-2-37.

(176) 2,072,676. Tungsten-base alloy. A. Jedele, Germany. 3-2-37.

(176) 2,074,474. Tungsten base alloy for points of gold nibs. A. Jedele, Germany. 3-23-37.

(177) 2,235,508. Process for producing alloys containing zirconium. H. von Zeppelin, and L. Teichmann, Germany. 3-18-41.

(178) 1,703,577. Tungsten alloy. H. Falkenberg, Germany. 2-26-29.

(178) 2,070,474. Zinc alloy. A. Dacco, Italy. 2-9-37.

(178) 2,166,338. Deep-drawing zinc alloy. K. Bayer and A. Burkhardt, Germany. 7-18-39.

(178) 2,166,340. Plastic zinc alloy of constant dimensions. A. Burkhardt, Germany. 7-18-39.

(178) 2,166,341. Machinable plastic zinc alloy. A. Burkhardt and W. Wolf, Germany. 7-18-39.

(191) 1,736,053. Nickel-chromium-iron alloy and articles made therefrom. W. Rohn, Germany. 11-19-29.

(0.5) 2,234,127. Process of manufacture of a metallurgical product intended to be melted for forming a metal or an alloy. R. Mautsch, Belgium. 3-4-41.

(1) 1,947,656. Ledeburitic, preliminary iron alloy free from graphite. J. Novak and R. Kesselring, Czechoslovakia. 2-20-34.

(1) 1,966,480. Method of prepariny alloys. P. Berthelemy, H. de Montby and J. Pouvreau, France. 7-17-34.

(1) 1,966,481. Homogeneous antimony-bismuth alloy. P. Berthelemy, H. de Montby and J. Pouvreau, France. 7-17-34.

(1) 1,977,182. Corrosion-resisting ferrous alloy adapted for forging and casting purposes. M. Fould, France. 10-16-34.

(1) 2,027,763. Process of making hard sintered metals. G. Boecker, Germany. 1-14-36.

(3) 2,177,228. Method of preparing ore briquettes. O. Seidl, Hungary. 10-24-39.

(5) 1,866,203. Agglomeration of finely-divided ferruginous ores, concentrates and the like. A. Folliet and N. Sainderichin, France. 7-5-32.

(5) 1,916,863. Method and apparatus for agglomerating metalliferous masses. A. Kroll, Luxemburg. 7-4-33.

(6) 2,132,149. Recovery of metals by direct reduction of their ores. E. Edwin, Norway. 10-4-38.

(8) 1,789,895. Roasting and/or sintering of fine ores or other fine materials. A. Fassote, Belgium. 1-20-31.

(8) 1,828,241. Blende sintering process. L. Boscheron, Belgium. 10-20-31.

(10) 2,142,090. Refining of cathode copper. L. Bercovici, Belgium. 1-3-39.

(10) 2,198,914. Treatment of materials containing tantalum and niobium. J. Leemans, Belgium. 4-30-40.

(12) 1,686,075. Process of making synthetic

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pig iron. E. Edwin, Norway. 10-2-28.

(14) 1,618,316. Process of electric smelting. F. Tharaldsen, Norway. 2-22-27.

(14) 1,924,034. Process for the continuous conversion of ferruginous materials into spongy metallic agglomerates. A. Folliet and N. Sainderichin, France. 8-22-33.

(18) 1,950,000. Process for the treatment of ores containing lead. P. Gamichon, France. 3-6-34.

(18) 1,963,893. Process for the production of metals in a finely divided state. E. Drouilly, France. 6-19-34.

(21) 2,140,800. Treatment of substances containing tantalum and/or niobium. J. Leemans, Belgium. 12-20-38.

(22) 2,289,787. Production of shaped articles from metal powder. K. Kaschke, and H. Vogt, Germany. 7-14-42.

(24) 1,784,490. Process for the recovery of the tin contained in the residues of tin-plate manufacture. J. Laley, France. 12-9-30.

(26) 2,168,597. Process and apparatus for the direct production of steel and other metal from ore. A. Auriol and A. Auriol, Belgium. 8-8-39.

(27) 1,762,250. Iron oxides and their production. C. Delachaux, France. 2-19-29.

(28) 2,164,727. Process for the production of low carbon steel. S. Westberg, Norway. 7-4-39.

(30) 1,897,881. Process for the simultaneous manufacture of iron or its carbide compounds and of portland cement or hydraulic limes. L. Basset, France. 2-14-33.

(30) 2,067,373. Process for the manufacture of iron or steel and Portland cement in a rotary furnace. L. Basset, France. 1-12-37.

(33) 1,714,767. Process for the reduction of metallic oxides. A. Cousin, Belgium. 5-28-29.

(37) 1,885,923. Continuous process for the treatment of iron and other ores.

(38) 2,107,980. Method for preparing iron and steel. J. Elian, France. 2-8-38.

(39) 1,759,753. Method for working up iron ores in a direct way. A. Ledeboer, France. 5-20-30.

(40) 1,689,734. Process of direct reduction of iron ores. T. Levoz, Belgium. 10-30-28.

(40) 2,182,009. Method of reducing ore, particularly iron ore. F. Wiberg, Sweden. 12-5-39.

(40) 2,320,206. Reaction method between liquids or between solid and liquid substances. W. Engel and N. Engel, Denmark. 5-25-43.

(41) 2,254,660. Treatment of ferriferous ores. K. Koller and Z. Galocsy, Hungary. 9-2-41.

(42) 2,219,046. Treatment of iron ores. K. Koller and Z. Galocsy, Hungary. 10-22-40.

(45) 1,954,922. Method for the aluminothermic preparation of air quenching steel. C. Delachaux, France. 4-17-34.

(46) 2,303,064. Process for simultaneously dephosphorizing and deoxidizing steel, R. Perrin, France. 11-24-42.

(52) 1,826,497. Process for dephosphorizing iron in the converter and means for carrying out said process. F. Bicheroux, Belgium. 10-6-31.

(52) 2,104,890. Process of separating from pig-iron the vanadium contained therein. N. Wark, Netherlands. 1-11-38.

(54) 2,147,205. Process for dephosphorizing and desulphurizing steel. R. Lemoine, France. 2-14-39.

(54) 2,147,206. Process for dephosphorizing and desulphurizing steel. R. Lemoine, France. 2-14-39.

(54) 2,310,865. Process for effecting metallurgical reactions regularly and rapidly. R. Perrin, France. 2-9-43.

(55) 2,288,836. Process for economically and rapidly obtaining high quality steels. R. Perrin, France. 7-7-42.

(63) 2,133,327. Process for refining lead which contains bismuth. L. Jollivet, France. 10-18-38.

(63) 2,198,673. Process for the manufacture of aluminum. H. Loevenstein, France. 4-30-40.

(67) 1,698,647. Purification of magnesium and its alloys. G. Michel, France. 1-8-29.

(67) 2,091,639. Process for the melting, refining, and casting of magnesium and its alloys. A. Jessup, France. 8-31-37.

(68) 2,073,018. Process for the treatment of light metals and their alloys. H. Lepp, France. 3-9-37.

(68) 2,206,562. Process for the manufacture of aluminum. H. Gentil, France. 7-2-40.

(71) 2,112,191. Process for purifying metallic cadmium. A. Fassotte and R. Favre, Belgium. 3-22-38.

(75) 1,971,815. Treatment of sulphurous iron ores, for the purpose of obtaining sulphur and iron and other valuable products. B. Halvorsen, Norway. 8-28-34.

(76) 1,919,699. Process for the refining of black copper. J. Leemans, Belgium. 7-25-33.

(76) 2,073,020. Method of improving the

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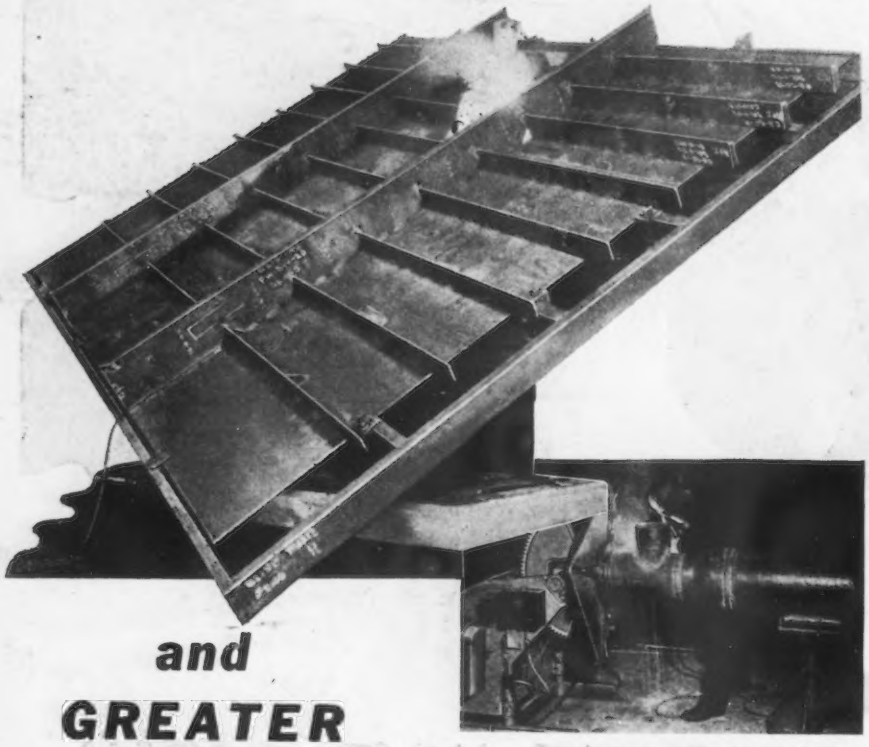

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The large photograph shows how a battery of Ransome 16,000 lb. capacity positioners is used in the shops of the Harris Structural Steel Company in New Market, New Jersey. The work shown is a pre-fabricated ship section. Notice the holding cradle which is bolted to the positioner table top. The weldment is quickly clamped to the cradle for all down-hand position welding.

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WP4-3

Capacities 500-lb. to 40,000-lb., hand-operated and motor-operated . . . Head-stocks and Tail-stocks . . . Turning Rolls

physical and mechanical properties of alloys. H. Lepp, France. 3-9-37.

(78) 1,914,788. Method of refining lead for use thereof in antifriction alloys containing other metals which are not adapted to be alloyed with lead. A. Ricard and L. Daniel, France. 6-20-33.

(78) 2,110,445. Process for purifying impure lead. F. Leferrer, France. 3-8-38.

(78) 2,110,446. Process for purifying impure lead. F. Lefe.rer, France. 3-8-38.

(84) 2,166,659. Process for the treatment of beryllium ores. D. Gardner, France. 7-18-39.

(82) 1,826,583. Process of metallurgical treatment. C. Thurneyssen, France. 10-6-31.

(83) 1,808,594. Process for separating platinum from the other precious metals. G. Collard, France. 6-2-31.

(84) 2,205,854. Method for manufacturing titanium and alloys thereof. W. Kroll, Luxemburg. 6-25-40.

(85) 1,826,552. Extraction of tin from ores, alloys, scrap or the like. L. Lamy, E. Mathieu and L. Gagnaux, France. 10-6-31.

(86) 1,712,641. Process for extracting metals from their compounds. C. Aarts, Netherlands. 5-14-29.

(87) 1,813,042. Process for the treatment of zinciferous and composite ores, by the volatilization of metallic elements. A Folliet and N. Sainderichin, France. 7-7-31.

(88) 1,647,381. Process for making liquid zinc from blue powder. F. Tharaldsen, Norway. 11-1-27.

(88) 2,238,819. Process for the condensation of zinc vapors. P. Neve, Belgium. 4-15-41.

(91) 1,638,684. Reduction process using circulating reducing gases. E. Edwin, Norway. 8-9-27.

(92) 1,797,700. Process for smelting sulphide ores to metal, matte, and slag. H. Skappel, Norway. 3-24-31.

(93) 2,073,019. Process for the purification of metals and metallic alloys. H. Lepp, France. 3-9-37.

(93) 2,128,444. Process for the purification of molten metals. E. Vroonen, Belgium. 8-30-38.

(94) 1,819,064. Operation of blast furnaces. E. Baumgartner, Czechoslovakia. 8-18-31.

(97) 1,642,574. Method for separating the components of alloys. C. Bossiere, France. 9-13-27.

(105) 2,273,569. Process for the recovery of silver. A. Goette, Germany. 2-17-42.

(103) 2,290,313. Process for separating nickel and cobalt in solutions. M. Caron, Netherlands. 7-21-42.

(110) 1,905,460. Process for converting into soluble salts lead and other metals contained in lead bearing ores. P. Gamichon, France. 4-25-33.

(117) 2,168,542. Process for extracting ores and the like. A. van Es, Netherlands. 8-8-39.

(119) 1,783,046. Process for the separation of cobalt and iron from solutions rich in iron as obtained by lixiviating roasted pyrites. N. Lenander, Norway. 11-25-30.

(121) 2,274,237. Process for the removal of metallic magnesium from mixtures of beryllium and magnesium. G. Jaeger and A. Rudert, Germany. 2-24-42.

(122) 2,091,950. Process for the preparation of alloys containing boron. J. Andrieux, France. 9-7-37.

(122) 2,194,965. Process for the manufacture of complex silicon alloys. J. Andrieux, France. 3-26-40.

(122) 2,301,366. Method for increasing the temperature of the beginning recrystallization of metals and alloys. H. Bumm and H. Muller, Germany. 11-10-42.

(123) 1,890,595. Acid-proof alloys. E. Valenta, Czechoslovakia. 12-13-32.

(125) 1,876,467. Production of rust-proof or non-corrodible steel. J. Novak and R. Kesselring, Czechoslovakia. 9-6-32.

(125) 1,890,548. A pre-alloy for producing rust-proof or non-corrodible steel. J. Novak and R. Kesselring, Czechoslovakia. 12-13-32.

(125) 1,727,775. Alloy-steel building material. W. Hulsbruch, Germany. 9-10-29.

(126) 2,261,851. Iron alloy for cutting tools. L. Kluger, Germany. 11-4-41.

(127) 2,035,955. Process for the production of ferro-chromium free of carbon. A. Foss, Norway. 3-31-36.

(131) 2,131,350. Treatment of substances containing tantalum and/or niobium. J. Leemans, Belgium. 9-27-38.

(133) 2,069,469. Process for the production of metals and alloys with very small contents of carbon. G. Andersen, Denmark. 2-2-37.

(133) 2,164,279. Treatment of substances containing tantalum and niobium. J. Leemans, Belgium. 6-27-39.

(135) 2,150,555. Treatment of materials containing tantalum and/or niobium. J. Leemans, Belgium. 3-14-39.

(135) 2,183,517. Treatment of materials con-

with

Wickman

SWISS TYPE AUTOMATICS

and their various attachments

In addition to normal turning and forming operations

The No. 2 Wickman machine illustrated is equipped with both three-spindle and slotting attachments. Three other attachments for drilling, threading and taper turning are also supplied for this machine. All Wickman attachments are easily interchangeable.

Do you manufacture parts which are in any way similar to those illustrated above—which require any of the operations listed? Are you interested in holding production runs of those parts to tolerances of ± .0005″ or closer and securing finishes as fine as 25 micro-inches? If your answers to these two questions are in the affirmative, Wickman Swiss Type Automatics have a place in your production.

Two Swiss Type Automatics are produced by Wickman. The No. 2 machine shown above has a ½″ bar capacity and will handle pieces up to 4″ long. The No. 1 machine has 5/32″ bar capacity, maximum length capacity of 1 9/16″.

LET US SEND YOU FULL INFORMATION

THE Wickman CORPORATION

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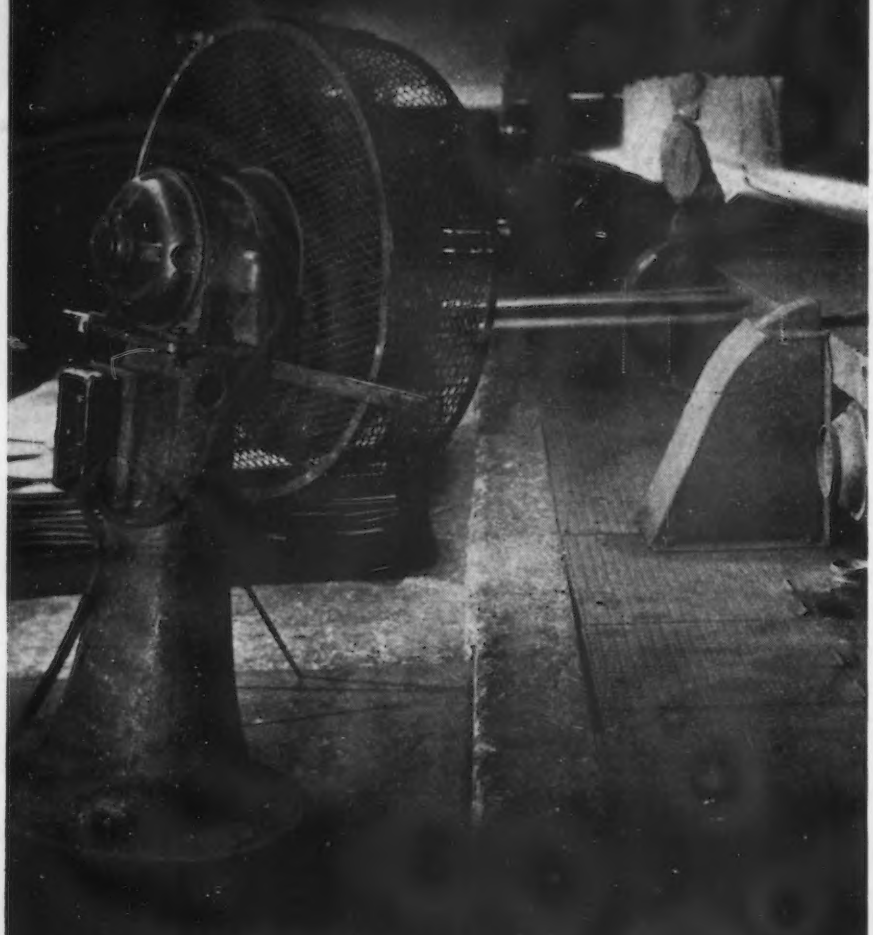
PERKINS MAN COOLERS

TRADE MARK REGISTERED UNITED STATES PATENT OFFICE



PERKINS MAN COOLERS are used successfully not only to bring comfort to workers in hot places, but also to perform cooling functions in hot manufacturing processes.

Perkins Man Coolers are made in stationary and oscillating types, both portable.

B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.

taining tantalum and niobium. J. Leemans, Belgium. 12-12-39.

(137) **2,042,684.** Method of securing a homogeneous mixture of hard materials and matrix metals. E. Schjoth, France. 6-2-36.

(137) **2,093,656.** Manufacture of bodies containing metallic carbides. G. Fodor and H. Garih, France. 9-21-37.

(138) **1,750,751.** Process for the manufacture of aluminum alloys. A. Geyer, France. 3-18-30.

(140) **2,225,938.** Alloy with artificial radio activity. O. Yadoff, France. 12-24-40.

(142) **1,680,004.** Aluminum alloy of high resistance. H. Benit, France. 8-7-28.

(142) **2,175,236.** Method of preparing an alloy having artificial radio activity. O. Yadoff, France. 10-10-39.

(147) **2,288,513.** Light and ultra-light alloys containing aluminum and magnesium. L. Canac and E. Segol, France. 6-30-42.

(147) **2,310,214.** Light and ultra-light alloys containing aluminum and magnesium. L. Canac and E. Segol, France. 2-9-43.

(148) **1,831,023.** Process of manufacture of aluminum-silicon alloys. E. Mathieu, R. Perrin, A. Greffe and S. Cavalieri, France. 11-10-31.

(150) **2,069,705.** Process of manufacture of metallic glucinum and its alloys. R. Gadeau, France. 2-2-37.

(153) **2,116,252.** Alloys for electrical contacts and electrodes. H. Schwarzkopf, Austria. 5-3-38.

(153) **2,119,965.** Alloy for electrical purposes and particularly suitable for use as an electric contact material. H. Schwarzkopf, Austria. 7-7-38.

(155) **2,256,788.** Corrosion-resistant copper-zinc alloy which is workable in the cold state. W. Muller and M. Niessner, Germany. 9-23-41.

(155) **2,259,078.** Corrosion-resistant copper-zinc alloy which is workable in the cold state. W. Muller and M. Niessner, Germany. 10-14-41.

(165) **1,917,378.** Gold alloy which has the property of being softened by tempering and hardened by annealing at low temperature and comprises a certain amount of gold according to the fineness of the alloy that is desired. L. Lenfant, France. 7-11-33.

(165) **1,946,231.** Process for the manufacture of alloys of precious metals which are amenable to heat treatment. L. Nowack, Germany. 2-6-34.

(166) **1,720,065.** Alloy for metal packings for joints and the application of same. G. Verdickt, Belgium. 7-9-29.

(166) **1,754,364.** Bearing metal of the ternary lead-tin-antimony system containing a high percentage of lead. P. Kemp, Austria. 4-15-30.

(166) **2,157,383.** Lead alloy to be used in the chemical industry. F. Cuvelliez, Belgium. 5-9-39.

(168) **2,224,151.** Magnesium alloys. G. Gauthier, France. 12-10-40.

(168) **2,305,825.** Magnesium alloy. A. Burkhardt and K. Riederer, Germany. 12-22-42.

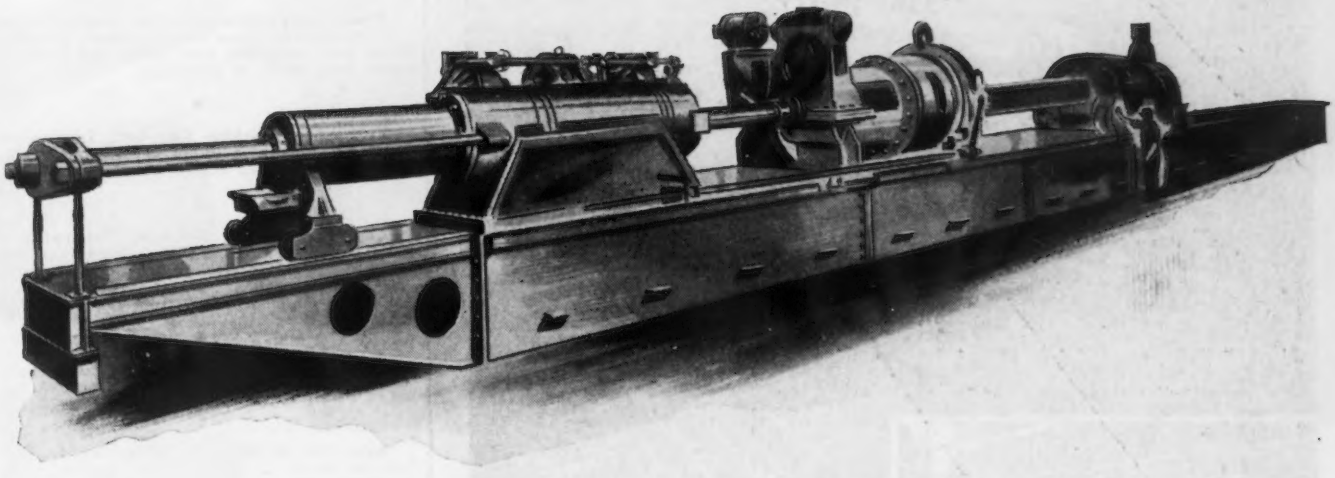
(170) **1,771,773.** Unoxidizable alloy designed particularly for the manufacture of valves and other adjusting and packing members subjected to the action of superheated steam. C. Contal, France. 7-29-30.

New WPB Steel Division Appointments Made

• • • **H. J. French has** been named assistant director for raw materials and facilities of the WPB Steel Division, it was announced on March 7. Mr. French succeeds Carl W. Meyers, who has resigned to return to his former position with the Republic Steel Corp. at Massillon, Ohio. Mr. French has been serving as chief of the WPB Metallurgical and Conservation Branch.

S. A. Crabtree, Chicago, has been appointed successor to L. E. Creighton as chief of the WPB Alloys Steel Branch. Mr. Creighton, who recently resigned, has returned to his former position with the Rotary Electric Co., Detroit. Mr. Crabtree will also continue as deputy assistant director for production.

WE'D LIKE TO WRING TOJO'S NECK ... THIS WAY



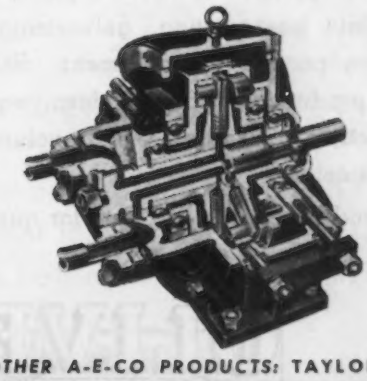
A typical application for HELE-SHAW FLUID POWER

YES, if we had our choice of means for wreaking vengeance on Tojo, this "Twister Stretcher" would get the call. It's a right handy "little" gadget (109 feet long) used in certain essential plants for taking the kinks out of structural aluminum shapes and bars.

The operator slips in an I-beam, channel, or angle and with push-button ease exerts up to a 350-ton pull on the shape, twisting it at the same time to remove any distortion.

The stretching pressure is supplied by Hele-Shaw Fluid Power generated by a Hele-Shaw Pump. Smooth stretching action and ease of control characterize the operation. Hele-Shaw Fluid Power might be equally effective for a current or future application you have in the back of your mind... for stretching, squeezing, pushing, pulling, lifting, tilting, and a long list of similar operations. Want to find out?

THE
Hele-Shaw
Fluid Power Pump



AE CO 75th ANNIVERSARY

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, LO-HED HOISTS

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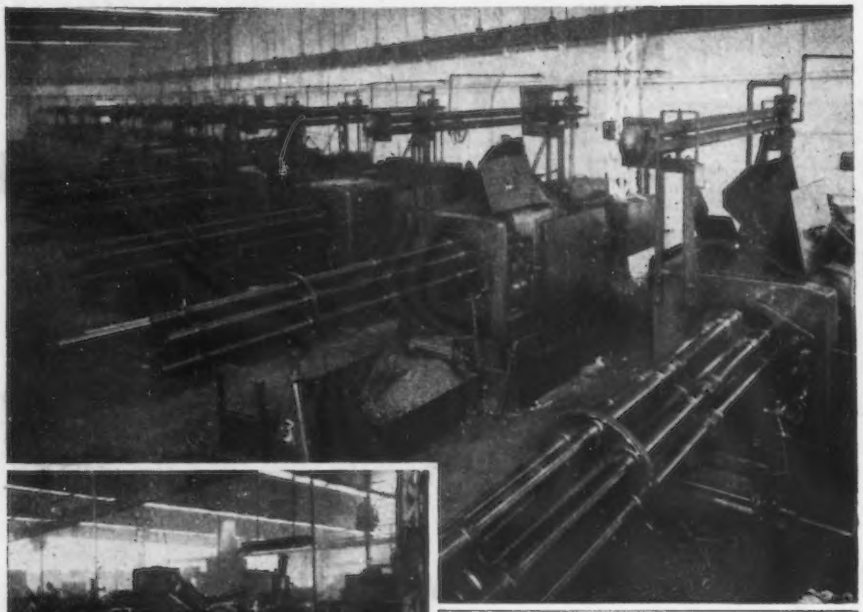
Honorably Discharged

and looking for Work!



Battery of Screw Machines capacity 1⅝" max. dia., and centerless grinders.

Available for

SUB-CONTRACTING SMALL PARTS

The above facilities, capable of sustained, economical and accurate production of small parts, are supplemented by complete heat-treating, galvanizing, plating and other modern processing equipment. Recently released from war production, this modern equipment, adequately manned, can handle a steady volume of work up to 1⅝ in. diameter.

Send blueprints and data for quotation.

OLIVER IRON AND STEEL Corporation

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH 3, PA.

Trade Notes

Harnischfeger Corp., Milwaukee, has established a separate repair sales division to facilitate service to customers on all P&H products, including electric overhead traveling cranes, hoists, a.c. and d.c. welders, welding electrodes, and welding positioners.

•

Pemco Corp., Baltimore, has just completed the entire renovation of its research facilities. New equipment has been added and additions have been made in personnel.

•

Logansport Machine Co., Inc., Logansport, Ind., has appointed the Rudel Machinery Co., Inc., 100 East 42 Street, New York, as its representative.

•

Gould Commercial Division, National Battery Co., Depew, N. Y., is shifting manufacture of aircraft batteries to a newly acquired plant in Zanesville, Ohio. New machinery as well as equipment taken from Depew will be installed.

•

Bedaux Co., Inc., New York, has changed its name to Albert Ramond and Associates, Inc.

•

Atlas Car & Mfg. Co., Cleveland, has appointed the A. J. Philpott Co., Denver, as its representative in that vicinity for storage-battery locomotives, electric industrial trucks and industrial haulage equipment.

•

Aga Metal Tube Co., Elizabeth, N. J., has changed its name to Agaloy Tubing Co. and has taken over larger quarters at Springfield, Ohio.

•

Cross Gear and Machine Co., Detroit, has changed its name to the Cross Co. to cover the company's broadened activities which include a wide range of special machine tools. There are no changes in personnel or general policies.

•

Nelson's Screw Machine Products announce the removal of its plant and executive office to West Street, Plantsville, Conn.

•

Duff-Norton Mfg. Co., Pittsburgh, manufacturers of jacks for industrial use, has removed its eastern district offices to 250 Park Avenue, New York. George L. Mayer is in charge.

•

Reliance Aircraft & Tool Co., Ltd., Belleville, Ontario, has been taken over by Reliance Industries, Ltd.

•

National Battery Co., St. Paul, will begin production on April 1 in its 11th plant situated in Sioux City, Iowa. Production in the new plant will be devoted entirely to farm-light storage batteries.

•

Chicago Alloy Products Co. has moved its plant to larger quarters at 19th Street and Washtenaw Avenue, Chicago. J. J. Chernyk now manages the business, succeeding his father, the late Ben Chernyk, president and founder. The company purchases and processes stainless steel, high speed steel, nickel and nickel alloy steel scrap.

•

The West Bend Aluminum Co., West Bend, Wis., has purchased the business and plant of Kissel Industries, Inc., Hartford, Wis., to take possession at once and operate as the Hartford division of the West Bend plant.

•

The Perfex Corp., Milwaukee, has received government approval for an addition to its main plant to cost $85,000 and increase present floor area about 15 per cent.

6" Ajax machine forging sockets in two ends of female member of Di-Lok Chain

Greater Achievements Require Greater Production From

HEAVY-DUTY FORGING MACHINES

★ Industrial Progress in almost every field of manufacture is requiring products of greater strength and toughness that can be produced to close tolerances on a high production basis. Forgings provide the great strength required, due to the grain flow being refined and shaped to the contour of the product in the forging die.

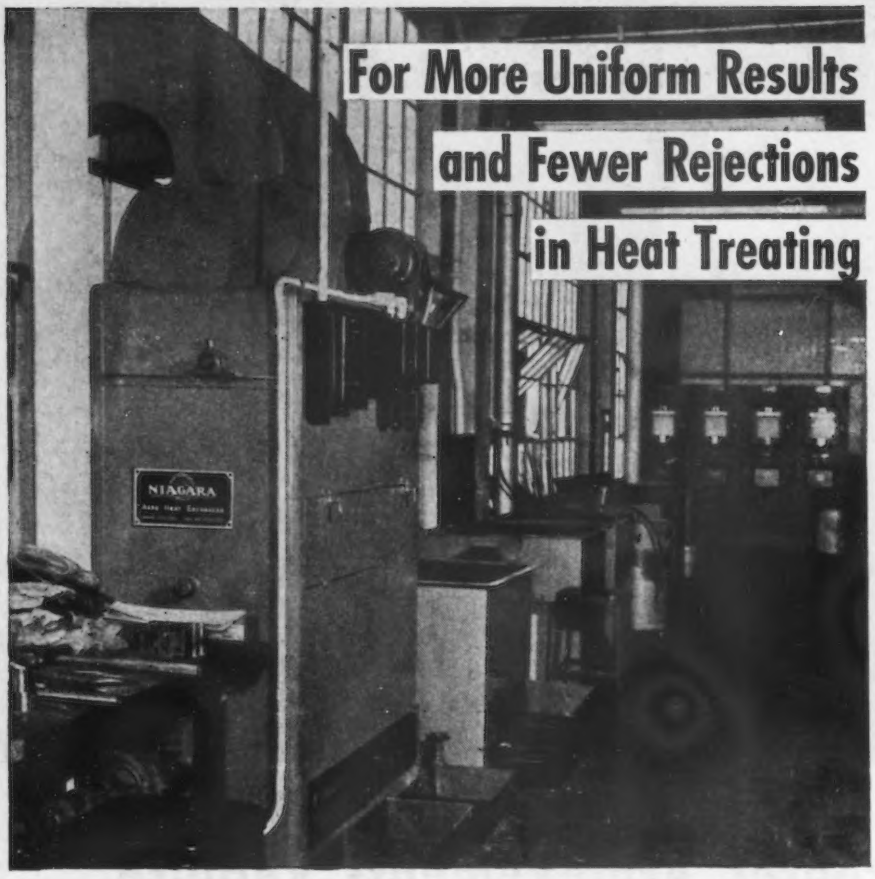
Uniformity, at a high degree of accuracy, is provided by AJAX Forging Machines due to their sound mechanical construction embodying many exclusive, patented features.

High speed production on AJAX machines is accomplished by the patented direct acting air clutch providing instantaneous response to the operation of the treadle.

Forgings such as these illustrated are being produced on AJAX Forging Machines faster, better and at less cost for manufacturers of ships, airplanes, trucks, tractors, tanks, diesels, ordnance, locomotives, agricultural machinery and other products.

Write for Bulletin 65-B

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
621 MARQUETTE BUILDING • CHICAGO, ILLINOIS



● Two years of experience with the NIAGARA *AERO* HEAT EXCHANGER as used to cool water and oil quenching baths for heat treating has proven that more accurate control of temperature pays extra dividends.

First installed by many users because it saved nearly all the cost of cooling water and the attendant piping and pumping costs, it has proved to these same users that its greatest value is in improving and increasing production by assuring more uniform, reliable operations, with more accurate hardening results and greatly decreased rejections because of more accurate control of temperatures.

If you have a problem of cooling any industrial liquid to controlled temperatures—as in quenching, machining, grinding or wire drawing coolants, or in chemicals or intermediates, or in equipment or engine jacket water, or in air compressor cooling to keep water and oil out of the lines, the NIAGARA *AERO* HEAT EXCHANGER provides accurate temperature control at lower cost.

Write for complete information

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"25 Years of Service in Air Engineering"

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INDUSTRIAL COOLING • HEATING • DRYING
HUMIDIFYING • AIR ENGINEERING *EQUIPMENT*

WPB Stops Blanket Construction Approvals

• • • **Blanket authorizations,** which have been used to permit owners of substantial industrial and commercial establishments to carry on miscellaneous routine construction during a fixed period, will no longer be issued generally, WPB announced in issuing Direction 3 to Conservation Order L-41. Such blanket authorizations will be issued hereafter only in cases where the filing of individual project applications would interfere with the war effort or cause extreme hardship to the applicant.

The necessity for blanket construction authorizations has been for the most part eliminated by (1) the recent transfer of jurisdiction over applications involving $25,000 or less to WPB field offices, (2) by simplification of WPB application procedures under Direction No. 1 to CMP Regulation No. 6, and (3) by the exception of certain types of minor capital additions from the Order L-41 construction authorization requirement.

In cases where blanket authorizations may be justified, application will be made as at present on WPB form 617 and filed with the WPB field office for projects less than $25,000; and filed with the War Production Board, Washington, D. C., if $25,000 or more. A person seeking blanket authorization, will prepare his application in the same way he would prepare it for a single job, in accordance with instructions in WPB form 617.

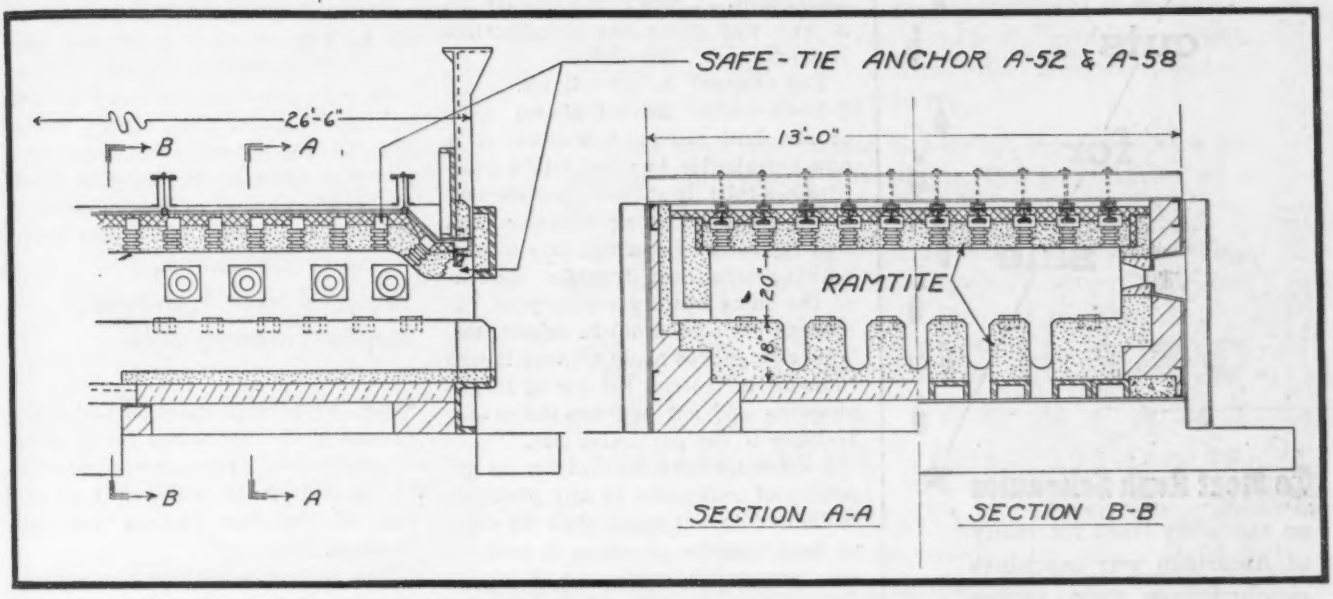
Blanket authorizations will permit the builder to do miscellaneous routine construction, but no materials may be acquired or used contrary to limitations that will be made a part of the authorization. In the case of equipment items that must be listed on the application, the builder may use only those which are specifically approved. The use of such items or deviations from the Construction Limitations will be approved only in exceptional cases.

No job for which tax amortization privileges are requested may be included in a blanket application. A separate application is to be filed for each such job at the time the request for tax amortization is made.

The new Direction 3 to order L-41 supersedes instructions outlined in the WPB letter of instruction WPBI-43 (formerly PDL-362), which has heretofore contained the rules for the granting of blanket authorizations.

RAMTITE PRODUCTS SERVE EVERY INDUSTRY USING HEAT

Just the right refractory for PLATE HEATING FURNACES



YES—Ramtite is the right refractory for plate heating furnaces . . . Because:

1. Its high refractoriness guarantees long trouble-free lining service.
2. Its monolithic surface plus good insulating value makes accurate furnace temperatures easily controlled.
3. To build a furnace of similar design with prefired shapes would be difficult, if not impossible. But, Ramtite is installed while plastic, so construction of well-engineered furnace design is easy.

Send for a bulletin describing the engineering properties of Ramtite.

RAMTITE PRODUCTS

Ramtite Plastic Refractory . . . in three grades

Fracto-Crete and Mono-Cast castable refractories

Esso Bond air set refractory mortar

Hott-Patch heat set refractory mortar

Esso (silicon carbide base) patching and ramming mixes

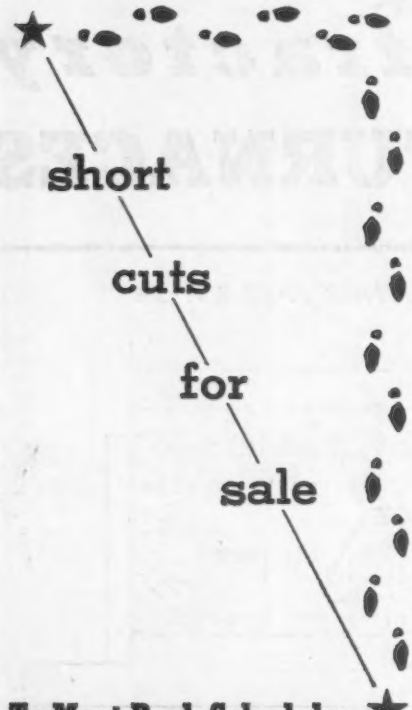
Safe-tie Refractory Anchors

THE RAMTITE CO.
Division of The S. Obermayer Co.
1805 S. ROCKWELL ST. • CHICAGO 8, ILL.

RAMTITE

PLASTIC REFRACTORY

POST WAR STRATEGY



To Meet Rush Schedules

on assembly lines for many of American war machines revolutionary time-saving methods and devices were invented here.

To Save You Steps

in your manufacture of post-war products, leave the parts production up to us.

The Specialist Can Do A Better Job For Less

U•S•AUTOMATIC

CORPORATION

Screw Machine Products

AMHERST • OHIO

Manufacturing Limits Eased on Unit Heaters

Washington

• • • To eliminate unnecessary hardship on manufacturers of unit heaters and convectors, WPB announced an amendment to schedule I to order L-107, Extended Surface Heating Equipment. Today's changes do not in any way relax the simplification restrictions of the order.

The changes are as follows:

1—In larger housed blower units of standard size unit heaters, it is now permissible to substitute a tube-within-a-tube heat transfer element of no greater heating capacity than that replaced. Formerly, only a tube-within-a-tube heat transfer element of the same heating capacity as the element replaced could be substituted. This change was made because it was intended to restrict the use of larger elements and not to limit the manufacturer to one particular size.

2—Manufacture, fabrication or assembly of convectors by any producer is limited to not more than 20 sizes of heat transfer elements in each of the permissible depths (6, 8 or 12 in.). A convector is a heat transfer element enclosed in a cabinet that serves as a stack to accelerate the circulation of air through the heating element. Previously, the producer was limited to not more than 20 sizes as determined by the rated equivalent direct radiation capacity. This change will permit manufacturers to make units of different measurements provided they do not involve more than 20 sizes in each depth.

3—Recessed or semi-recessed cabinets for convectors for use in hospitals for mentally disturbed patients may now be produced. Formerly, only wall and free-standing cabinets were permitted.

Order L-107 itself was also amended to remove those provisions that made it possible to schedule production of extended surface heating equipment under this order. Order M-293 is the general scheduling order and if it becomes necessary to schedule production of this equipment it can be accomplished under that order.

COMING EVENTS

March 27, 28—American Society of Tool Engineers, Philadelphia.

March 30, 31—American Gas Association War Conference, Rochester, N. Y.

April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.

April 5, 6, 7—SAE National Aeronautic Meeting, New York.

April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

April 17, 18—American Zinc Institute, St. Louis.

April 20, 21—AIME Open Hearth Meeting, Pittsburgh.

April 25 to 28—American Foundrymen's Association, Buffalo.

May 1, 2—Westinghouse Machine Tool Electrification Forum, Pittsburgh.

May 8—Association of Iron & Steel Engineers, spring conference, rolling mill committee, Pittsburgh.

May 9, 10—American Steel Warehouse Association, Inc., Chicago.

May 25—American Iron and Steel Institute, New York.

Shipyard First Approved Surplus Property Sale

Washington

• • • The first transaction under the government's new setup for disposal of surplus war property was recorded in the sale by the Maritime Commission of the San Jacinto shipyard, Houston, Tex.

The sale was approved by W. L. Clayton, Surplus War Property Administrator, and was the first announced deal to cross his desk since his appointment two weeks ago.

The shipyard was sold to E. I. du Pont de Nemours & Co. for $200,000, described as a price substantially in excess of the value placed on the property by an independent appraiser retained by the government.

Du Pont will adapt the plant for the preparation of phenothiazine.

OPA Permits Installation Charges for Pressure Vessels

• • • The provision of the regulation setting maximum prices for used storage vessels which allows sellers to charge a portion of the original installation cost, when in excess of $100, has been amended to include all vessels listed in that regulation. These vessels include some 2600 sizes and combinations of used pressure vessels and used enclosed atmospheric pressure vessels—cylindrical tanks made of black steel and used for holding gas or liquids. This change was made in amendment 2 to MPR 465 by OPA.

It was the original intention when the compensation-for-installation provision was put into effect Jan. 5, 1944, to include all tanks covered by the regulation. Through an oversight, one group was omitted.

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- Production
- ★ Adaptability
- Fixture Saving
- Operation Saving
- Material Saving
- Fine Finish
- ★ Flatness
- ★ Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*

HERE are two surface grinding problems that came to the Blanchard Engineering Department in one week:

(1) Grind a hardened steel ring 86½" in diameter to a tolerance of ±.0002" for thickness.

(2) Grind the edges of a steel strip, .005" thick, .125" wide, and 20" long, straight and to a tolerance of ±.0005".

Thirty years experience in grinding flat surfaces enabled Blanchard Engineers to solve the grinding of both of these jobs, using Blanchard vertical Surface Grinders and Blanchard Grinding Wheels.

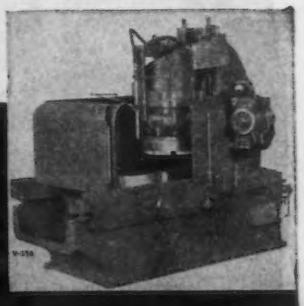
If you have work which lies within the range here indicated, you should investigate the possibilities of a Blanchard.

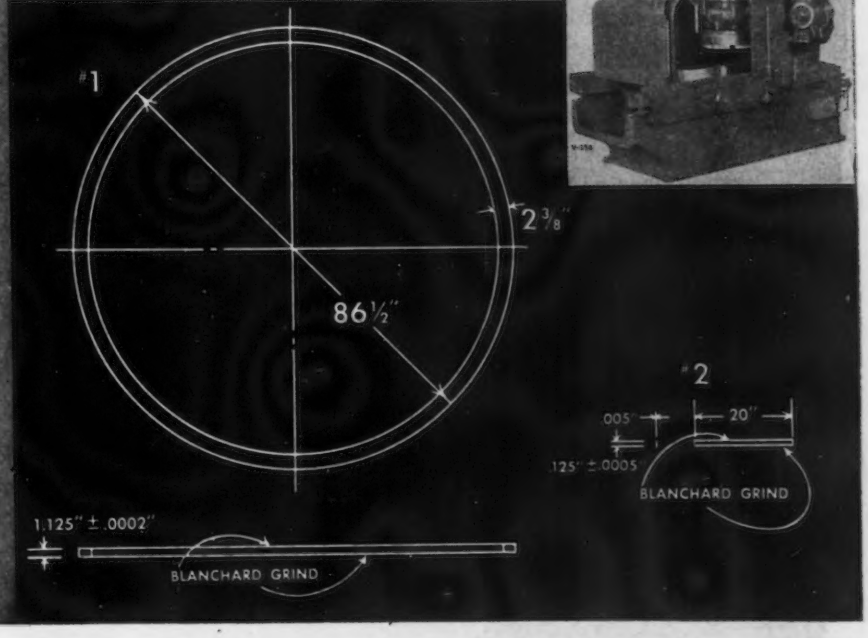
Whether the job is large or small, usual or unusual, Blanchard can show you how to grind it better and faster.

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

Grinding Hardened Steel Rings and Edges of Steel Strip on Blanchard Surface Grinders.





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Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

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GUSHER
COOLANT PUMPS

Because they're simple in design Gusher Coolant Pumps are trouble-free, highly efficient and long lasting. No metal-to-metal contacts, thus making continuous handling of grinding compounds possible. There's a type and model for your requirements. Write for complete new catalog.

★

Model 9040—Available in any current characteristics, including 25 cycle, 1, 2, or 3 phase. Totally enclosed 1/4 h. p. motor.

THE RUTHMAN MACHINERY CO.
1821 READING ROAD CINCINNATI 2, OHIO
The "Gusher" — A Modern Pump for Modern Machine Tools

Steel Payrolls Total $141,794,000 in Jan.

• • • Payrolls of the steel industry rose in January to $141,794,000 over December, 1943, which totaled $140,203,000. In January 1943 they amounted to $129,760,000.

Average number of employees at work in the industry throughout the month amounted to 583,000. Wage earners averaged 116.5c. per hr. for the month compared with 116.1c. per hr. in December, 1943, and worked an average of 45.7 hr. per week, as against 43.2 hr. in December, 1943.

Construction Machinery Repairs Parts Order Eased

Washington

• • • Restrictions on the purchase of repair parts for construction machinery and equipment were eased by WPB by amending order L-192. Parts for current use may now be purchased by certification by the purchaser instead of through application for WPB authorization, with the exception of purchase orders of more than $1000 for parts for shovels, cranes and draglines of less than 2½ cu. yd. capacity. Such purchase orders are subject to WPB authorization.

Approximately 85 per cent of all new construction equipment is needed to fill military requirements, the WPB Construction Machinery Division said. This means that used equipment must take care of civilian needs. It has therefore been found advisable to facilitate the purchase of repair parts required to keep the equipment in operation by relaxing restrictions insofar as possible.

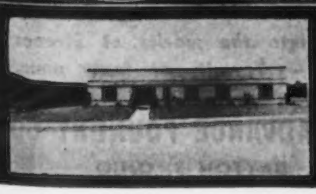
Shovels, cranes and draglines are the most critical items covered by order L-192, which controls the production and distribution of specified types of construction equipment. The authorization required for repair parts' purchase orders of more than $1000 is designed to conserve parts for the most essential uses.

Certification of purchase orders requires that the repair parts ordered are needed to replace worn out parts within 30 days after receipt and are not for stock; that the purchaser does not have other parts on hand or on order for this purpose; and that he has complied with the provisions of order L-196.

PRECISION STAMPING

for Victory

Applying its many years of experience in the production of fine metal stampings to the manufacture of War Material, The Metal Specialty Co., is completely equipped to give you efficient service in Stamping, Rolling, Coining, Forming, Drawing and Annealing in all Meals. Specialists in Hydraulic cold drawing and embossing in all metals including stainless steel. Deep drawing and embossing up to 850 tons capacity. Shells drawn up to 20" depth. Assembling including Flash and Resistance Seam Welding Pressed metal products to specification.



The
METAL SPECIALTY *Co.*
MAIN OFFICE AND PLANT • ESTE AVENUE • CINCINNATI, OHIO

aircraft precision

in factory and field

SIMPLY PEELING laminations from Laminum shims provides the precision required in the assembly of vital aircraft parts. And the Laminum shim provides repeated quick, accurate adjustments out in the field!

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

Laminated Shim Company
Incorporated
76 Union Street • Glenbrook, Conn.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT
2046

Order Changes Aid in Laboratory Needs

• • • Conditions under which priority assistance is given to laboratories were clarified by WPB through issuance of an amended Preference Rating Order P-43. The definition of "laboratory" now specifies that any person who carries on scientific or technological investigation, testing, development or experimentation in his business is considered to operate a laboratory in buying material for these purposes, even though he does not have a separate department in his company or institution for such activities.

Priority ratings assigned by the order may be used to get materials for development of products designed primarily for future civilian markets only if such activities will be carried on without diverting any manpower, technical skill, or facilities from war work. Laboratories that have been assigned serial numbers by WPB may not use their AA-1 preference rating for activities connected with future civilian markets.

New provisions of the amended order follow; Restrictions on the quantity of aluminum that may be obtained under the order are removed. Priorities assistance assigned under P-43 may be used for construction jobs costing not more than $500 without applying for permission to start construction under L-41. The laboratory's cost of labor and of equipment required for laboratory activities need not be included.

Hand tools and safety equipment bought by a laboratory for resale to its employes for use in the laboratory's activities may be obtained under the order. Procedure for obtaining controlled materials has been simplified, and the allotment number V-9 is used in place of MRO-P-43. A new procedure for obtaining Class A products is set up and described.

Even though machinery or facilities include new features or developments, material for their production cannot be obtained under the order if they are intended for use in the manufacture of commercial products.

ARMCO Earns $6,098,074

Middletown, Ohio

• • • The American Rolling Mill Co., for 1943 reported a consolidated net income of $6,098,074, compared with net income of $7,780,988 in 1942. Net sales in 1943 amounted to $199,266,466 compared with $180,978,867 in 1942.

STRENES METAL
IN FRONT LINE OF SERVICE

BEFORE THE WAR

Strenes can be cast to shape. Most of the usual machining time is saved. Redressing is reduced. That is why before the war Strenes gained heavily as forming and drawing die metal. In one case around 2,000,000 stampings were obtained and the die is still in good condition, ready to resume operation at the end of the war. Runs of 100,000 pieces up are not uncommon. Hundreds of the largest plants in the country used it regularly in their tooling programs. Want the names of pre-war users of Strenes?

IN THE WAR

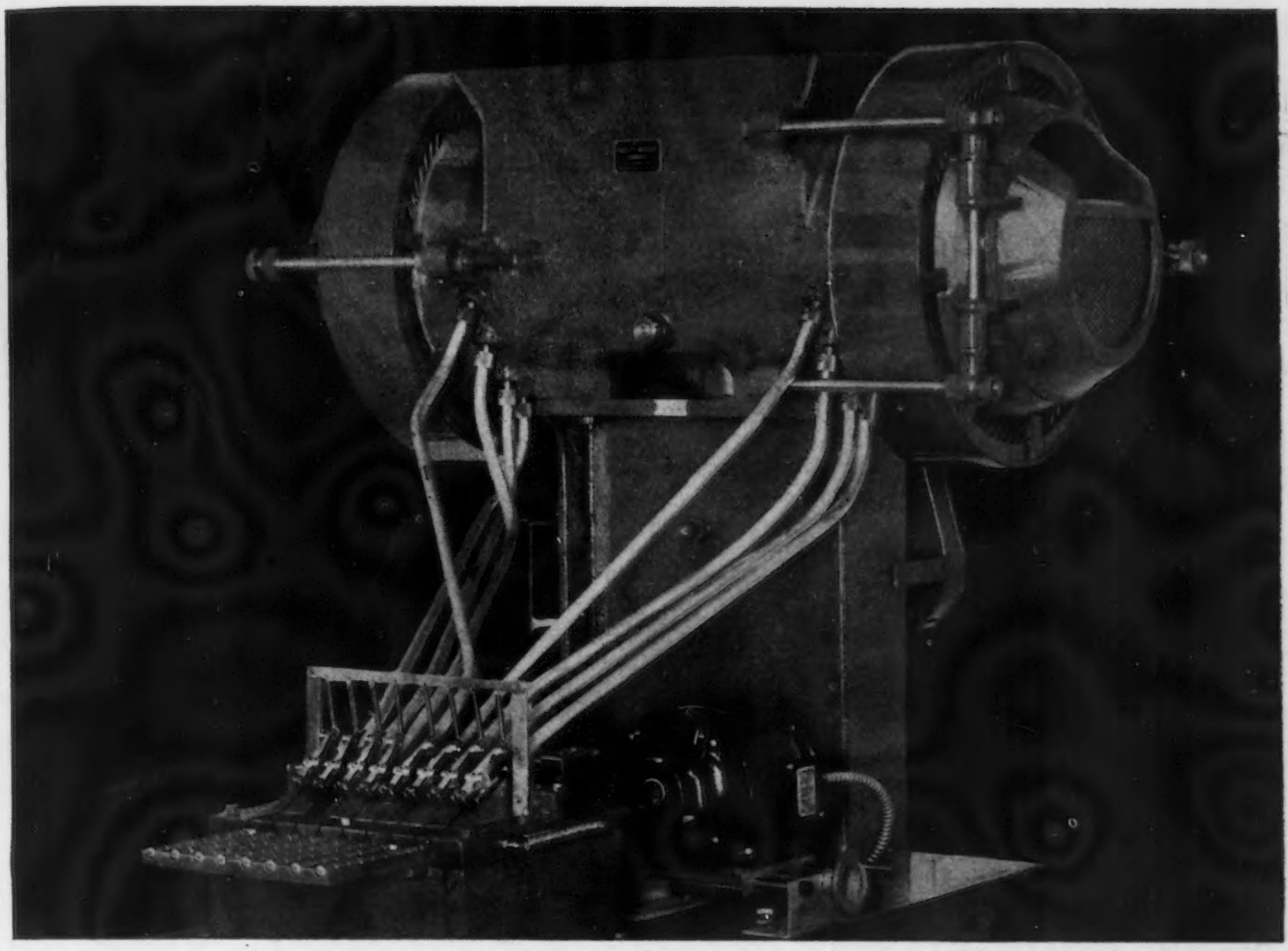
Strenes today is being used for draw pots, draw pot inserts, draw rings for draw bench operation, for progressing upsetting dies—all in shell manufacture. Glad to identify all such users and many others.

AFTER THE WAR

After the war, refrigerator, stove, metal casket, grave vault, farm implement and other manufacturers will resume with Strenes metal forming and drawing dies. Many of the automobile, truck and tractor builders are extensive users, for body, fender and hood dies. Will name them to interested inquirers.

Look into the merits of Strenes metal — Try it, at least once.

THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO



Another FIDELITY Machine — war-born with peace-time applications — perhaps for you

If you have many small metal parts which have had to be sorted and handled manually—in large quantities—you will be interested in this adaptable basic machine which FIDELITY has made in a number of variations.

The parts are dumped into a hopper from which they are fed out in single or multiple tracks, in correct position for the next process. In some cases, sequential steps are taken care of by additional mechanisms or attachments, made integral with the automatic hopper and feeder element.

The machine illustrated sorts and delivers copper slugs through eight tracks at the rate of 20 slugs per minute per track—a total of 160 per minute.... Receiving trays, platforms or troughs in such machines can generally be designed to function also as piece counters or batch boxes.

The range of FIDELITY'S developments in special machines designed and built to solve unusual and special production problems is described briefly in "Facilities."

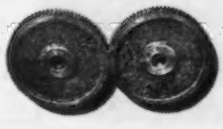
A copy of this book is available if you write on your business letterhead.

BUY MORE BONDS

ARMY E NAVY

33 YEARS' EXPERIENCE

Designers and Builders of Intricate, Automatic Precision Machines



FIDELITY MACHINE COMPANY

3908-18 FRANKFORD AVENUE, PHILADELPHIA 24, PA.

MACHINE TOOLS

. . . News and Market Activities

Sale of Idle Machine Tools Permitted Without Priority Rating

Washington

• • • **Provisions of the recently amended Priorities Regulation 13, as they apply to the sale of idle and excess stocks of machine tools, have been clarified by the Tools Division. The rules governing "special sales" of idle and excess materials have been broadened in the regulation to include finished products, including machine tools. "Special sales" include sales of products by a person who does not sell them in the regular course of his business. List B of PR13 now provides that such special sales of machine tools may be made without any priority rating or allocation.**

Heretofore, machine tools that have been put into actual use have been obtainable on unrated purchase orders. However, new machine tools delivered to a customer, but which he did not put into use because of reduction or cancellation of contracts or for other reasons, have been subject to the restrictions of Priorities Regulation 1. That regulation provides that property acquired with a preference rating, but not used for the purpose for which the preference assistance was granted, could only be sold to persons and in ways specified by WPB.

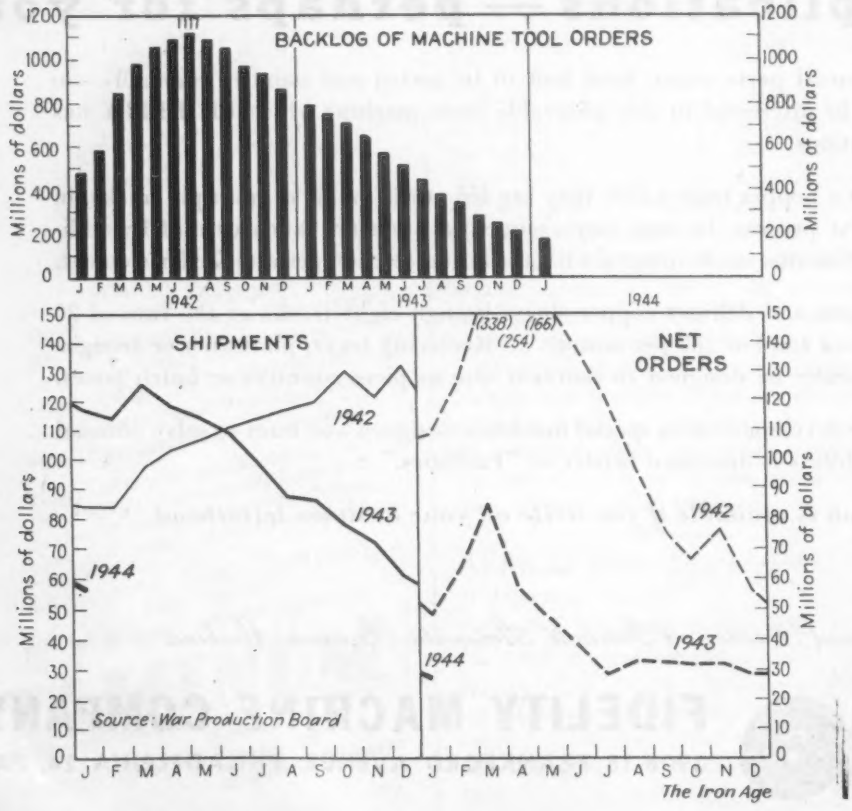
The addition of machine tools to List B of PR13 with the symbol "WOP" (without priorities) now frees such delivered but unused machine tools from the restrictions of PR1.

Sales of new machine tools by producers continue to be governed by General Preference Order E-1-b (Machine Tools). No change in Preference Order E-4 (Second Hand Machine Tools) is contemplated, the Tools Division said. The mechanism established by that order will still be used where it is desired to allocate to a particular buyer a specific used machine tool offered for sale.

No Priorities for Post-War Yet

Cincinnati

• • • **District machine tool manufacturers indicate that there continues to be a modest flow of new business, but otherwise the market is without interesting feature. Recent apparent pressure on WPB to ease priority requirements to allow manufacturers to manufacture and deliver some post-war material brought a stern warning from local WPB officials that they had no objection to manufacturers considering post-war business, but that no priorities would be issued for any of this type of production. In the meantime, manufacturers indicate that renegotiation conferences have reached conclusions and in most instances companies have set up agreements on the controversy, with some payments having been reported.**



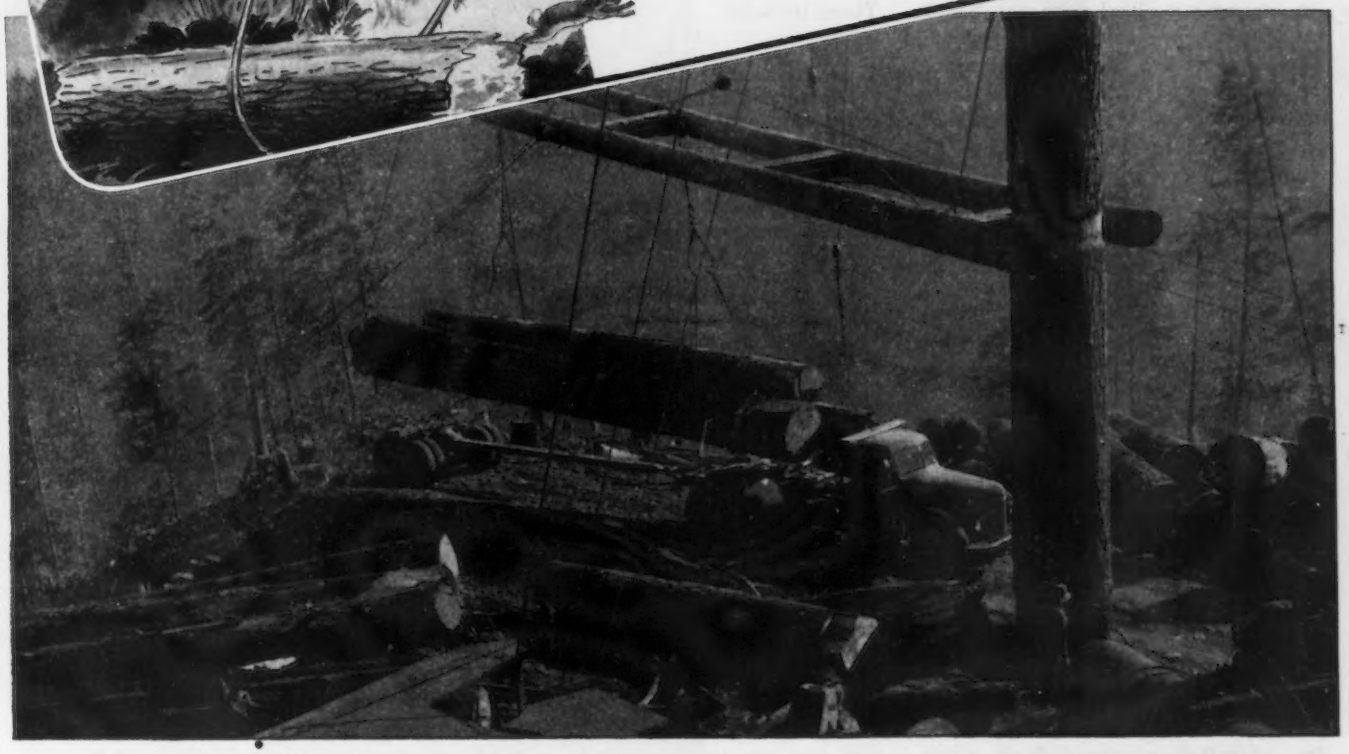
Machine Tool Orders and Shipments Off

• • • **Machine tool shipments in January declined about 7.5 per cent from December, 1943, to a value of $56,349,000 according to the final report for these months by the WPB Tools Division. December shipments were valued at $60,861,000. Shipments have been declining almost steadily each month since December, 1942, when they totaled $131,960,000. Monthly average shipments in 1939 were valued at $16,660,000, in 1940 at $36,890,000, in 1941 at $64,290,000, in 1942 at $110,146,000, and in 1943 at $98,350,000.**

Orders placed in January totaled $29,736,000, a drop of about 12 per cent from December's total of $33,742,000. Cancellations in January declined 46.5 per cent to $3,820,000, leaving net new orders for that month of $25,916,000, or about 6 per cent less than the December total of net new orders of $27,603,000.

Backlog of unfilled orders in January declined 13.8 per cent to $181,548,000 or slightly more than three months' production at the January rate. December backlog was valued at $210,606,000.

FIRST SOLUTION OF MANPOWER SHORTAGE



Modern Multiplier of Manpower ... WIRE ROPE

Perhaps while in pursuit of food, which scampered under a fallen tree, some primitive man angrily pulled on a vine tangled around the tree and found that he would not need to call for help to move an otherwise impossible load.

In solving the first manpower shortage, this primitive no doubt wondered who pulled as hard on the other end of the vine as he did on his and little realized he had discovered the principle of the pulley.

Today, the pulley has been multiplied into the block-and-tackle and the latter rove with wire rope so strong and tough that mankind goes on hoisting and moving loads which yesterday were considered impossible.

To Union Wire Rope engineers the impossible is a constant challenge. In the finest of wire rope laboratories they work at the one job of making wire rope stronger and tougher to last longer. The tensile strength, torsional values, fatigue life, ductility, hardness of wires, etc. are predetermined. From numerous tests and checks the pedigree of every run of wire rope is recorded and then, wherever possible, its performance on the job is watched. With Union engineers wire rope making is a specialty in which they do not propose to be excelled.

FREE

Do You Need Wire? Manufacturers using high carbon steel wire functionally are invited to investigate the dependable source of supply afforded by our extensive facilities. Our engineers will submit interesting proposals on your requirements.

UNION WIRE ROPE CORPORATION, 2158 Manchester Ave., KANSAS CITY 3, MO.
Tulsa Houston Chicago Salt Lake City New Orleans Monahans, Texas
Portland, Ore. Ashland, Ky. Atlanta

For Two Years of Team-work with Our Armed Forces

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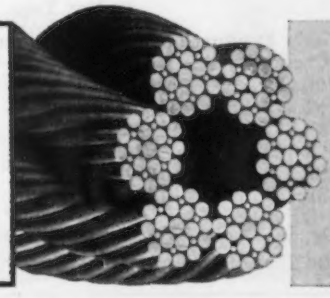
WHEN YOU NEED PREFORMED WIRE ROPE SPECIFY union-formed



UNION WIRE ROPE CORP.

union *Wire Rope*

"THE ULTIMATE IN LOW COST WIRE ROPE"

NON-FERROUS METALS

. . . News and Market Activities

Truman Committee Reports on Magnesium

• • • **The Truman Committee** report on magnesium, filed with the Senate on Monday, suggested that programs for the wide use of the metal should be inaugurated promptly. The committee recommended that the WPB give immediate consideration to the elimination of its M-2 order restricting the use of magnesium to war and essential civilian items. Such action, the report stated, would constitute an important first step in carrying out the committee's principal recommendation that surplus materials be made available to all who want to use them in areas where there is no manpower shortage, providing the users are not refusing war contracts.

At the present time, there are in this country two privately owned plants and 13 plants for which the government has spent to date $370,000,000. An additional $15 million was spent for fabricating facilities. Expenditures will still be made for process improvements. In the operation of 12 of the government owned plants, $116 million has been advanced for operation expenses from which the government has received through the delivery of magnesium a return of $58 million.

Of the 13 plants constructed and operated at government expense, only six can be considered as producing above capacity and five are still below. The remainer will either be operating at or near capacity.

Although critical of Dow Chemical Co.'s prewar monopoly position, the committee appreciated the contribution of the company's "know-how." In 1939, Dow produced about 7 million lb. of magnesium and in 1940 about 12,500,000. In 1941, capacity was again increased to 15,500,000 lb. Additional facilities were established at Freeport, Tex., having a capacity of 12 million lb. annually, plus 6 million lb. annual capacity financed by the British Government. In 1941, the government provided capital for an additional 18 million lb. expansion. At Marysville, Mich., and Velasco, Tex., were erected plants having a yearly output of 72 million lb.

Reviewing the expansion program, the committee report described the various processes employed and the capacities of the facilities constructed. These include:

	Annual Capacity, lb.
Dow Process:	
Diamond Magnesium Co., Painesville, Ohio	36,000,000
International Minerals & Chemicals Corp., Austin, Tex.	24,000,000
Mathieson Process:	
Mathieson Alkali Works, Inc., Lake Charles, La.	54,000,000
Carbothermic Process:	
Permanente	28,000,000
Ferrosilicon Process:	
Ford Motor Co., Dearborn, Mich.	40,000,000
Permanente Metals Corp., Lathrop, Cal.	20,000,000
New England Lime Co., Canaan, Conn.	10,000,000
Magnesium Reduction Co., Luckey, Ohio	10,000,000
Amco Magnesium Corp., Wingdale, N. Y.	10,000,000
Electro-Metallurgical Corp., Spokane, Wash.	48,000,000
Basic Magnesium Corp.	112,000,000

While criticizing at great length the promotion and construction of the Basic Magnesium plant at Las Vegas, Nev., the report lauded the work of the Anaconda Mining Co., present operator, for its skill in finally exceeding capacity operations while reducing the cost per lb. of magnesium.

In 1943, magnesium production reached 391,000,000 lb., while an estimate of 1944 output is 531,000,000 lb. with the requirements figure set at 485,000,000 lb.

Zinc Limitations Relaxed

Washington

• • • **Restoration of the use** of zinc in the manufacture of many finished products was announced by WPB last Thursday. This action, the board said, is in line with its general policy to permit the use of scarce materials if the result is to conserve material in greater demand, effect a saving in manhours or enable the manufacture of a better product.

The restoration was effected by amendment to order M-11-b to add a number of items to the list of exceptions to the limitations imposed.

Coal stokers, domestic electric ranges, dry cell batteries and portable electric lights, electric fans, mechanical pencils, motorized fire apparatus, protective coating or plating of zinc on loose leaf metal parts and units.

There will be no general increase in the output of the finished products involved, nor will there be any relaxation in the retrictions on the manufacture of the products, WPB said. End product volume and other restrictions on manufacture still remain under the controls set up by the many L orders under which they are produced.

•

Exemptions for Scrap

• • • **Companies which generate** or accumulate less than 50,000 lb. of copper and copper-base alloy scrap are no longer required to file WPB Form 452 although they must continue to comply with the provisions of Copper Order M-9 requiring the disposal of all scrap in excess of 30 days' accumulation unless such accumulation aggregates less than 10,000 lb.

U. S. COPPER STATISTICS, FEBRUARY, 1944

in Net Tons

	Production		Deliveries to Customers	Refined Stocks
1943	Crude	Refined		
July	100,456	105,589	129,631	55,097
August	97,413	100,077	147,135	53,726
Sept.	98,867	98,333	141,111	45,844
Oct.	102,589	97,274	129,212	47,148
Nov.	99,340	102,136	138,881	52,027
Dec.	98,553	104,644	115,850	52,121
1944				
Jan.	95,902	92,781	101,779	45,800
Feb.	96,229	87,128	124,532	36,489

BALDWIN SERVES THE NATION . . .

Every "Standard" Casting has a Past and a *Future*

Some of the *experience* that helps produce every Standard casting goes clear back to the days of the individual craftsman at Freedom Forge, before the Revolution. And *some of it* has been gained in the day-to-day production of the largest and most complicated shapes, every one a challenge to the highest skill of the foundryman.

There is some of this "past" in every Standard Casting, no matter how small or simple . . . and so each Standard Casting has a bit more "future" in the way of service and satisfaction. At Standard, we are equipped to handle all of your casting and forging needs. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pennsylvania, U. S. A.

BALDWIN PRODUCTS

Hydraulic presses • Testing equipment • Steel forgings and castings • Diesel-electric locomotives • Diesel engines • Metal plate fabrication • Rolled steel rings • Bronze castings • Heavy machine work • Crane wheels • Bending rolls • Plate planers • Babbitt metal • Alloy iron castings • Briquetting presses.

BALDWIN
STANDARD
STEEL FORGINGS & CASTINGS

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on page, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1	
No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*
OPA Group 2	
Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
OPA Group 3	
Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]
OPA Group 4	
Automobile radiators	7.00
OPA Group 5	
Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.375
Loose Yellow Brass Trimmings	7.375

Aluminum

Plant scrap, segregated	
2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50
Plant scrap, mixed	
All solids	7.50
Borings and turnings	5.50
Obsolete scrap	
Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap	
Pure solids and all other solids, exempt	
Borings and turnings	8.00
Mixed, contaminated plant scrap	
Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

Alloy Steels—

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AFFILIATE OF INTERNATIONAL HARVESTER COMPANY

General Offices: 180 North Michigan Avenue **Chicago 1, Illinois**

SCRAP

. . . News and Market Activities

WPB Committee Protests Claims Of Scrap Sufficiency and Weak Prices

Washington

• • • **Protesting general reactions** to current weaknesses in the scrap market, the Iron and Steel Scrap Industry Advisory Committee of WPB recently asserted that scrap shortages still exist in the major grades and that current reports on market conditions and the attitude of consumers will work a detriment to the war effort. Scrap supplies, the committee reports, are at a 2.4 month level, down from three months' supply last Summer, and if inventories should fall further, furnaces may have to go down.

A review of steel requirements for the next six months indicates that production of carbon steel must be maintained at utmost capacity. Consequently scrap needs will remain at least at present levels. "The prevalent opinion," states the report, "among steel mills that there is a surplus of scrap in the United States is absolutely erroneous and is probably founded upon assistance from the WPB Steel Division in directing the flow of scrap. England has returned to the market for a portion of the overseas scrap that has heretofore flowed to the United States."

From the standpoint of alloy grades, despite the excess of supply over demand, alloy is not entirely free yet, the report claimed. Industry must continue to cooperate if the unbalance in steel scrap is to be overcome and if pressure for removal of the segregation order is to be avoided. If the order is removed, producers who cannot dispose of the alloy scrap will mix it, with the result that carbon steels will become contaminated and specifications will not be met.

There is no question that the need for uncontaminated carbon steel scrap of good quality will remain great until the end of the war and the supply will have difficulty meeting demands. However, WPB's committee overlooks the fact that surpluses in specific grades in specific localities do occur, and dealers offer such scrap at below-ceiling prices to get rid of it.

The charge that mills have notified dealers that they will refuse to buy except at certain prices or freight rates and that mills are cutting inventories is undoubtedly true, but it is believed that the former charge is true with regard to specific grades. The fact that mills request allocations of scrap when their PD forms show they have inventories because such inventories are out of balance indicates there are shortages of scrap and also indicates that some grades are in sufficient supply. This shouldn't cause too much concern, since it is basically sound not to stock material that cannot be used within a reasonable length of time. The charges are related because one results from the other. Refusal to pay ceiling prices for any scrap grade results from surpluses of that grade.

The extent of price breaks in the tool steel and stainless steel scrap markets are described on page 108.

There can be no denying that definite weaknesses have occurred at various points for such grades as low phos, shoveling turnings, machine shop turnings, mixed borings and turnings, alloy turnings, tool steel, bushelings and stainless. All the talk in the world of shortages will not alleviate these particular conditions, because mills definitely cannot utilize these grades in the quantities they are accumulating. Likewise, when a mill feels that its scrap inventories are at a desired limit, regardless of the reason, that mill will stop buying.

It is not sufficient for WPB to say these conditions shouldn't exist because of shortages in the major carbon scrap grades, because the conditions do exist and little or nothing can be done about it unless "floor prices" are established. Then what little is now sold would cease moving entirely.

•

NEW YORK — Scrap purchases are slower in this area, with much of what normally has been low phos being thrown into open hearth grade shipments. This is hoped to have a two-fold effect, bettering open hearth scrap quality and tightening up a loose situation in low phos. However, dealers are still offering it at under ceiling prices. Some 900 tons of imported scrap, mainly battle scrap, came through New York this week. Additional shipments of battle scrap have also been received at other Atlantic seaboard ports.

•

PITTSBURGH—Despite high steel operating rate, scrap supplies appear in good balance here. Alloy scrap is still being sold minus part or all of the alloy premiums.

•

CINCINNATI — Foundry cast and standard open hearth steel scrap are both in strong positions in the southern Ohio district, but some weakness is developing in the foundry steel grades. Dealers admit some sales under ceiling on borings and turnings, particularly out of the district, where buyers refuse to pay higher freight rates and the ceiling price at the same time. Consequently, borings and turnings for out-of-district shipment are reported selling $1 to $2 under the ceiling. Alloy turnings on out-of-district sales are selling f.o.b. Cincinnati $3 under ceiling. Sales within the district, however, are reported holding rigidly to current rate schedules with most consumers fairly well supplied.

•

BUFFALO—There is little scrap in dealer yards here and most items are moving readily. One dealer started the month with less than 400 tons in sight. Low phos, reported down $1 in New York, is being taken at the ceiling and there has been no shading of prices on blast furnace items, as in Cleveland and Detroit. Trade talk is that a serious shortage of scrap may develop at the end of the year if the war goes into 1945.

•

BIRMINGHAM — Open hearth grades currently are leading other grades in demand here, but consumers are paying base price only for this material. They will not absorb springboard allowances of $2. Consumers of cast grades are reported out of the market.

•

BOSTON—A slight increase in supplies of turnings and light scrap is reported. Shipments to consumers are slow due to labor shortages, but one large yard has stepped up forwardings of producers scrap. As for yard scrap, this firm is doing little. Chemical borings are wanted, but scarce. Shortage of cast iron scrap is critical. Industrial plants are not dismantling machinery these days. Here and there a yard has 50 or 75 tons, but has no help to break up cast.

•

CHICAGO—Weakness noted in short shoveling turnings a fortnight ago has filtered down through other blast furnace grades with reflection in brokers offering prices. Undoubtedly any future sales to mills will confirm this tendency.

•

DETROIT—Blast furnace grades are unchanged from last week. Short turnings are selling around $1 below ceiling with scattered sales farther below. The

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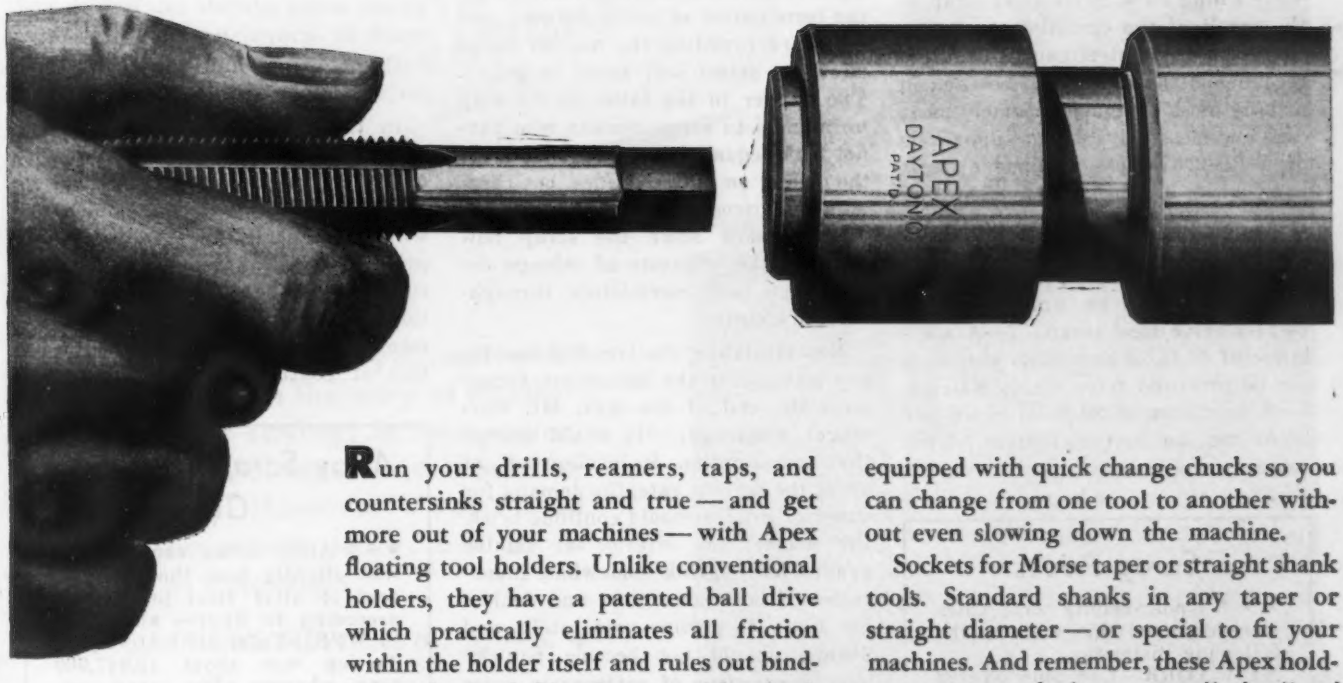

Run your drills, reamers, taps, and countersinks straight and true — and get more out of your machines — with Apex floating tool holders. Unlike conventional holders, they have a patented ball drive which practically eliminates all friction within the holder itself and rules out binding under load. Use them on either horizontal or vertical spindles. Buy them equipped with quick change chucks so you can change from one tool to another without even slowing down the machine.

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alloy situation is slightly improved, but alloy scrap of all kinds is still going at the base price plus nothing for alloy content or at most, half the allowed premium.

•

PHILADELPHIA — Little change has taken place this week. Shipments appear adequate although little scrap is moving out of the yards. A boatload of scrap from the south arrived here for Bethlehem. Shipments of foundry cast have slowed up considerably. Little if any can be had. Although heavy open hearth grades are in good demand, there is weakness in turnings.

•

ST. LOUIS—Receipts of scrap in this area are still below requirements, one reason being the absence of peddlers and truckers to move accumulations to yards. Mills need carbon steel scrap free of alloys. Railroad movement is hampered by shortage of men to handle material.

Stainless Valve Scrap Approved for Mess Equipment

Washington

• • • **Piling up of valve** steel scrap as the result of the curtailment of purchases of valve steel caused WPB to recommend that the scrap be used in making mess equipment, namely meat cans and mess trays. Future approvals of WPB-2933 mess equipment items upon which the use of modified 18-8 (type 302W) stainless has been approved, will require that in melting: 1—A minimum of 50 per cent of the contained nickel be procured from 14-14-2 valve steel scrap. 2—A maximum of 40 lb. of chromium per ingot ton be procured from virgin sources. 3—A maximum of 20 lb. of nickel per ingot ton be procured from virgin sources.

Scrap Prices

• • • **Under-ceiling scrap sales were reported this week in the following districts:**

NEW YORK—Low phos offered at $1 under ceiling.

CINCINNATI—Out of district shipments of borings and turnings at $1 to $2 under ceiling.

CINCINNATI—Out of district sales of alloy turnings sell f.o.b. Cincinnati at $3 under ceiling.

BIRMINGHAM—Consumers refuse to pay springboard allowance of $2 on various grades carrying this premium.

GENERAL—Special tool steel and stainless steel scrap going at prices far below ceilings in many districts and other districts report that sales are practically nonexistent.

Barringer Warns Against Under-Ceiling Sales; Reports on Future

Montreal

• • • **At the meeting** of the Canadian Secondary Materials Association, Edwin C. Barringer, president and executive secretary of the Institute of Scrap Iron & Steel, Inc., made some pertinent remarks with regard to the future trends in secondary and scrap materials. He emphasized the shortage of preferred base grades, such as heavier grades of carbon steel scrap for open hearths and cast iron grades, pointing out that if open hearth furnace operations through 1944 are at current rates, definite shortages of such scrap will result by the end of the year.

With regard to inventories and prices, he said that it is known that some consumers are considering reducing inventories as a precaution against the termination of war contracts, and some are prodding the market in an effort to detect soft spots in prices. The danger in the latter is not only unfairness to scrap dealers who cannot make equalizing adjustments over the ceiling on scarce grades, but pressure on prices by consumers will inevitably slow down the scrap flow and sap the interests of salvage departments and committees throughout the country.

Recapitulating the trend in secondary metals for the immediate future until the end of the war, Mr. Barringer remarked: "It would appear that consumption is leveling off at about the current rate, the demand for superior grades should continue brisk, the market for inferior or lighter grades may shrink somewhat, inventories of both consumers and dealers are likely to decline moderately, and dealers should not become panicky over suggestions of softness in price but resist them as impeding a necessary sustained flow of material.

If the German war ends before the Japanese war, production of war material may be cut by 33 to 50 per cent. While land fighting was originally expected to almost cease with the end of the German war, experts now believe that the Japanese army must be defeated, and China seems the logical base for such operations. In such an event, production of material would not shrink back entirely to air and Navy equipment, but would round off the termination of contracts in better fashion for many industries. However conditions may develop, the end of the German war will sharply reduce production and scrap consumption will likely drop to an extremely low level while industrial and factory scrap, which is about 50 per cent of all purchased scrap, will still be coming into the market in substantial volume. This will offset the shortages of strictly dealer scrap but will work to a disadvantage on dealers in small communities and to the relative advantage of dealers in large industrial centers.

A variable in the postwar period is the increased flow of obsolete material and idle or excess inventories. An orderly liquidation of these surpluses appears prudent, but, if making work after the war is the major consideration, the recycling of surpluses would provide much work and result in scrapping only of the original man-hours and not of the material itself.

In the immediate postwar period, outpouring of secondary materials will be substantial while consumption will be greatly reduced and demand will be practically nil. If government price controls are relaxed, price fluctuations may be terrifying and agitation can be expected for the establishment of a price floor and a continuation of controls.

Alloy Scrap Consumption

• • • **Alloy scrap consumption was slightly less than 44 per cent of alloy steel production, according to figures attributed to WPB. Total alloy steel production was about 13,047,000 tons, whereas alloy scrap consumption, including home scrap, was 5,724,000 net tons.**

Monthly alloy steel production and alloy scrap consumption were as follows:

Month	Alloy Steel Production, Net Tons	Alloy Scrap Consumption, Net Tons
January	1,224,000	456,000
February	1,165,000	428,000
March	1,264,000	493,000
April	1,193,000	500,000
May	1,196,000	534,000
June	1,081,000	493,000
July	1,077,000	502,000
August	1,107,000	514,000
September	1,034,000	475,000
October	999,000	477,000
November	891,000	432,000
December	816,000	420,000

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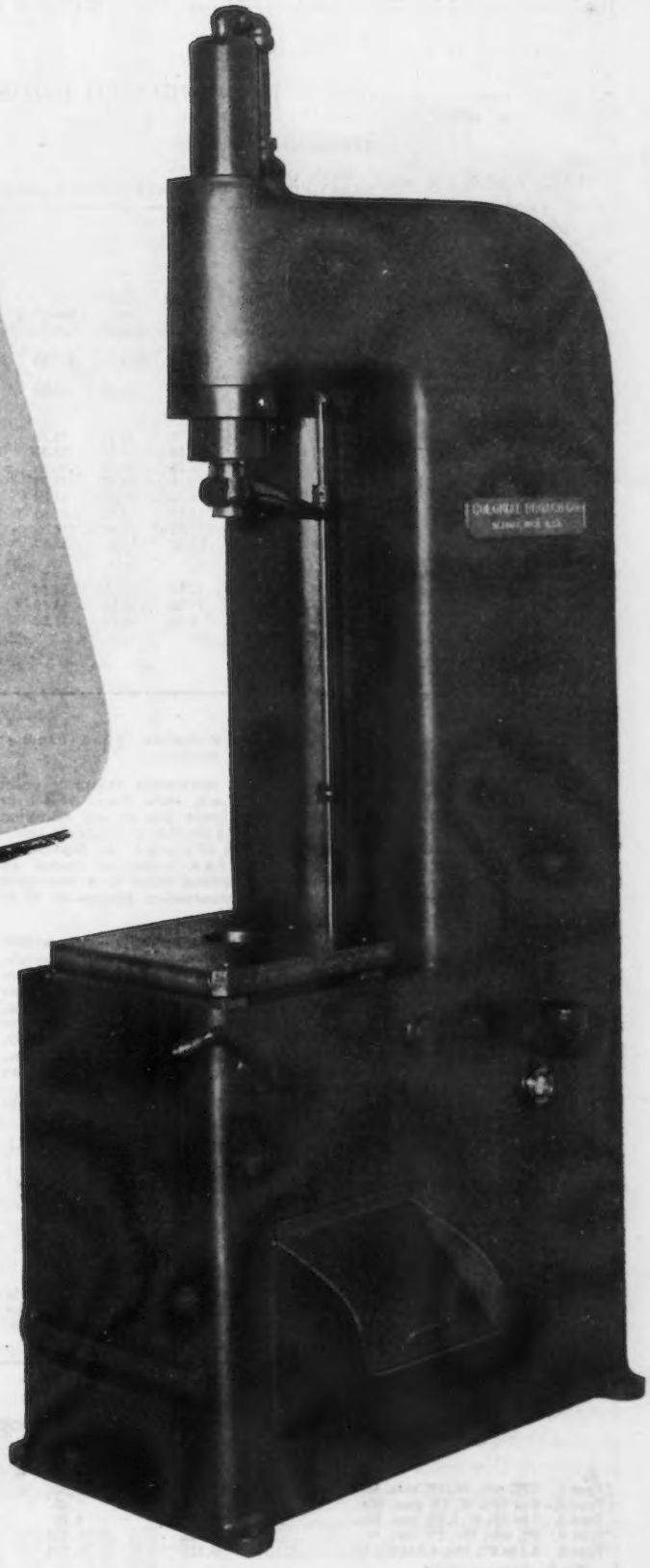

You can figure for yourself what that means in the way of flexibility and of savings in manpower, capital investment and manufacturing cost. However, if you would like the whole story, ask for a copy of Colonial's

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IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

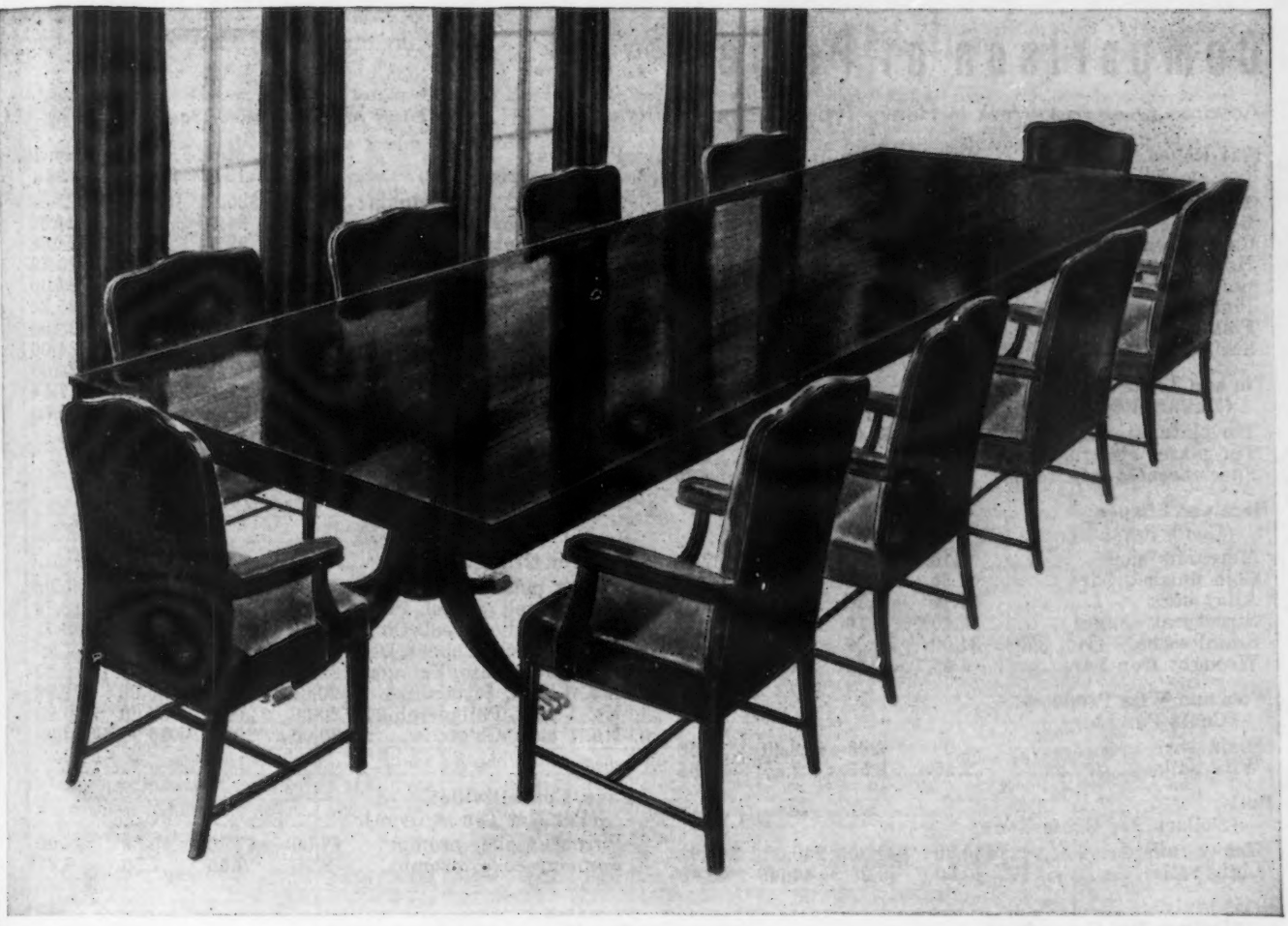
	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS	UNSEGREGATED TURNINGS
$1.50 per lb. contained W if 5% or more.	$1.30 per lb. contained W if 5% or more.
$1.15 per lb. contained W if 1 to 5%.	$1.00 per lb. contained W if 1 to 5%.
$0.80 per lb. contained Mo if 1.5% or more.	$0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.
If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.
If Cu or Ni content over 0.25%, price shall be reduced by 50%.
If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Price schedules on railroad scrap and cast iron scrap will be carried in the last issue of each month.



LET'S HOLD A PEACE CONFERENCE—NOW

The public, during war times, may be content to go without your products. But it is quite possible that consumers may not want to wait too long for them after peace comes. Quick production of your products at that time may require "outside" manufacture of machine tooled parts or even of complete mechanisms.

So why not hold a "peace conference," in advance of peace, where, if you please, we can be invited in to discuss your future plans to produce civilian goods? It might be of great importance to you in speeding production later when delivery to market is urgent.

It's true we can not take contracts now for immediate delivery, because of our serving the Army and the Navy, as we have been for over twenty years. The Army-Navy "E" and four stars have been awarded to Pollak for continued high achievements in the production of bomb racks, bomb shackles, fuzes and other war equipment.

We will not deny that this recognition of merit for our performance for our armed services is highly gratifying to us. But unless it also indicates to our future peacetime customers that we can develop and build good products for them as well, its significance will have been lessened.

Pollak has the ability, equipment and plant to develop and produce not only fine precision products but also the capacity to produce them in required quantity—and on time.

That is why we believe our executives and engineers have much to offer in the way of valuable knowledge, techniques and experience. At your suggestion they will be glad to gather around your planning-for-peacetime-products conference table—without obligation.

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Five Army-Navy "E" awards—the Flag and Four Stars—each of which symbolizes six months of Exacting Service to our Armed Forces, have been awarded to Pollak.

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Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Mar. 14, 1944	Mar. 7, 1944	Feb. 8, 1944	Mar. 16, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Mar. 14, 1944	Mar. 7, 1944	Feb. 8, 1944	Mar. 16, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 171-183.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
March 16, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 16
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	[10] Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[3]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[2]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2. 49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.59¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)		(Duluth = 2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.32¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018a	3.922	4.772	3.605	3.666	3.822	4.702	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.753	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.203	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25¢	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ 50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9637*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9640*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9642*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9645*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9650*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports)**

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $31.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb
Grooved, universal and sheared	1.90c

Wire Rods

(*No. 5 to 9/32 in.*)

	Per Lb
Pittsburgh, Chicago, Cleveland	2.00c
Worcester, Mass.	2.10c
Birmingham	2.00c
San Francisco	2.50c
Galveston	2.25c

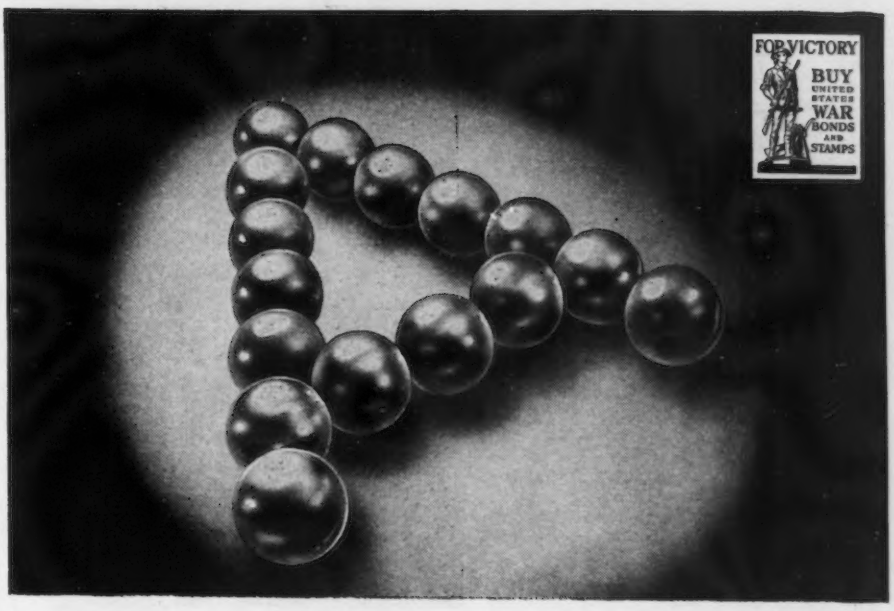
9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

	Base per lb
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 1c. higher.



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ROLL ON ABBOTT Bearing BALLS

GET UNINTERRUPTED PERFORMANCE

Production schedules are met—contracts are fulfilled — UNINTERRUPTED PERFORMANCE is achieved from each piece of equipment—each mechanism . . . Users are proving daily that time and labor are saved because their BEARING BALL assemblies are "ABBOTT" . . . ABBOTT has the answers to BEARING BALL problems. Your "tough performance job" may be a "regular" for ABBOTT. Get the vital UNINTERRUPTED PERFORMANCE by specifying "ABBOTT"—carry the load as planned.

ASK FOR DELIVERY ESTIMATES ON THE GRADE OF BALL TO MATCH YOUR STANDARDS OF PRECISION.

SPECIFY "ABBOTT"

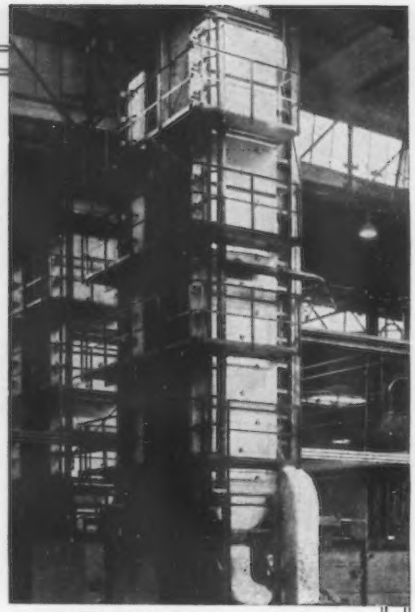
ROLL ON ABBOTT Bearing BALLS
THE ABBOTT BALL COMPANY HARTFORD, CONN. U.S.A.

Big Installations
or Small Parts--

Call BRANDT of Baltimore

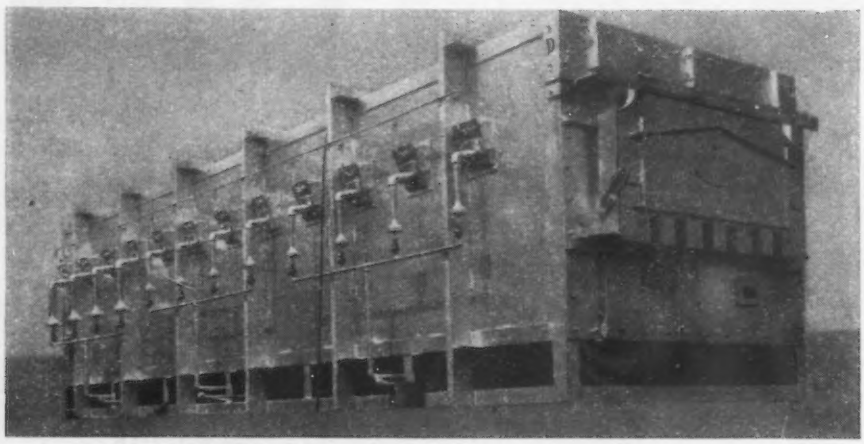
for precision in Heavy Plate and Sheet Steel Work

Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. Address: Charles T. Brandt, Inc., Baltimore-30, Md.



BRIGHTENING FURNACE, 44 ft. high, for use with Continuous Electrolytic Tinning Lines . . . Furnaces and Tinning Lines engineered, fabricated and installed by Brandt.

BRANDT of Baltimore—*Craftsmen in Metal Since 1890*



BELLEVUE FURNACES

are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

Send for full details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle.	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $46 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Hot Rolled*	*Lap Weld. Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	....
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	....

*15½ gage and heavier. **On 80-rod spools in carload quantities.
†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	

In full keg lots, 10 per cent additional discount.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets
(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets
(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Consumer Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

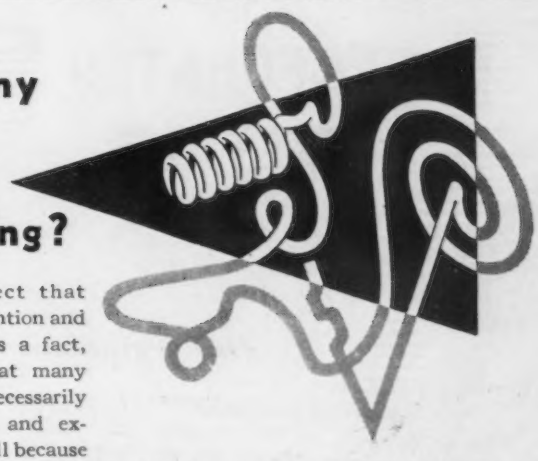
	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

CLEVELAND *makes them of greater strength and accuracy by the Kaufman Process.*

CLEVELAND FASTENERS

The Cleveland Cap Screw Company
2917 EAST 79TH STREET • CLEVELAND 4, OHIO
Warehouses: Chicago, Philadelphia, New York, Los Angeles

How many BENDS in a Spring?



Here's a subject that deserves close attention and investigation. It's a fact, sad but true, that many springs are unnecessarily intricate, difficult and expensive to make, all because of lack of understanding of the ultimate purpose. Ofttimes, a simplified design—or a different type of material can do wonders in the way of reducing costs and "upping" performance. Here's where experience in spring design pays off. Let the springmaker in on your requirements—in the early stages if possible.

A good spring in time saves nine!

DUNBAR SPRINGMAKERS
SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.
Division of Associated Spring Corporation

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*		
Brooklyn	*27.50*	*27.00*		*28.00*		
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*		
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	
Bethlehem, Pa.	25.00	24.50	26.00	25.50		
Everett, Mass.	25.00	24.50	26.00	25.50		
Swedeland, Pa.	25.00	24.50	26.00	25.50		
Steelton, Pa.		24.50			29.50	
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	
Sparrows Point, Md.	25.00	24.50				
Erie, Pa.	24.00	23.50	25.00	24.50		
Neville Island, Pa.	24.00	23.50	24.50	24.00		
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00		
Buffalo	24.00	23.00	25.00	24.50	29.50	
Cincinnati, Ohio	*25.11*	*24.61*		*25.11*		
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	
St. Louis	*24.50*	*24.50*				
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00		
Cleveland	24.00	23.50	24.50	24.00	*32.42*	
Hamilton, Ohio	24.00	23.50		24.00		
Toledo	24.00	23.50	24.50	24.00		
Youngstown	24.00	23.50	24.50	24.00	*32.42*	
Detroit	24.00	23.50	24.50	24.00		
Lake Superior fc.						34.00
Lyles, Tenn. fc. (2)						33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	
Duluth	24.50	24.00	25.00	24.50		
Birmingham	20.38	19.00	25.00			
Los Angeles	*26.95*					
San Francisco	*26.95*					
Seattle	*26.95*					
Provo, Utah	22.00	21.50				
Montreal	*27.50*	*27.50*		*28.00*		
Toronto	*25.50*	*25.50*		*26.00*		

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.

PRICES

REFRACTORIES
(F.o.b. Works)

	Per 1000
Fire Clay Brick	
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

	Per Net Ton
Chrome Brick	
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 on field grade to and including Pacific ports add 75c. per 100 all grades.

IF THERE IS A FLAW "FLASH-O-LENS" WILL FIND IT!

The new FLASH-O-LENS offers foundry-men, machinists, and many others engaged in producing metal parts for war contracts an efficient, economical means of examining the most minute defects during routine inspections.

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Manufacturers — ELIZABETH, N. J.

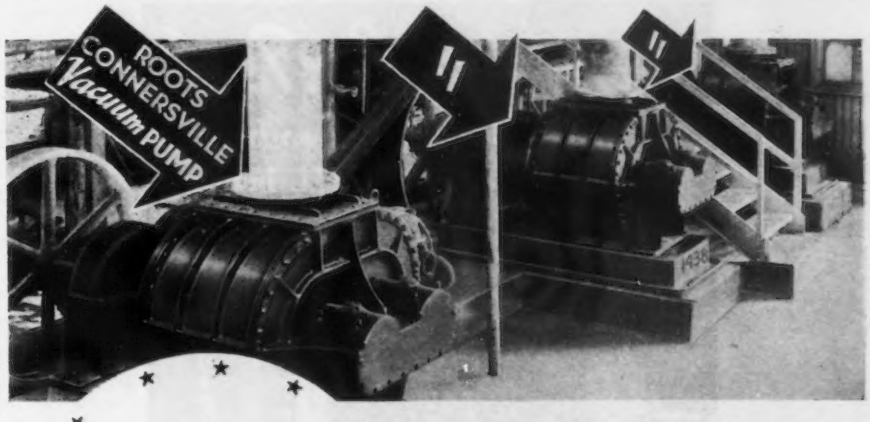

Photo shows three heavy duty "R-C" Vacuum Pumps, installed in a New Mexico plant. Capacity 4,250 c.f.m. each; suction 10" mercury.

Write for Bulletin.

"R-C" Positive Displacement Vacuum Pumps will handle more air per horsepower, under moderate vacuums, than any other type of pump.

They are extensively used for filter service, dewatering of sludges and pulps, testing purposes, pneumatic conveying, priming centrifugal pumps, and other applications where a dependable, economical, and steady vacuum is required.

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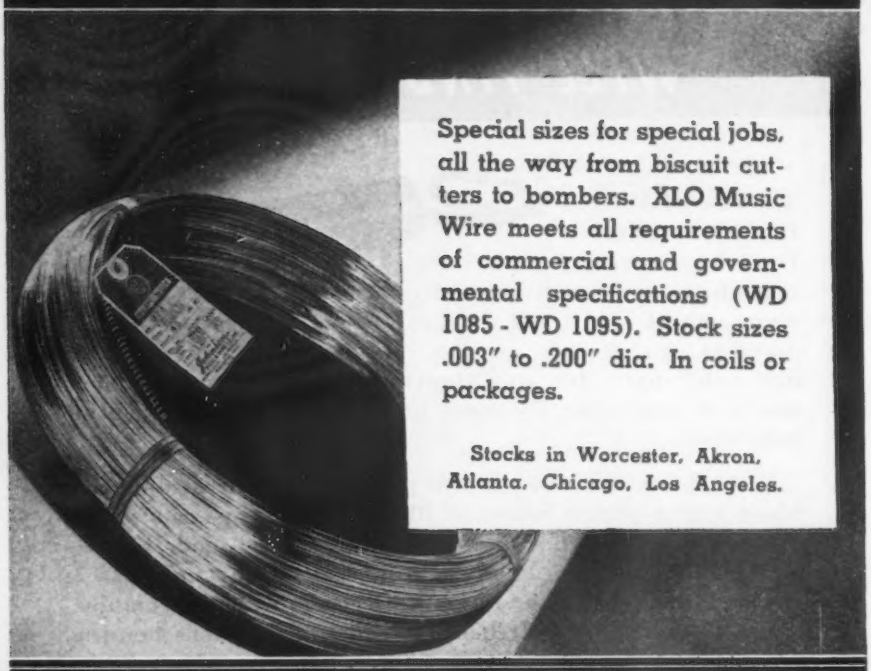
Improved Moderate Speed VACUUM PUMPS

JOHNSON XLO Music Wire



Special sizes for special jobs, all the way from biscuit cutters to bombers. XLO Music Wire meets all requirements of commercial and governmental specifications (WD 1085 - WD 1095). Stock sizes .003" to .200" dia. In coils or packages.

Stocks in Worcester, Akron, Atlanta, Chicago, Los Angeles.

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WORCESTER 1, MASSACHUSETTS.
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

Did you Know?

Over 50% of furnace wall radiation losses alone can be stopped? Therm-O-Flake Insulation is preferred for this work in most steel plants.

Here's why!

Highest insulating value — easy to apply — low maintenance — low cost — high reclamation — sticks tightly to silica or basic brick — permits closer control of fuel-air ratios — reduces cold air infiltration.

Write for literature

Illinois Clay Products Company
JOLIET, ILL.

Therm-O-flake
HIGH TEMPERATURE INSULATION
BRICK - BLOCK - COATINGS - CONCRETE - GRANULES

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Carload lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	36c.
L.c.l. lots	38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk	34c.
L.c.l. lots	35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si	6.65c.	7.10c.	7.25c.
75% Si	8.05c.	8.20c.	8.75c.
80-90% Si	8.90c.	9.05c.	9.55c.
90-95% Si	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.
2000 lb. to carload	6.30c.
Less ton lots	6.55c.

Ferrochrome

(*65-72% Cr, 2% max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more... $1.90

Ferrovanadium, 50-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open Hearth	$2.70
Crucible	$2.80
Primos	$2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.

2000 lb. to carload	$1.20
Under 2000 lb.	1.30
Per lb. alloy	$1.20
Ton lots	$1.25

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots	25c.
2000 lb. to carload	26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots	58c.
2000 lb. to carload	59c.

Grainal No. 1, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis, per lb. ..... 87.5c.

Bortram, f.o.b. Niagara Falls

Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.

2000 lb. lots	$2.25
Under 2000 lb. lots	$2.30

Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium ... $1.23
Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum ..... 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant with usual freight allowances, per lb. of alloy
Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 6.5c.
Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots	8.75c.
Ton lots	9.25c.

FOR ALL TYPES of INDUSTRIAL FURNACES

NATIONAL AIROIL FUEL OIL - GAS BURNERS

Movable Flame Billet Heating Oil Burner

In this unit, the burner is arranged on a sliding carriage with a ball and socket adaptor which permits easy and exact placement of the flame to any part of the furnace and withdrawal of the burner from the furnace when not in use. The burner furnished with this unit is the Type SA, illustrated below.

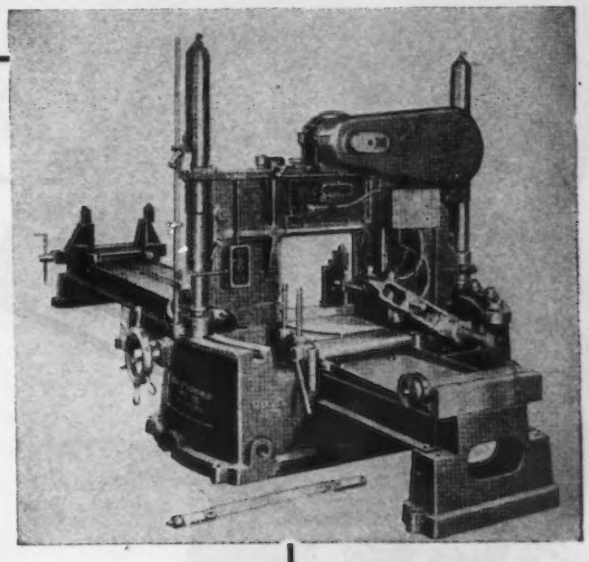
With extension tip for firing heavy fuel oil or tar, using steam or compressed air for atomization. Venturi throat and internal expansion insures fine atomization and low steam or air consumption. Holds steady as a gas flame. Tips for cone, round or flat flame of any angle.

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

Type SA

NATIONAL AIROIL BURNER COMPANY, INCORPORATED
1271 East Sedgley Ave., Philadelphia, Pa.
ESTABLISHED 1912 INCORPORATED 1917

CUTS the Toughest Steels and Largest Sizes *easily.*



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18
Giant Hydraulic Hack Saw
Capacity 18"x18"
Cuts angles up to 45° by simply swiveling upper machine housing.

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ARMSTRONG-BLUM MFG. CO.
"The Hack Saw People"
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Eastern Sales Office
225 *Lafayette St.,*
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Production line installations like these show how Farquhar Hydraulic Presses are meeting today's unprecedented industrial demands. They are examples that may well point your way to profitable peacetime operations.

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Farquhar Hydraulic Press Engineers know how to apply their equipment to modern production. With

FOR SPEED....ACCURACY
PRODUCTION

The IRON AGE

ESTABLISHED 1855

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March 23, 1944

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The Silent Doers

SOMETIMES one observes what is and sometimes he may observe even more forcibly what isn't. Like the man who, seeing the prairies for the first time, asked: "Where are the mountains?"

Anyone who has had sufficient contact with industry must have observed that the doers are usually men of few words. The engineers, production men, foremen, superintendents and active managers are in the category of "the strong and silent" who do not talk much.

Not that they cannot talk, and eloquently, when they see fit. But to see fit they first must know that you are genuinely interested in what they are doing, and second that you are capable of understanding it. Otherwise they feel that their time can be better spent.

Shop talk is as a rule confined to the fewest and shortest words necessary to convey an idea clearly. It is concise, which means that it expresses much in few words. That this is an asset and not a liability is proved by the fact that it gets things done. Verbosity either in speech or writing leads to confusion of thought or conceals a lack of it. It was said of Charles E. Sorensen, the noted Ford production executive, that if you wanted him to read a letter or a statement you had best get it all on one page.

What a blessing it would be if our statesmen and administrative officials would adopt this principle of brevity plus clarity. Not only would it save the time required to turn out and to read billions of unnecessary words and thus automatically solve the paper shortage, but one would know what they meant and also whether they were merely concealing a crooked needle of thought in a verbal haystack.

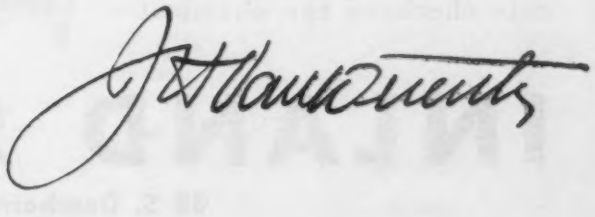
The Baruch report, like some others written by doers called to Washington, is a fine example of clarity and brevity. But it is a report only and God alone knows what will happen to its understandability after the legalistic phrase makers get through with it.

When you are hiring a doer in industry you are looking for a smooth thinker. If the applicant for the job is glib or garrulous, he has two strikes on him to start with.

One reason why we and the rest of the world are in such a mess is that we select our elected officials on the basis of word tonnage rather than performance poundage. George Romney of the Automobile Manufacturers' Association has well expressed this as follows:

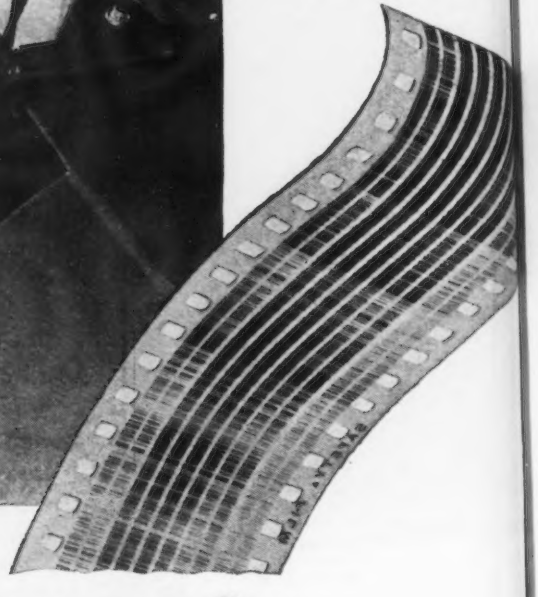
"There is one peculiarity about the past decade that is startlingly obvious. This is the curious fact that for about ten years in virtually all of the so-called civilized countries, the management of human affairs gravitated strongly into the hands of leaders who could talk glibly, write elegantly and argue forcibly but who were notoriously deficient in the ability to act competently."

After that, perhaps the less said the better.



Examination of the spectrum emanating from the vaporization of the steel sample in an electric arc quickly reveals the chemical content of the sample.

A spectrographic film provides a permanent record of each sample.



How the Spectrograph Helps Maintain Inland Quality

Every open hearth heat run at the Inland mills is checked not only by routine control methods of chemical analysis, but also in a special spectrographic laboratory.

Inland was one of the first steel mills in America to install and develop technique for using the spectrograph in control of quality. An important advantage of this method is the rapidity with which tests can be made. At any stage during the working of a heat a melter can have an accurate check on the chemical content within ten minutes after a sample is delivered to the laboratory. Not only do these frequent and rapid tests assure the uniform high quality of Inland steel, but they also help maintain capacity production—a vital necessity in this time of war.

The spectrographic analysis is only one of the many checks and balances used by Inland in the production of steel—it is only one of the numerous quality control methods adopted by Inland after rigid tests prove their practicability.

ARMY E NAVY

INLAND STEEL CO.

38 S. Dearborn Street • Chicago

Sales Offices: Milwaukee Detroit St. Paul St. Louis Kansas City Cincinnati New York

The IRON AGE
MARCH 23, 1944

NEWS FRONT

► The Steel Division of WPB, which at one time had 800 employees, now has less than 450.

► At Wright Field, an expanded program for disposal of surplus aircraft material is taking shape. The program, formulated by Lt. Col. A. E. R. Peterka, contemplates distribution of surplus materials by gathering them at centralized depots from which they will be filtered out through industry-operated warehouses or directly from contractors' plants to the warehouse distributors.

► Reductions in magnesium production at five plants have been ordered by WPB. The reduction will amount to about 33,750,000 lb. annually or less than 6 per cent of national capacity.

► The Truman Committee expects total employment to reach 53,400,000 by July with unemployment remaining at approximately the present level of one million.

The committee has taken a stand against the argument that reducing the civilian economy to bare levels of subsistence will bolster the morale of the men in the armed services.

They argue that a sound healthy economy must be maintained to wage a long war and provide jobs for the returning fighters.

► The much-juggled 1944 truck program has been shaken down more than 15 per cent in the Army vehicle category. Of the 742,433 military units originally planned for production this year, 123,149 have been eliminated, including 42,013 medium and 81,136 light trucks.

More facts on cutbacks are coming to light. Jeep production has been severely reduced, and the entire half-track program has been all but eliminated.

► Authorization has come from WPB for completion of the structural steel mill at the Geneva plant. When completed, the 26-in. mill will have an annual capacity of 200,000 net tons of structural shapes, billets and rounds.

Rail rates are now being studied since the entire economy and future of Geneva operations depend almost entirely on what the rail rate to Coast points will be.

► Rumors are being circulated that ship construction after June, 1944, will be curtailed drastically.

► Additional experimental evidence on the effects of sub-zero cooling on the tempering of high speed steel indicates that this practice will within the next few years become a routine commercial practice.

The maximum secondary hardness is attained in the sub-zero treated specimens at a lower temperature--and in a shorter time--than that for specimens in which the cooling was stopped at room temperature.

Indications are that sub-zero treatment following the first tempering operation will eliminate the need of a third tempering operation to secure a completely tempered martensitic structure.

► A survey of commercial installations of submerged heating of pickling solutions indicates that they may well result in considerable saving in time, acid and equipment. Better pickling department working conditions also result.

► The Progressive Welder Co. is now marketing a practical d.c. resistance welder using storage batteries as a source of welding current.

► By setting up an ideal gear with no error, a method has been developed to present a general classification of spur gear errors and a method of recording and evaluating the deviations.

► According to the Algiers radio consideration is being given to the use of helicopters in evacuating wounded men from the high mountain positions in Italy. At most only two wounded could be carried at one time.

► One of the smarter London dailies has discovered a new German secret weapon. Newly invented aircraft loudspeakers will pour an incessant flood of sound on England, destroying the nerves of the population. No mention is made of what the aircraft crews will use to save their own nerves. Probably an ear plug--i.e., a round peg in a square head.

. . . Some Effects of Sub-Zero C

By G. A. ROBERTS
Research Metallurgist,
and
J. P. GILL
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INTEREST in the application of sub-atmospheric temperatures to the heat treatment of metals has recently reached a new high. This is especially true for the heat treatment of high speed steel. At the present time it is too early to present detailed, accurate and complete information concerning the increase in cutting tool performance obtained when high speed steel is subjected to treatments involving the use of sub-zero temperatures. Suffice it to say that favorable reports have been made and that without doubt a further and continued investigation of the merits of this process is warranted.

Rather meager knowledge of the effects and benefits of such treatments on high speed steel has been obtained within the past several years, although it must be admitted that metallurgists have been aware of the possibility of transforming retained austenite to martensite by the use of sub-zero temperatures for several decades.

In 1937 Gulyaev[1] reported that the sub-zero treatment of high speed steel permits higher cutting speeds when working with short chips. Two year later this same author[2] investigated the kinetics of the sub-atmospheric austenite transformation in high speed steel by making magnetic measurements during cooling to —297 deg. F. He showed that, after hardening at the usual temperatures, the austenite transformation range extends well below room temperature but that complete transformation of the austenite is not attained by such sub-zero cooling. He also found that room temperature aging of hardened high speed steel stabilizes the retained austenite so that the sub-atmospheric transformation is partially suppressed.

[1] *A. Gulyaev, "Improved Heat Treatment of High Speed Steel to Improve Cutting Quality," Metallurg, Vol. 12, 1937, pp. 65 to 77.*

[2] *A. Gulyaev, "Transformation of Retained Austenite at Sub-zero Temperatures with High Speed Steel," Metallurg, Vol. 14, 1939, pp. 64 to 77.*

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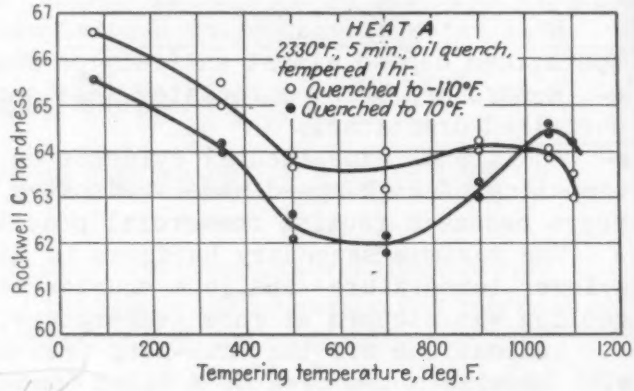
FIG. 2 — Effect of sub-zero hardening on the tempering of high speed steel at temperatures between 80 deg. F. and 1200 deg. F.



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The first comprehensive American paper to be published on this subject appeared in 1942[3].

In it the authors, Gordon and Cohen, verified the findings of Gulyaev by means of hardness, dilatometric, magnetic and specific volume measurements. In addition, these authors showed that the sub-zero cooling not only provides, in certain instances, an increase in hardness and strength but also results in a remarkable increase in ductility. These results are summarized in Table V of their paper which is reproduced as Table I herein.

[3] *M. P. Gordon and M. Cohen, "Transformation of Retained Austenite in High Speed Steel at Sub-Atmospheric Temperatures," Transactions A.S.M., Vol. 30, 1942, p. 569.*

A brief review of the fundamental principles of hardening high speed steel is warranted to permit a more thorough understanding of the phenomena occurring during sub-zero treatments. At the hardening temperature, high speed steel (of any type) consists of a mixture of highly alloyed austenite and undissolved complex carbide. The latter occupies from 5 to 10 per cent of the volume of the steel. On oil quenching (or even air cooling) the austenite is stable until the M-point is reached. The dilatometric curve for the cooling of an 18-4-1 type high speed steel from 2350 deg. F. to sub-zero temperatures (Fig. 1) illustrates this state of affairs. On cooling below the M-point the austenite continuously

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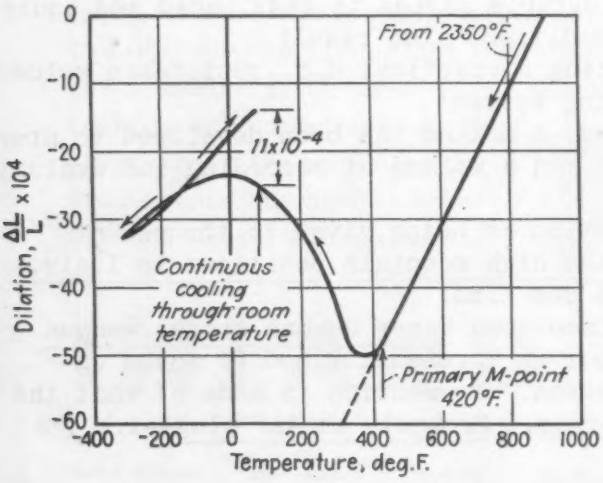
LEFT

FIG. 1—Dilatometric curve of an 18-4-1 high speed steel cooled from 2350 deg. F. to —310 deg. F. showing the M-point and the continuous nature of the austenite-martensite reaction on cooling to below room temperature. After Gordon and Cohen[3].



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Cooling on the Tempering of High Speed Steel

. . . Great attention is now being given to the application of sub-atmospheric treatment of metals, particularly high speed steel. The authors herein review past work and give data on recent experiments indicating that this treatment has very important commercial applications that will become quite prominent within the next several years.

decomposes into martensite. It is to be particularly noted that this decomposition exhibits no discontinuity at room temperature but proceeds until a temperature of —150 deg. F. is reached.

It is generally agreed that approximately 20 per cent austenite remains at room temperature. When cooled directly to temperatures of —310 deg. F., 60 per cent of this austenite, retained at room temperature, transforms to martensite. The major portion of this additional transformation occurs on cooling to temperatures of —110 deg. F. and thus it can be assumed that after cooling to this latter temperature the retained austenite in high speed steel amounts to only 8 or 10 per cent by volume. The M_c—and M_{90}—points* for high speed steel of this type, austenitized at 2350 deg. F., are therefore, 420 deg. F. and —110 deg. F. respectively.

If the austenite is permitted to remain at room temperature for even short periods of time it is partially stabilized. However, on further cooling at least 30 per cent of the austenite retained at room temperature will transform to martensite resulting in a retained austenite content of 14 to 15 per cent at —110 deg. F. If, on the other hand, the cooling is stopped before room temperature is reached, there will be considerable quantities of retained austenite when the steel is heated for tempering. It is estimated that at a temperature of 275 deg. F. approximately 65 per cent austenite remains untransformed.

The data recorded below are the results of recent experiments which were undertaken as a part of the comprehensive program to enable a better understanding of the practical aspects of sub-zero hardening of high speed steel. The analyses of the two

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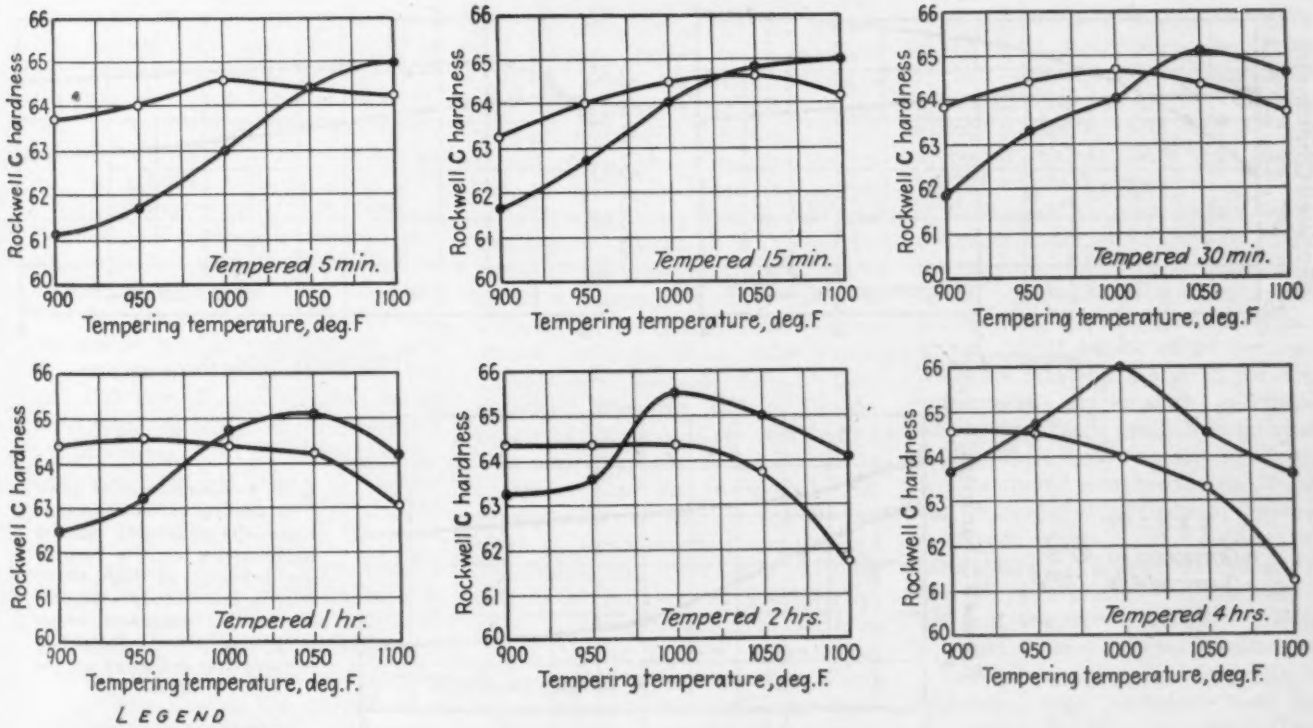
The use of the numeral subscripts in this sense to indicate the amount of martensite in per cent which exists at any temperature is perhaps more satisfactory than the use of other methods since it permits a quantitative representation of the whole course of the austenite-martensite reaction in a simplified manner.

FIG. 3—Comparison of effect of cooling to room temperature with cooling to sub-zero temperatures on the tempering behavior of high speed steel in the secondary hardening range. Hardness versus tempering temperature. Tempering times indicated on the curves.



high speed steels used in this investigation follow:

Heat A

	Per Cent
Carbon	0.70
Silicon	0.28
Manganese	0.21
Sulphur	0.010
Phosphorus	0.017
Tungsten	17.70
Chromium	4.01
Vanadium	1.01

Size: 3/8 in. sq. x 3 in.

Heat B

	Per Cent
Carbon	0.74
Silicon	0.33
Manganes	0.21
Sulphur	0.013
Phosphorus	0.019
Tungsten	17.68
Chromium	4.05
Vanadium	1.03

Size: 5/16 in. sq. x 2 1/2 in.

The specimens were preheated at a temperature of 1450 deg. F. in a salt bath, then transferred to a high temperature salt bath maintained at 2330 deg. F. In all cases the austenitizing time, not including the time required for heating to the bath temperature, was 5 min. The specimens were oil quenched to a temperature of approximately 800 deg. F. and then air cooled to room temperature. The samples subjected to the sub-zero treatment were immediately placed in a mixture of dry ice and alcohol maintained at a temperature of —110 deg. F. and left in this bath for a period of 2 hr. Tempering was conducted in a salt bath at the temperature and for the times indicated in the tables and illustrations.

The sub-zero temperatures used in these experiments were obtained in a simple metal chamber, 12 in. in diameter by 20 in. high, insulated on all sides with 12 to 15 in. of sawdust. The alcohol used was a commercial grade. Maintenance of a temperature of —110 deg. F., measured with either a copper-constantan thermocouple or with a low temperature thermometer, for periods of 6 to 8 hr. was possible with approximately 15 lb. of dry ice in 4 to 5 gal. of liquid. The consumption of dry ice, of course, increases as the amount of metal to be treated increases.

In all cases the hardness of the specimens as quenched to room temperature but without benefit of the sub-zero treatment ranged between 64.7 and 65.5 Rockwell C before tempering. On the other hand, the hardness of specimens which were subjected to the dry ice treatment ranged between 65.7 and 66.3 Rockwell C before tempering.

In order to compare the effects of sub-zero hardening upon the complete tempering curve for high speed steel Fig. 2 is included. It will be noted that the sub-zero hardened specimens are superior in hardness after a 1 hr. tempering treatment until a temperature of approximately 1000 deg. F. is reached.

The cooling high speed steel con-

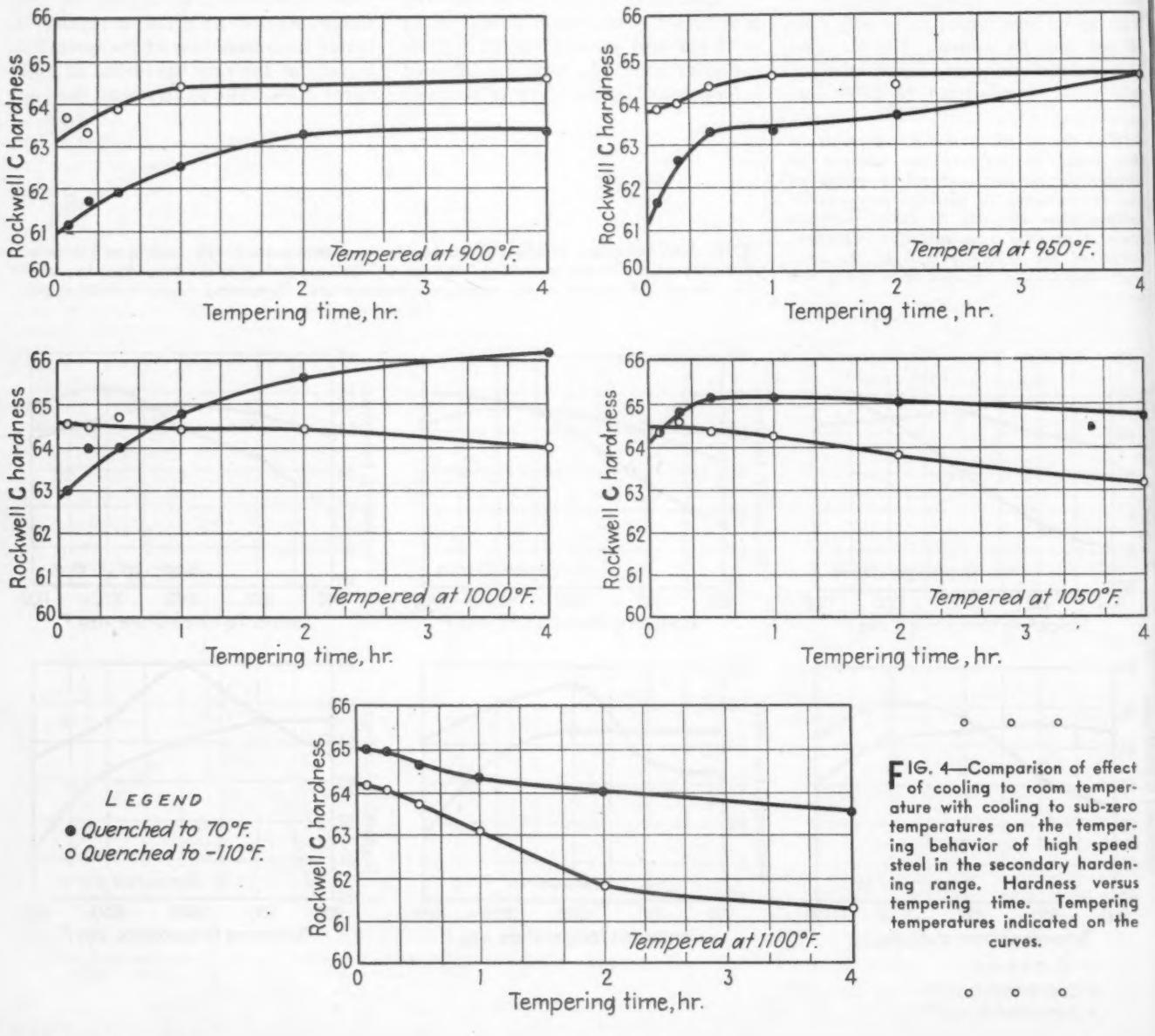


FIG. 4—Comparison of effect of cooling to room temperature with cooling to sub-zero temperatures on the tempering behavior of high speed steel in the secondary hardening range. Hardness versus tempering time. Tempering temperatures indicated on the curves.

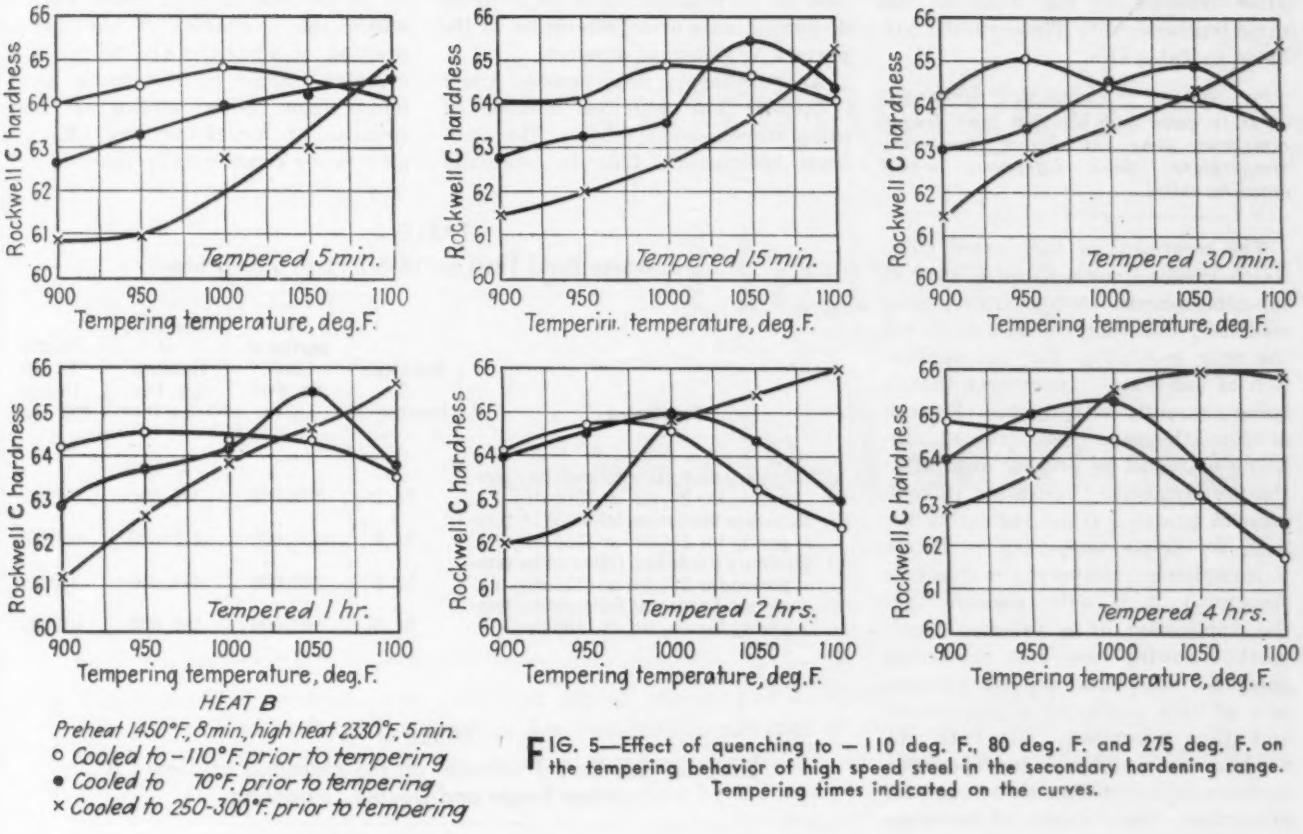


FIG. 5—Effect of quenching to −110 deg. F., 80 deg. F. and 275 deg. F. on the tempering behavior of high speed steel in the secondary hardening range. Tempering times indicated on the curves.

tinuously from the austenitizing temperature to sub-zero temperatures does not always result in an improved hardness after tempering is revealed by Figs. 3 and 4 which record the results of tempering experiments conducted within the secondary hardening range only. Examination of Fig. 3 reveals that even at normal tempering temperatures of between 1000 and 1050 deg. F. high speed steel samples which have been cooled to room temperature are often superior in hardness to those which have been cooled to —110 deg. F. in a mixture of dry ice and alcohol. It is apparent that the maximum secondary hardness is attained in the sub-zero treated specimens at a lower temperature—and in a shorter time (see Fig. 4)—than that for specimens in which the cooling was stopped at room temperature. At tempering temperatures of 900 and 950 deg. F. the samples which have been treated at sub-atmospheric temperatures are considerably superior in hardness, while at tempering temperatures of 1050 and 1100 deg. F. the reverse is true.

The results shown in Figs. 3 and 4 are verified in Fig. 5 which records the data obtained from a series of experiments on Steel B. Included also was a study of the effect of arresting the cooling during the quench at a temperature considerably in excess of room temperature. A complete study of the effect of such arrested quenching on the tempering of high speed steel has been recently published by Gordon, Cohen and Rose[4].

[4] *M. P. Gordon, M. Cohen, and R. S. Rose, "Effect of Quenching Bath Temperature on the Tempering of High Speed Steel" Preprint Number 34, A.S.M. 1943.*

Knowledge of this behavior is important since in many commercial heat treating procedures high speed steel is never permitted to reach room temperature prior to the initial tempering operation. As would be expected from the trend shown in Figs. 3 and 4, arresting the cooling at a temperature between 250 and 300 deg. F. results in a further increase in the temperature required to obtain maximum secondary hardness, while at the lower tempering temperatures such specimens show exceptionally low hardness values. Data assembled from the work of Gordon, Cohen and Rose[4] confirm this finding.

In tempering, the decomposition of austenite must be preceded by the precipitation of complex alloy carbides at the tempering temperature. The subsequent lowering of the alloy content of the retained austenite enables its transformation to martensite on cooling to room temperature. It is natural to assume that it will take a longer time to decompose large amounts of austenite than small amounts. Thus, after tempering at low tempering temperatures within the secondary hardening range the steel in which the initial cooling is stopped at or above room temperature will still contain quantities of retained austenite and will possess lower hardness values than the steel which was initially cooled to sub-zero temperatures. After tempering at higher tempering temperatures the large quantities of martensite in the latter steel have begun to soften slightly while the former steel is approaching its maximum hardness closely associated with, but slightly preceding, the complete transformation of retained austenite.

When room temperature is reached, therefore, assuming complete transformation of all of the retained austenite, specimens which have been subjected to sub-atmospheric temperatures should consist of 90 per cent tempered martensite and 10 per cent untempered martensite; specimens which have been quenched to room temperature should consist of 80 per cent tempered martensite and 20 per cent untempered martensite; whereas specimens in which the cooling has been stopped at a temperature of 275 deg. F. will probably consist of 35 per cent tempered martensite and 65 per cent untempered martensite.

Isolated experiments of multiple tempering have indicated that the differential in hardness created between these specimens after single tempering is partially maintained

after retempering for 2 hr. at the same temperature*. These results are listed in Table II.

**It is quite possible that with longer tempering times or higher tempering temperatures these differences would cease to exist.*

The treatment of high speed steel, which involves subjecting the steel to sub-atmospheric temperatures immediately following the quench, is not the only possibility for the application of sub-zero temperatures that is being currently investigated. Since it is often the case that retained austenite may still be present even after the first tempering operation in commercial practice (thus indicating the need for triple tempering to obtain a completely tempered martensitic structure) it is quite possible that the application of a sub-zero treatment following the first tempering operation will cause the transformation of this austenite to martensite and thus essentially eliminate the need for a third tempering operation in order to achieve the same physical properties. The dangers of breakage are reduced if this procedure is followed since a large part of the structure is tempered martensite. In direct cooling to sub-zero temperatures following the quench only untempered martensite is present and a certain percentage of breakage can occur.

The sub-zero treatment has also been applied to "fully tempered" tools of high speed steel with apparent increases in tool life. If such a treatment proves to be reliable and useful its basis must lie in either the transformation of small amounts of retained austenite to martensite or in some new phenomenon which may unsuspectedly be occurring during the cold treatment, such as a precipitation of carbide particles in a finely dispersed state or an alteration in the pattern of internal stresses.

As with every new process, there is almost an unlimited number of attempts made to develop the optimum treatment. This is especially so in the case of high speed steel in which the mechanics of the decomposition of austenite are normally so complex. Some of the many treatments now being attempted show promise of increasing tool life and may prove commercially feasible.

TABLE I

Transverse Bend Tests on 18-4-1 High Speed Steel[3]

Treatment	Rockwell C Hardness	Proportional Limit, Lb. Per Sq. In.	Modulus of Rupture, Lb. Per Sq. In.	Plastic Strain, Inches Per Inch
(a) Ordinary hardening followed by tempering for 2½ hr. at 1050 deg. F.	65.0	280,000	386,000	0.0007
(b) Sub-zero hardening followed by tempering for 2½ hr. at 1050 deg. F.	66.0	320,000	412,000	0.0015
(c) Ordinary hardening followed by tempering for 2½ hr. at 1150 deg. F.	63.0	220,000	444,000	0.0017
(d) Sub-zero hardening followed by tempering for 2½ hr. at 1150 deg. F.	62.5	240,000	435,000	0.0102

[3] loc. cit.

TABLE II

Effect of Sub-Zero Treatment on the Hardness of Steel "A" After Single and Double Tempering

Tempering Temperature, Deg. F.	Tempering Time	HARDNESS ROCKWELL C			
		Quenched to −110 Deg. F.		Quenched to 70 Deg. F.	
		Single Tempering	Double Tempering*	Single Tempering	Double Tempering*
900	4 hr.	64.7	65.1	63.3	64.0
950	1 hr.	64.7	64.9	63.3	64.5
1000	5 min.	64.6	65.0	63.0	66.1
1000	1 hr.	64.4	64.9	64.8	65.9
1000	4 hr.	64.0	64.5	66.2	66.0
1050	30 min.	64.4	63.8	65.2	65.1
1050	4 hr.	63.3	63.7	64.7	64.4
1100	30 min.	63.7	62.4	64.6	63.3
1100	4 hr.	61.3	61.3	63.6	62.6

* The hardness values recorded under the columns headed "Double Tempering" were all obtained after retempering the indicated specimens for 2 hr. at the indicated temperature, regardless of the initial tempering time of these specimens

Bearing Classification System for Small Motors

SMALL precision-type motors are assembled with bearings previously selected to match the diameter of the fits as the result of a method developed by R. R. Cameron, foreman at one of General Electric's plants.

New ball bearings as received are first checked on a series of pin gages to classify them according to inside diameter. Each gage is 0.0001 in. different in size. These sizes are arranged to spread over the usual bore tolerance of precision bearings and usually about four gages or pins are necessary. After each bearing is tried on a pin, it is placed in a tray marked with the size of the pin on which it was a snug fit.

Next these bearings are checked on a comparator dial gage for outside diameter and placed in rows in each tray according to 0.0001 in. variation in o.d. A comparator plug gage is used to determine the size of the bearing seat in the end shields and a suitable bearing is pressed into place. Not only is this bearing chosen from the correct row in the tray to fit the end shield, but the particular tray i.d. identification is noted in order to control the rotor fit. Each rotor is checked with a series of Carboloy ring gages 0.0001 in. different in size and the proper shaft is chosen to fit the bearing, depending on the fit desired.

With the bearings classified both according to outside and inside diameter, the proper size for both the shaft and end shield at hand can be chosen easily, and the unit assembled has the desired accuracy.

Submerged Heating Speeds Pickling

By THOMAS E. LLOYD
Associate Editor, THE IRON AGE

. . . The use of submerged combustion burners for heating pickling tanks has resulted in savings of time, acid, and equipment, as well as better working conditions in steel mill pickling departments, according to a survey of users of this equipment.

CONSIDERABLE success has been experienced in the use of submerged heating of pickling tanks in bar, wire, tube, sheet, and plate pickling. Installations of this equipment, built by the Submerged Combustion Co. of America, Inc., Hammond, Ind., are in operation in some of the largest and most modern steel plants in the country as well as in various heavy equipment manufacturing plants and navy yards. In a survey of several of the users of submerged heating equipment for heating pickling baths, the conclusion that it was very clean, economical, and very easy to maintain was general.

Actually, submerged heating dates back to the development of the first submerged combustion burner in 1887, a burner that was ignited by hand and lowered into the vat to be heated. However, the material used in the construction of this type burner was not corrosion resistant and was not particularly valuable for use in acid solution.

The modern version of the submerged combustion burner, which is only about six years old, has a simple and reliable system for ignition and control. The starting button actuates an especially designed gas-and-air compressor. The compressor delivers the products of combustion at a pressure sufficient to overcome the head of liquid that fills the combustion chamber and part of the burner tank. As the compressed air drives the solution from the burner, a hot wire igniter is heated to incandescence by the passage of a high-amperage low-voltage current, and, after a predetermined time, a flow of pilot gas is admitted to the igniter chamber where it is ignited. The main gas flow is then directed into the main burner where it is ignited by the pilot flame. The air-gas ratio is controlled automatically to give combustion efficiency. The set-up of this ignition and control system can be seen in Fig. 1.

When the main gas flame is ignited, the burner controls lock into a running position until the desired solution temperature is reached, when a thermostat acts to shut off the gas flow. The air continues to flow through the system to maintain a fixed rate of agitation regardless of solution temperature. When the solution cools the thermostat again acts and the controls re-cycle to automatically establish and ignite the gas flow. Solution temperatures can be maintained as close as 0.5 deg. F. if necessary, but for normal operation the control range is usually set at from 3 to 5 deg. F.

In steel mill pickling, one of the unique advantages of the system is the maintenance of temperature with agitation of the bath, plus the fact that there is no dilution of the bath because of steam being introduced into it. On the contrary, the bath actually becomes slightly more concentrated because of evaporation of the water facilitated by the agitation at the higher temperatures.

The products of combustion in this system of bath heating are discharged directly into the tank bath, creating a very active agitation which would be almost impossible to duplicate mechanically. Such agitation and controlled temperature are claimed to reduce pickling time on certain grades of steel as much as 70 per cent over the steam heated bath.

Tube Etching

At one particular plant that manufactures high grade welded tubing, the use of submerged heating had

TABLE I
Operations Required

Steam Heated Tank	Submerged Combustion Heated Tank
Pickle, sulphuric acid	Pickle, sulphuric acid, submerged heating
Rinse in steam heated tank	Cold rinse
Lime dip, steam heated tank	Lime rinse, submerged heating
Special etch, steam heated	Dip in drawing compound (eliminate bench lubrication entirely)
Rinse	
Dip in drawing compound (either in tank or at drawing bench)	

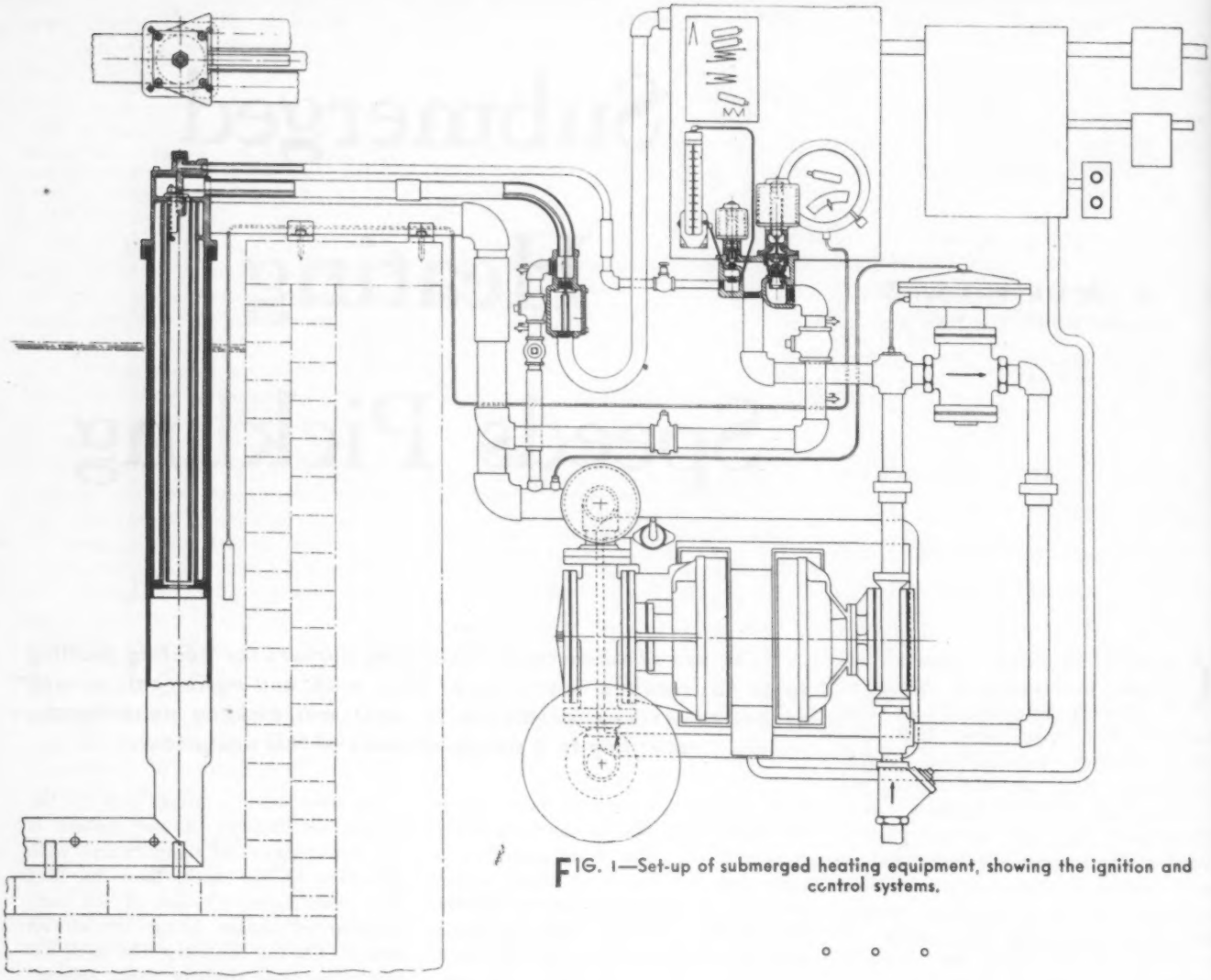


FIG. 1—Set-up of submerged heating equipment, showing the ignition and control systems.

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some very specific advantages. Previously six operations were required to get the desired results, but the new practice enabled the elimination of two of these operations. These set-ups are shown in Table I and the present layout is illustrated in Fig. 2.

In a normal day's operation, some 900,000 ft. of tubing are handled through the pickling department of this plant, and all of it is now handled in the tanks equipped with submerged heating equipment. About 75 per cent of the work must undergo further drawing which formerly required a heavy drawing compound, but now a dip lubricant proves sufficient. Furthermore, with previous equipment it was estimated that from 750,000 to 1,200,000 B.t.u.'s per hr. input was necessary to maintain operating temperatures, whereas with the immersed heat-exchanger burners the input runs only about 250,000 B.t.u.'s per hr.

In this operation, the purpose is somewhat different from normal steel mill purpose for pickling. In the tube pickling, it is not primarily the intent to remove mill scale but to produce an etched surface on the cold-finished tubing. This etched surface facilitates further cold drawing.

The tubing is all electric resistance welded from strip steel. To procure the desired etch is more difficult and exacting than the removal of scale, and instead of using inhibitors to retard the acid attack on the metal, stronger acid solutions, higher temperatures, and longer immersion times are employed. With previous pickling facilities, this work could not be accomplished as completely as now, so comparison of costs between the two

TABLE II

Unit No.	Heat Input, B.t.u.	Tank Capacity, Gal.	Acid Content of Bath	Operating Temperature, Deg. F.	Operating Cycle, Min.	Products Pickled in Tank
1	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
2	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
3	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
4	750,000	5300	6 to 10	165–170	25–45	Wire rods
5	500,000	2900	6 to 10	165–170	25–45	Wire rods
6	500,000	300	10 to 20	170–175	Varies	Pickle pointing

methods would not be practical. The present set-up would serve for scale removal if necessary.

Advantages pointed out by this manufacturer are that the pickling room is clean, practically dry, and free from acid fumes and steam at all times. Comfortable temperatures and working conditions are maintained. Furthermore, with the flame used for heating being beneath the surface, all heat is absorbed by the bath; the violent agitation of the bath produces a more rapid and uniform action on the work; and acid consumption is reduced considerably as the acid content of the bath is never diluted by condensation as is the case with the usual method of discharging steam into the tank.

Removal of fumes and steam created by the elevated tank temperatures is accomplished by blowing air across the top of the tanks and exhausting it from the opposite side. By this method, the tanks are entirely open on top for crane handling of the work and the fume removal is quite effective.

The acid tank is steel, rubber lined with acid-proof brick inside the rubber coating. The four tanks (pickle, rinse, lime, and lubricating) are set in a pit that is equipped with an acid-proof floor and walls. The space between the tanks and the walls is covered by removable concrete slabs which provide a smooth floor and convenient working platform for the workmen, yet leave the lower part of the tank accessible.

Plate and Sheet Pickling

Another user of submerged heating equipment, a midwest steel plant that uses the equipped tanks for pickling steel sheets and plate, cites equally favorable results. In this case, two Rocker type pickling units are operated, one being heated with steam from the plant steam supply system and the other equipped with a submerged heating system using natural gas. The units are large, each having 1,500,000 B.t.u. rated input with a capacity of 6100 gal. and operating on an acid-water ratio of 8 to 92 per cent, at temperatures in the neighborhood of 185 deg. F. The operating cycle alone favors the submerged heating unit by 35 per cent, with the pickling time for the submerged heated tank 12 to 15 min., and for the steam heated tank ranging from 16 to 20 min. As the two picklers are operated at the same temperature, the gain in time is due entirely to greater agitation created by the submerged heating exhaust through the bath.

The faster pickling produces considerably greater tonnage, making it highly desirable where pickling capacity is limited. Furthermore, in plants where steam capacity is limited, submerged heating could be used, making unnecessary the installation of additional high cost steam generating facilities. This company reported that the costs of operating the two units were not separated. However, the burner and compressor service cost is known to be higher than the steam using acid-proof brass pipe, but the cost per ton produced with the increased tonnage afforded by the tanks with submerged heating is minor. The only objection registered was that operators of the units with submerged heating must be more skilled to obtain best over-all results.

Pointing and Rod Pickling

Another midwestern steel plant has been using submerged heating since 1934 and in 1939 went 100 per cent to this type of heating for pickling tanks. Carbon and alloy steel bars and wire rods are pickled and one unit is used for pickle pointing. Table II shows the set-up of these six units.

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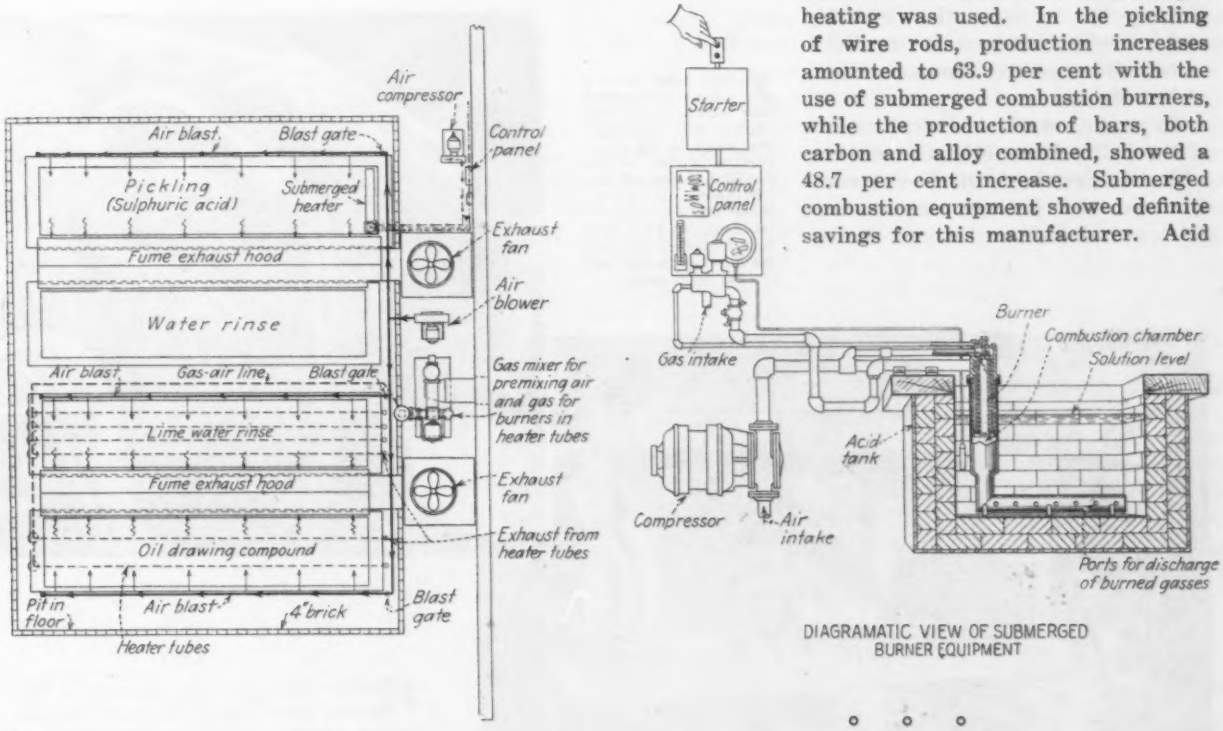

DIAGRAMATIC VIEW OF SUBMERGED BURNER EQUIPMENT

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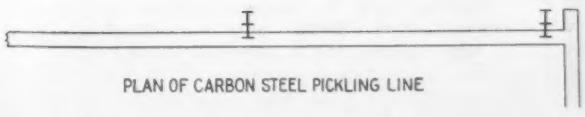

PLAN OF CARBON STEEL PICKLING LINE

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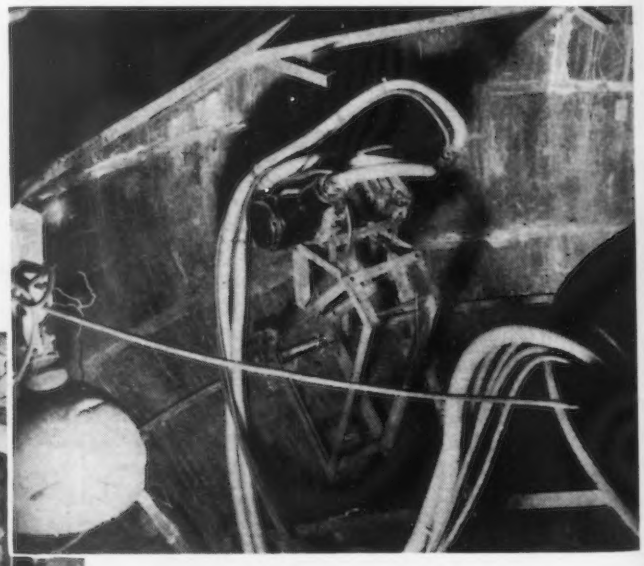

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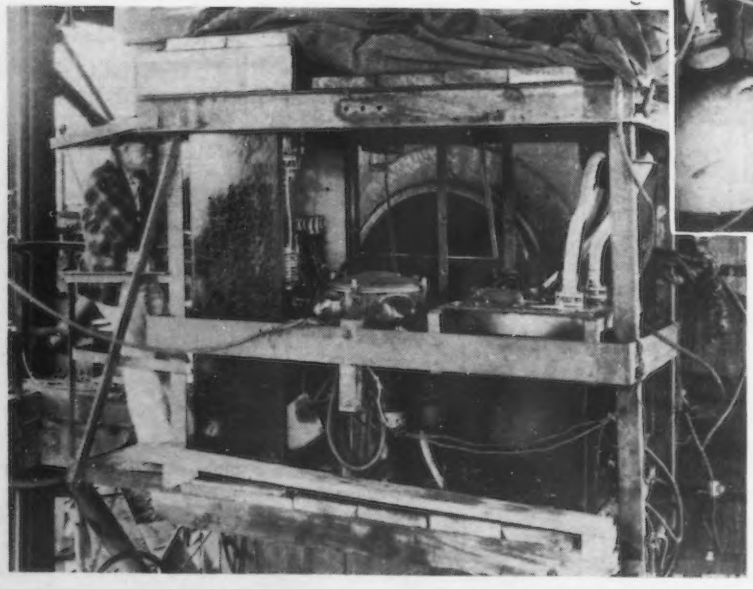

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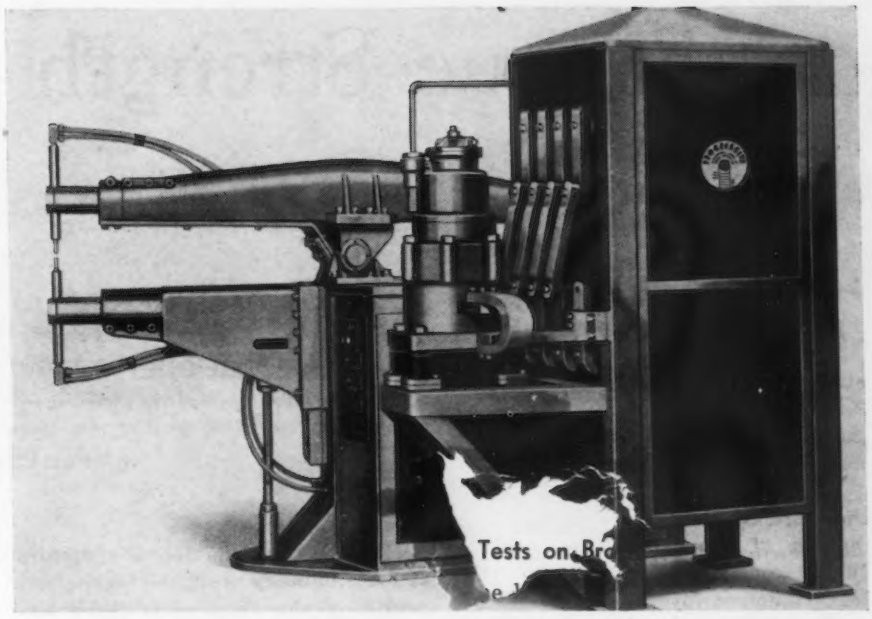

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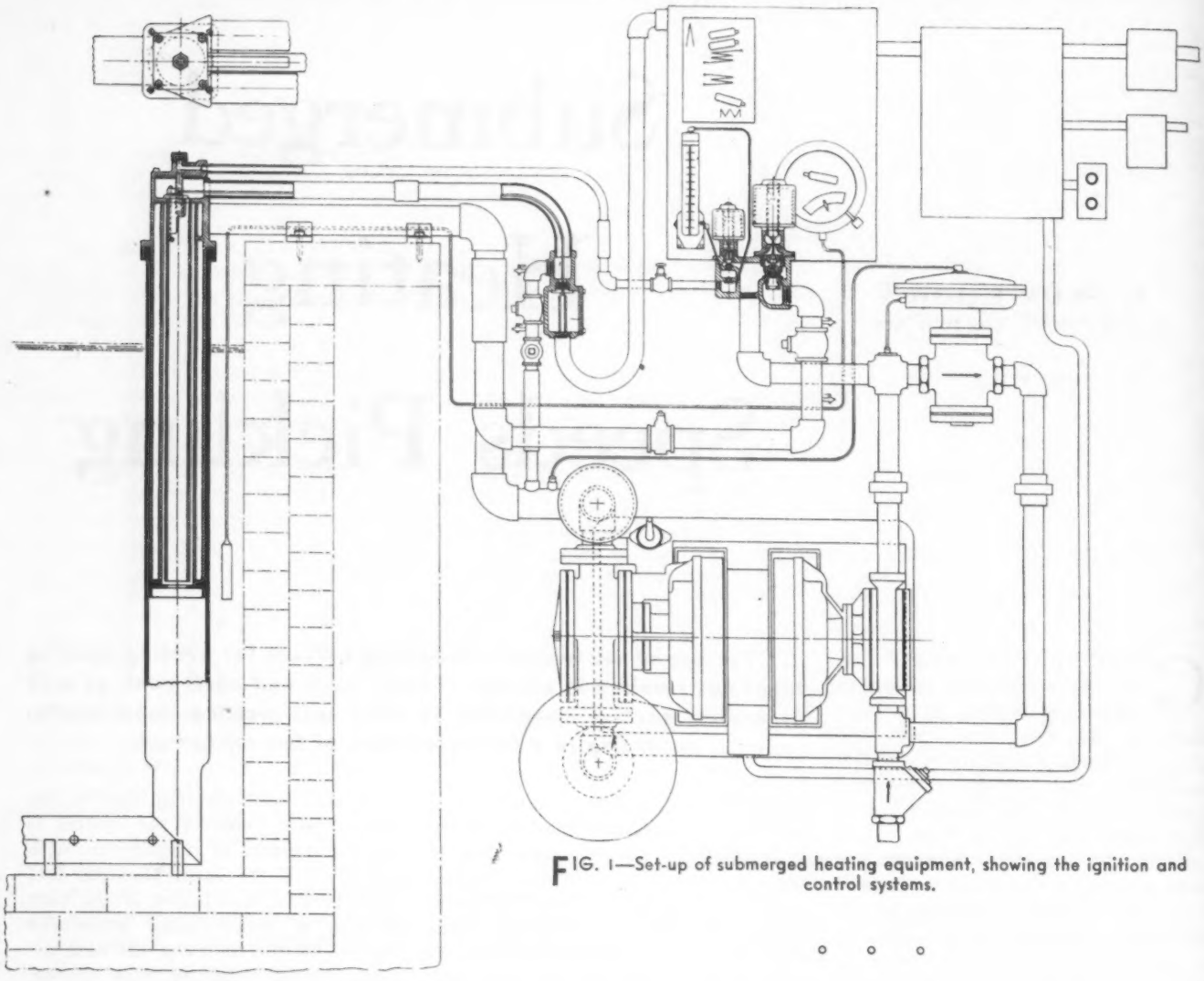

FIG. 1—Set-up of submerged heating equipment, showing the ignition and control systems.

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some very specific advantages. Previously six operations were required to get the desired results, but the new practice enabled the elimination of two of these operations. These set-ups are shown in Table I and the present layout is illustrated in Fig. 2.

In a normal day's operation, some 900,000 ft. of tubing are handled through the pickling department of this plant, and all of it is now handled in the tanks equipped with submerged heating equipment. About 75 per cent of the work must undergo further drawing which formerly required a heavy drawing compound, but now a dip lubricant proves sufficient. Furthermore, with previous equipment it was estimated that from 750,000 to 1,200,000 B.t.u.'s per hr. input was necessary to maintain operating temperatures, whereas with the immersed heat-exchanger burners the input runs only about 250,000 B.t.u.'s per hr.

In this operation, the purpose is somewhat different from normal steel mill purpose for pickling. In the tube pickling, it is not primarily the intent to remove mill scale but to produce an etched surface on the cold-finished tubing. This etched surface facilitates further cold drawing.

The tubing is all electric resistance welded from strip steel. To procure the desired etch is more difficult and exacting than the removal of scale, and instead of using inhibitors to retard the acid attack on the metal, stronger acid solutions, higher temperatures, and longer immersion times are employed. With previous pickling facilities, this work could not be accomplished as completely as now, so comparison of costs between the two

TABLE II

Unit No.	Heat Input, B.t.u.	Tank Capacity, Gal.	Acid Content of Bath	Operating Temperature, Deg. F.	Operating Cycle, Min.	Products Pickled in Tank
1	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
2	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
3	1,500,000	6500	6 to 10	165–170	30–40	Carbon and alloy bars
4	750,000	5300	6 to 10	165–170	25–45	Wire rods
5	500,000	2900	6 to 10	165–170	25–45	Wire rods
6	500,000	300	10 to 20	170–175	Varies	Pickle pointing

methods would not be practical. The present set-up would serve for scale removal if necessary.

Advantages pointed out by this manufacturer are that the pickling room is clean, practically dry, and free from acid fumes and steam at all times. Comfortable temperatures and working conditions are maintained. Furthermore, with the flame used for heating being beneath the surface, all heat is absorbed by the bath; the violent agitation of the bath produces a more rapid and uniform action on the work; and acid consumption is reduced considerably as the acid content of the bath is never diluted by condensation as is the case with the usual method of discharging steam into the tank.

Removal of fumes and steam created by the elevated tank temperatures is accomplished by blowing air across the top of the tanks and exhausting it from the opposite side. By this method, the tanks are entirely open on top for crane handling of the work and the fume removal is quite effective.

The acid tank is steel, rubber lined with acid-proof brick inside the rubber coating. The four tanks (pickle, rinse, lime, and lubricating) are set in a pit that is equipped with an acid-proof floor and walls. The space between the tanks and the walls is covered by removable concrete slabs which provide a smooth floor and convenient working platform for the workmen, yet leave the lower part of the tank accessible.

Plate and Sheet Pickling

Another user of submerged heating equipment, a midwest steel plant that uses the equipped tanks for pickling steel sheets and plate, cites equally favorable results. In this case, two Rocker type pickling units are operated, one being heated with steam from the plant steam supply system and the other equipped with a submerged heating system using natural gas. The units are large, each having 1,500,000 B.t.u. rated input with a capacity of 6100 gal. and operating on an acid-water ratio of 8 to 92 per cent, at temperatures in the neighborhood of 185 deg. F. The operating cycle alone favors the submerged heating unit by 35 per cent, with the pickling time for the submerged heated tank 12 to 15 min., and for the steam heated tank ranging from 16 to 20 min. As the two picklers are operated at the same temperature, the gain in time is due entirely to greater agitation created by the submerged heating exhaust through the bath.

The faster pickling produces considerably greater tonnage, making it highly desirable where pickling capacity is limited. Furthermore, in plants where steam capacity is limited, submerged heating could be used, making unnecessary the installation of additional high cost steam generating facilities. This company reported that the costs of operating the two units were not separated. However, the burner and compressor service cost is known to be higher than the steam using acid-proof brass pipe, but the cost per ton produced with the increased tonnage afforded by the tanks with submerged heating is minor. The only objection registered was that operators of the units with submerged heating must be more skilled to obtain best over-all results.

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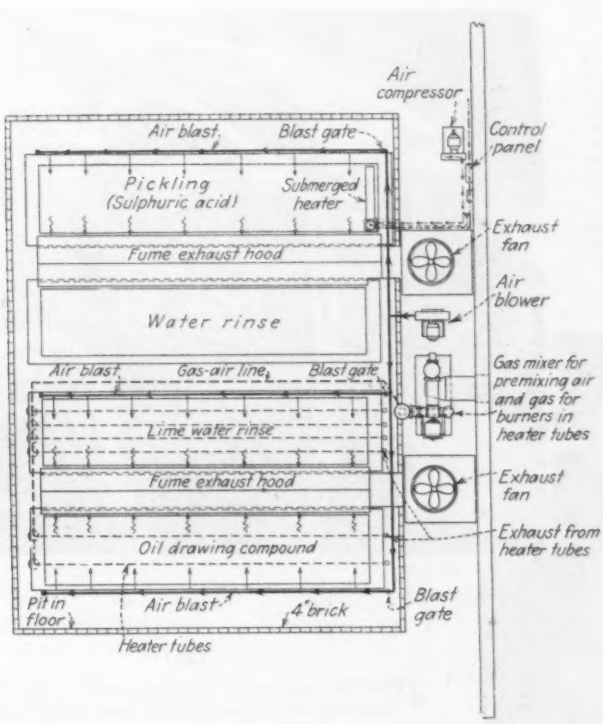

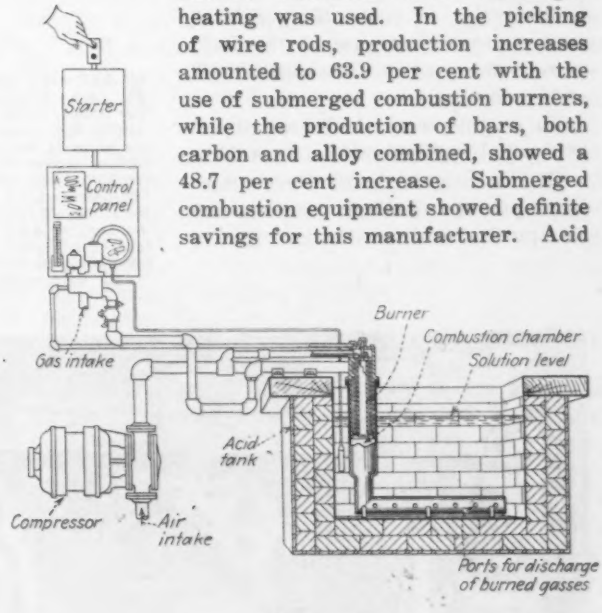

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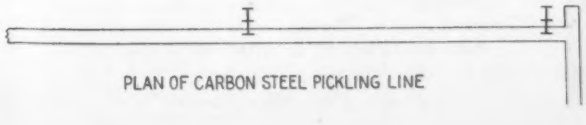

PLAN OF CARBON STEEL PICKLING LINE

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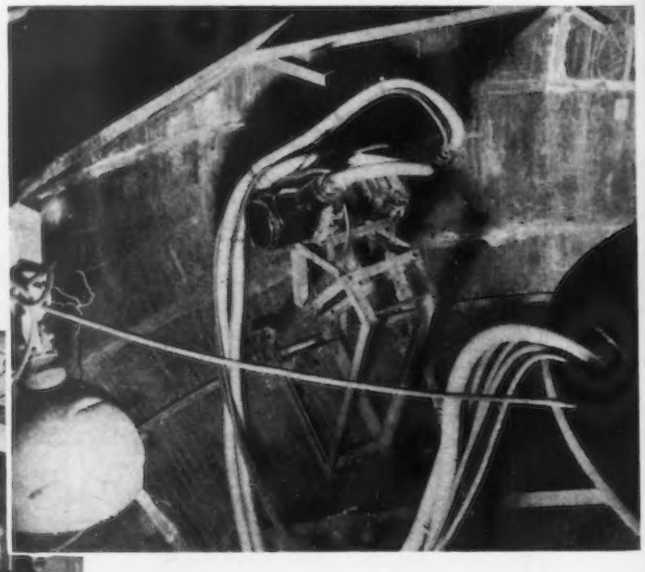

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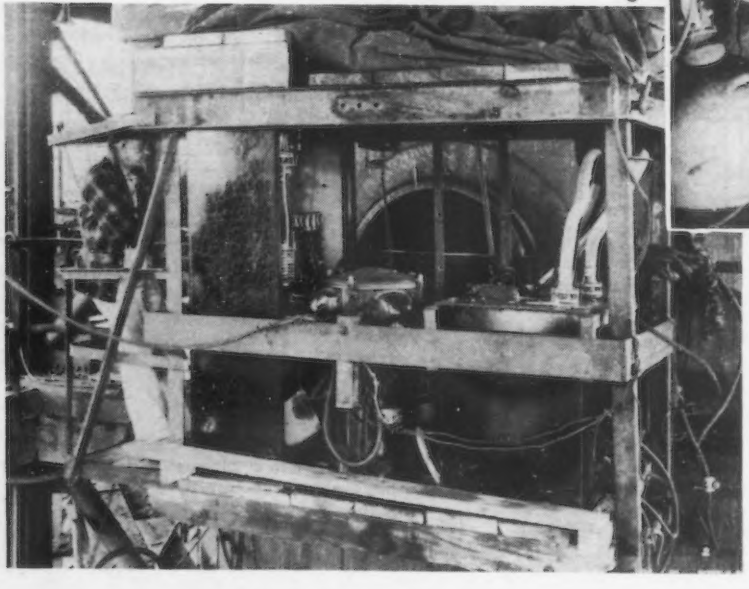

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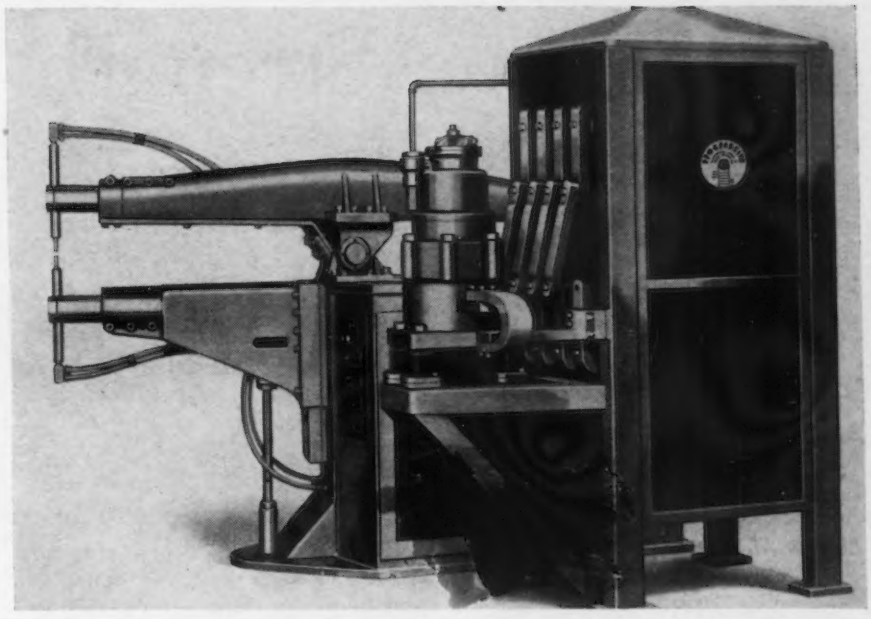

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Fatigue Strength Properties

By GEORGE SACHS
and
GEORGE ESPEY
Case School of Applied Science, Cleveland

THE values of yield strength and tensile strength specified by the Armed Forces for the principal structural aircraft tubing steel SAE X4130, listed in Table I, cannot be guaranteed in the conventionally annealed or normalized conditions.

Special heat treating [illegible] therefore, are being [illegible] duction of commercial [illegible] tubing, consisting either of [illegible]ing (followed by a controlled air quench and a stress relief anneal) or by a stress relief anneal, that is, an incomplete process anneal, of the cold finished tubing. While these two conditions differ slightly in their tensile properties, both can be readily produced to conform to specifications given in Table I, page 67.

Their microstructures differ in that normalizing results in a somewhat indistinct martensite-like structure, Fig. 1, while the stress-relieved tubing partially retains the fibered structure of longitudinally stretched ferrite and pearlite grains acquired in cold drawing, Fig. 2.

The investigation was undertaken in order to determine how the two conditions compared in regard to their fatigue strength properties.

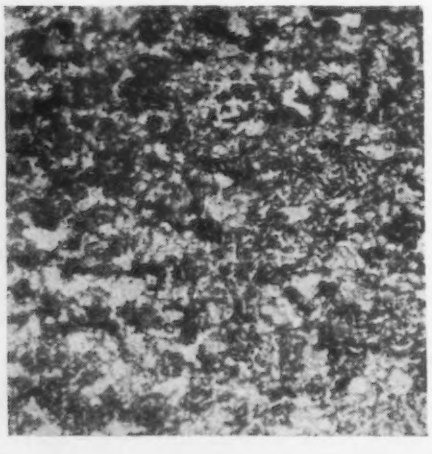
At present, the most common procedure used in determining the fatigue strength of tubing is to machine round or flat test bars from the wall of the tubing, but only rather thick walled tubing can be tested in this manner.

A few tests have been carried out on tubular specimens taken from relatively small sizes of tubing, using the common, rotary beam type, fatigue machines, designed for the testing of round specimens.[1]

Following this practice, tubular fatigue specimens were used* to determine the effect of both normalizing and stress relief finishing treatments on various fatigue strength characteristics of SAE X4130 tubing. In addition to the regular fatigue strength, the endurance properties were determined in the presence of the three major types of stress raisers: Notches, lateral pressure (chafing or fretting) and corrosion.[2, 3, 4]

Two sizes of tubing were selected.

**The Farmer rotating beam type of machine, extensively appplied to testing solid specimens, was used for testing the tubular specimens, at a speed of approximately 3500 cycles per minute.*



LEFT

FIG. 1—Photomicrograph showing indistinct martensite-like structure of normalized SAE X4130 tubing of Lot B-2, at 500 diameters.

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LOWER LEFT

FIG. 2—Photomicrograph showing fibered structure of stress relieved SAE X4130 tubing of Lot B-1, at 500 diameters.

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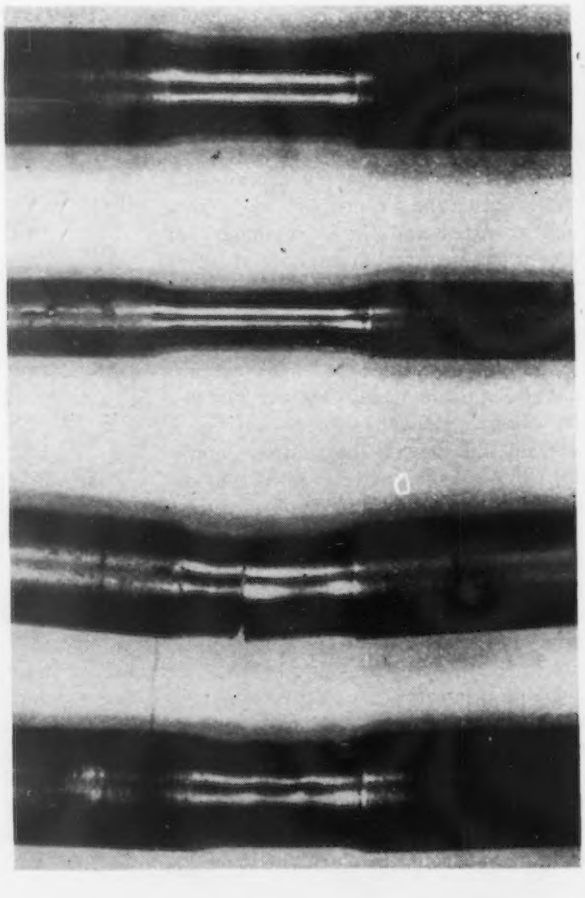
RIGHT

FIG. 3—Specimens developed for regular fatigue tests. For ⅝ to ¾ in. the wall of the specimen was reduced and polished longitudinally to 40 to 45 per cent of the original area. If the reduced area is longer than ¾ in., the larger diameter specimens show a pronounced tendency to buckle.



# of SAE X4130 Tubing

. . . Most widely used material for aircraft structures is normalized or stress relieved SAE X4130 tubing. This report on the research project conducted under the sponsorship of the Ohio Seamless Tube Co., Shelby, Ohio, discusses the effect of normalizing and stress relief annealing on the fatigue strength properties of this commercial tubing.

The dimensions, the last stages of the manufacturing procedure and the chemical and tensile properties of the various lots of tubing are assembled in Table I, page 67.

Tests on Polished Specimens

The specimens developed for the regular fatigue tests, Figs. 3 and 4, were characterized by the following features: The wall, for a certain length, was reduced and polished longitudinally to 40 to 45 per cent of the original area.* The maximum length of the reduced section of the specimens was ⅝ to ¾ in., because the larger diameter (9/16 in.) specimens had a pronounced tendency to buckle under the relatively high loads if the reduced portion was longer, Fig. 3. A fillet radius of ½ in. connecting the reduced section and the original portion was sufficiently generous to prevent significant stress concentration at any point in the specimen. This was proved since all failures in regular fatigue broke in the cylindrical portion of reduced sections some distance away from the fillet. The inner surface of each specimen was cleaned and inspected in order to insure the absence of seams and scratches.

**In order to entirety avoid failure in the grips from chafing fatigue, it was found that, for this steel having a strength of 100,000 to 120,000 lb. per sq. in., the ratio of reduced section to original section should be below 0.35.*

Five to eight specimens, subjected to different bending loads, were found to be sufficient to determine the regular fatigue strength within ± 2000 lb. per sq. in., or better than ± 5 per cent.

According to the results, Fig. 4, the fatigue strength values of commercial SAE X4130 tubing, having approximately the same tensile properties, but differing in size and in manufacture, vary considerably. The 60,000 lb. per sq. in. fatigue strength of the ⅜ in. diameter, stress relieved tubing amounted to 50 per cent of the tensile strength, while the 39,000 lb. per sq. in. fatigue strength of the 9/16 in. diameter normalized tubing equaled only 32 per cent of its tensile strength, Table II, page 67.

More than half of this large spread in fatigue strength can be attributed to the finishing heat treatment, the fatigue strength of the normalized tubing being 11,000 lb. per sq. in., or about 20 per cent lower than that of the stress relieved tubing, for either of the sizes investigated.

In addition, the fatigue strengths of both conditions of the 9/16 in. diameter tubing were 10,000 lb. per sq. in. lower than those for the corresponding conditions of the ⅜ in. diameter tubing, which accounted for the remainder of the variation. The generally lower values of the 9/16 in. tubing may be caused partially by its tendency to buckle, Fig. 3, thus increasing the effective strain to an indeterminate extent. An insignificant difference in the chafing fatigue values for the two sizes of tubing would also indicate that the effect of buckling is considerable under higher loads, since the chafing fatigue specimens were tested under much lower loads than the regular fatigue specimens.

o o o

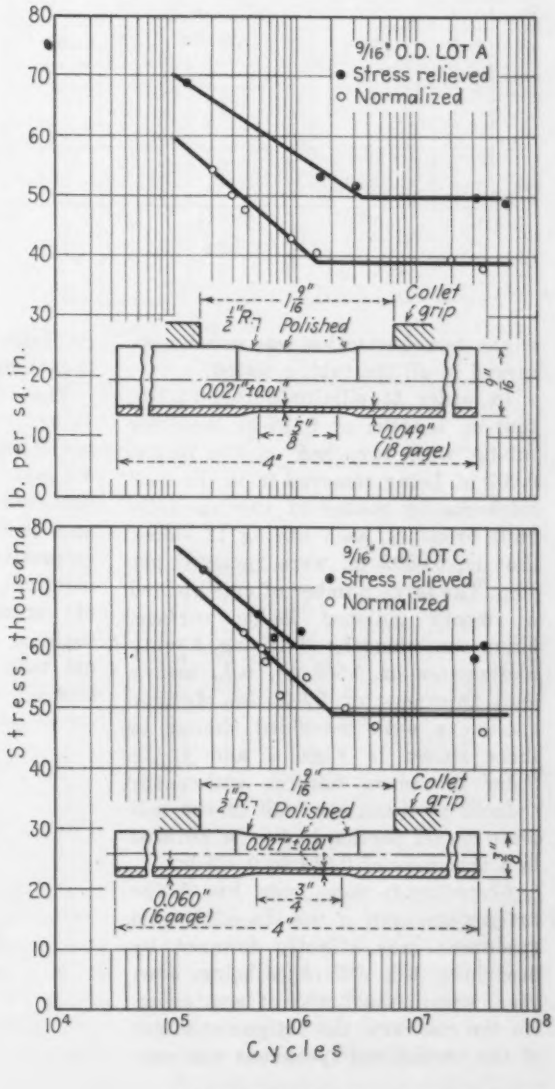


FIG. 4—Fatigue strength values of commercial SAE X4130 tubing having similar tensile properties but differing in size and manufacture vary considerably. Finishing heat treatment is the major factor in influencing fatigue strength.

Tests on Broached Specimens

The higher fatigue strength of the stress relieved than of the normalized tubing may be explained by corresponding differences in the quality of the inner surfaces. The higher temperature of normalizing may have resulted in a deeper decarburization than in the stress relief treatment. A

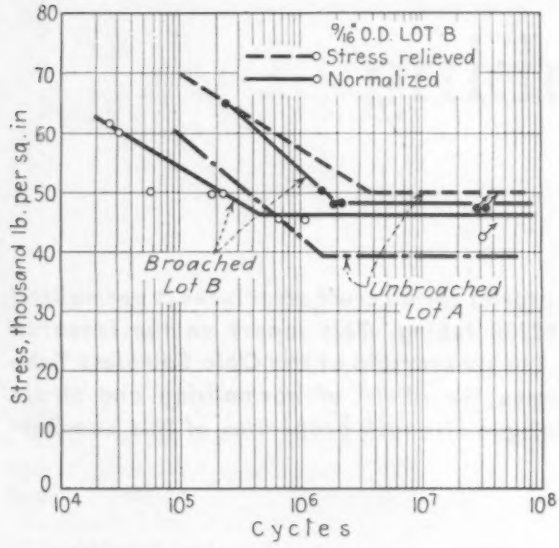


FIG. 5—Effect of broaching on fatigue strength of SAE X4130 tubing.

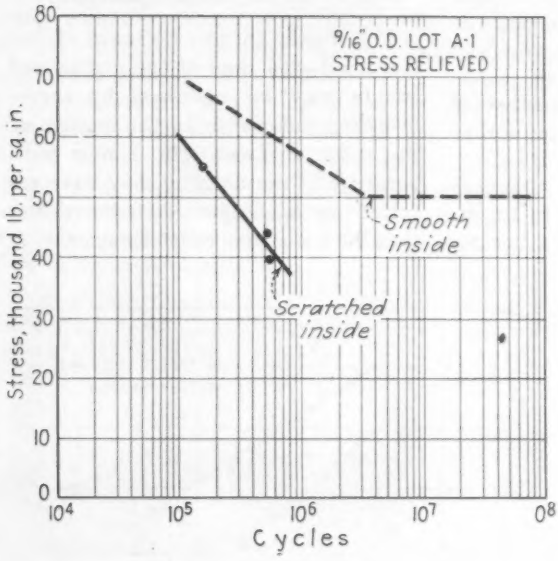


FIG. 6—Effect of inside scratches on regular fatigue strength of stress relieved SAE X4130 tubing.

slight decarburization was usually observed in all the tubing tested.

In order to eliminate this factor, four-in. lengths of 9/16-in. diameter tubing were broached on the inside, 0.005 in. being removed from the wall thickness by means of two specially built broaches, each having 12 steps; that is, 0.0002 in. were removed per step. The large number of cuts yielded a smooth polished inside surface. From these lengths of tubing, having a diameter of 0.565 in. o.d., and a wall thickness of 0.045 in., fatigue specimens were machined similar to those shown in Figs. 3 and 4. In order to secure failures within the reduced sections, the wall of the polished center portion had to be reduced to a thickness of 0.018 to 0.022 in.

According to these tests, Fig. 5, the fatigue strength of the stress relieved specimens was slightly lowered by broaching, this difference being, however, within the limits of scattering. On the contrary, the fatigue strength of the normalized specimens was considerably raised by the broaching of the inside.

The fatigue strength values for the stress relieved and normalized conditions, tested with a broached surface, 48,000 and 46,000 lb. per sq. in. respectively, were almost identical, within the limit of accuracy. However, such a comparison does not take into account the tensile strength of this stress relieved tubing (Lot B-1) which was considerably lower than the tensile strength of all the other investigated lots. Table I. Consequently, the ratio of fatigue strength to tensile strength was increased by broaching for both the stress relieved and normalized conditions by 0.04 and 0.07 respectively. Table II, page 67. Thus, the broaching only partially eliminated the difference in the fatigue strength ratios of the two conditions.

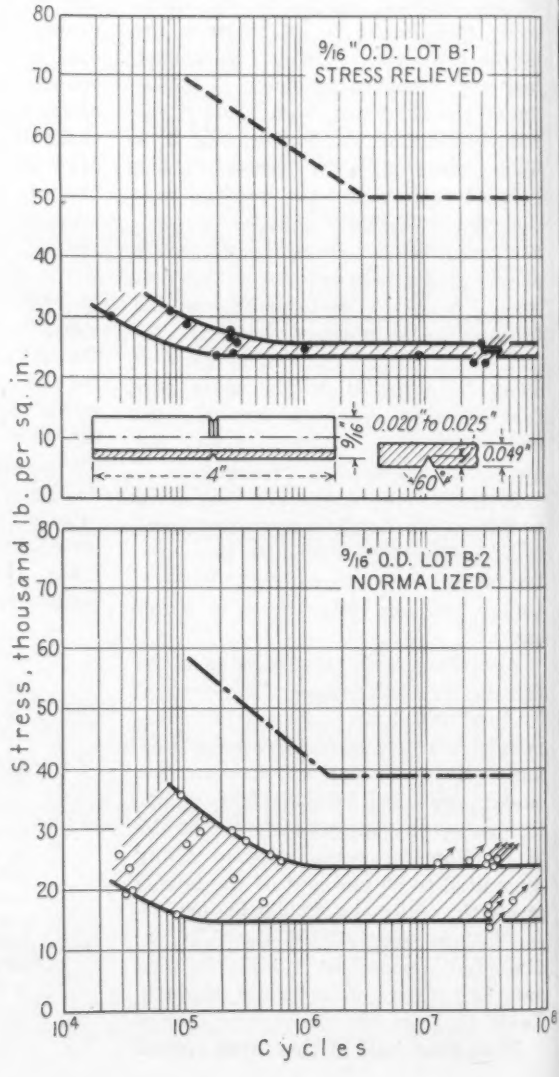
o o o

FIG. 7—Notch fatigue strength of SAE X4130 tubing.

Tests on Scratched Tubing

Some of the specimens prepared for the regular fatigue tests (without broaching) were found on inspection to exhibit deep "scratches" on the inside. Fatigue tests on such defective metal resulted in a considerably reduced life, Fig. 6. While the number of tests was not sufficient to establish a definite endurance limit for scratched tubing, their results indicate a fatigue strength of not over 35,000 lb. per sq. in., or 30 per cent lower than that of specimens with an unbroken surface.

This agrees with some similar tests



previously made on ½-in. diameter SAE 4130 steel tubing, heat treated to a tensile strength of over 200,000 lb. per sq. in.[1] For this steel, the fatigue strength of scratched specimens, 47,000 lb. per sq. in., was 30 per cent lower than that for unscratched tubing (67,000 lb. per sq. in.).

These results are difficult to explain. The effect of "notches" located in the direction of the straining (tension) should be small, according to general conceptions. However, it was observed that some of the scratched specimens exhibited longitudinal splits after failure, indicative of the development of transverse tension during loading.

Tests on Notched Specimens

In order to determine the effect of conventional notches, positioned perpendicular to the applied stress, specimens, 4 in. in length, cut from the 9/16 in. tubing were provided with a machined sharp 60-deg. V-notch,* having a depth of 0.020 to 0.025 in., or 40 to 50 per cent of the wall thickness, Fig. 7. Similar to the previously discussed fatigue strength values, the notch fatigue strength of tubing in the stress relieved condition was found to be superior to that in the normalized condition (without broaching), Fig. 7. In addition, normalized tubing differed from stress relieved tubing particularly with respect to the large scattering of the results. The lower limit of the scattering range for the normalized condition, 15,000 lb. per sq. in., was only 60 per cent of that for the stress relieved condition, 24,000 lb. per sq. in., while the upper limits of the scattering ranges differed only slightly.

There are various possible explanations for this peculiar discrepancy. First, it was observed that the vibrations, which are difficult to avoid in fatigue tests, considerably reduced the number of cycles for a given load for the normalized specimens, but did not noticeably affect the stress relieved specimens. Second, it appears possible that the normalized tubing varies over the length more than the stress relieved tubing. However, a large number of specimens in each condition would be required to establish definitely such differences between the two conditions of tubing.

Similar notch fatigue specimens of 9/16 in. tubing with a more shallow 60 deg. V notch, 0.012 ± .002 in. or approximately 25 per cent of the wall thickness, failed in chafing.

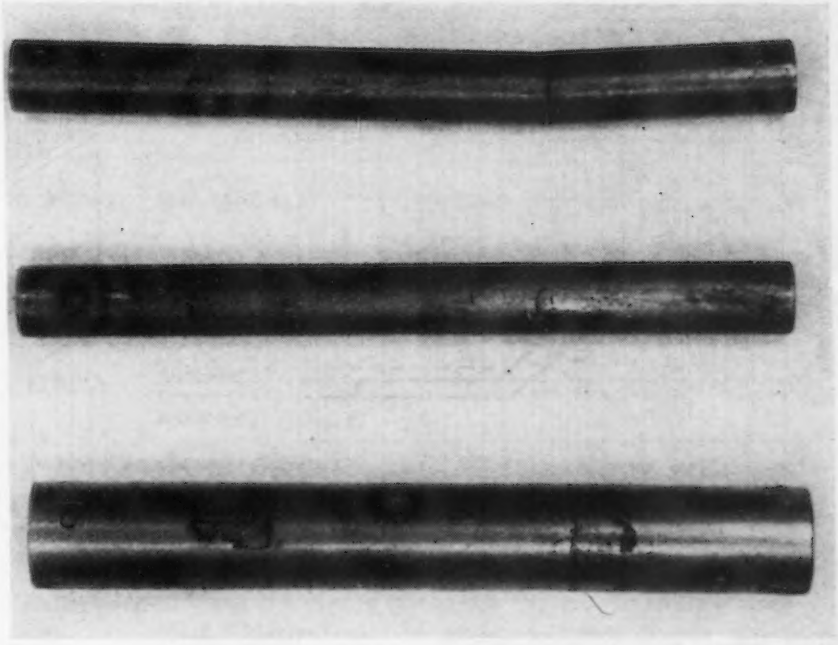


FIG. 8 — Chafing fatigue specimens need not be machined prior to testing. The pressure of the gripping collets constitutes an efficient stress raiser.

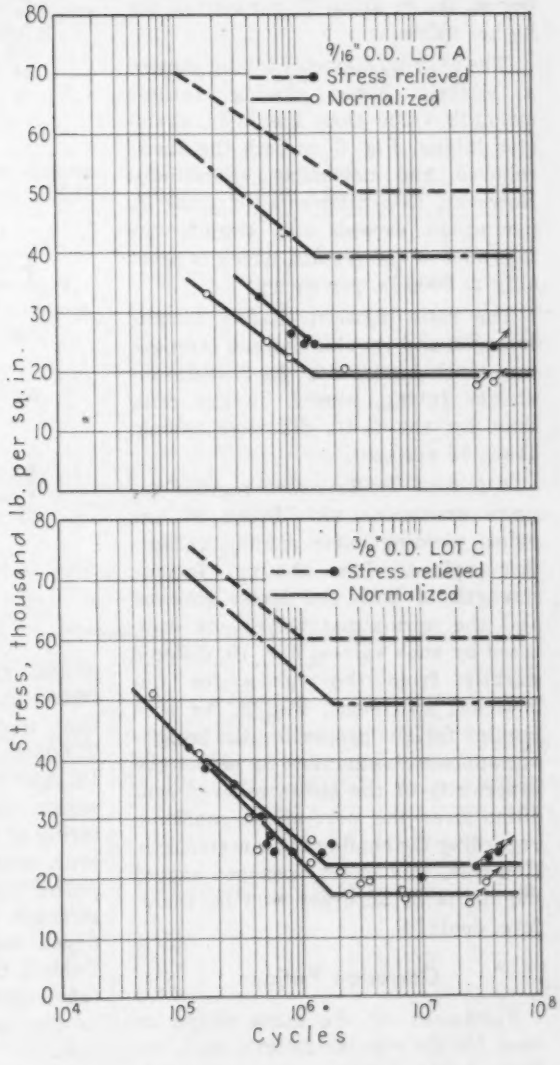


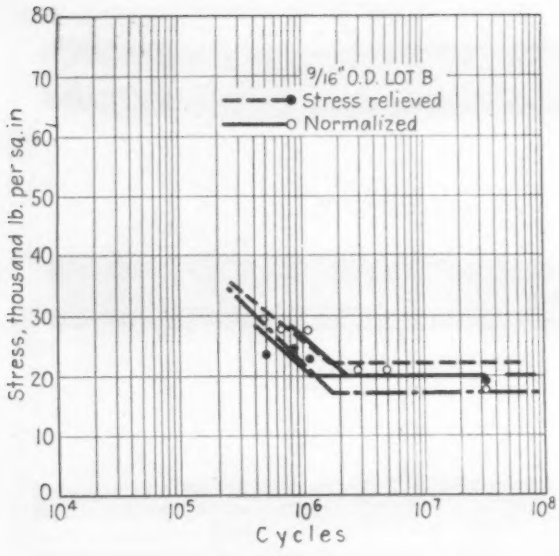
FIG. 9 — Chafing fatigue strength of SAE X4130 tubing.

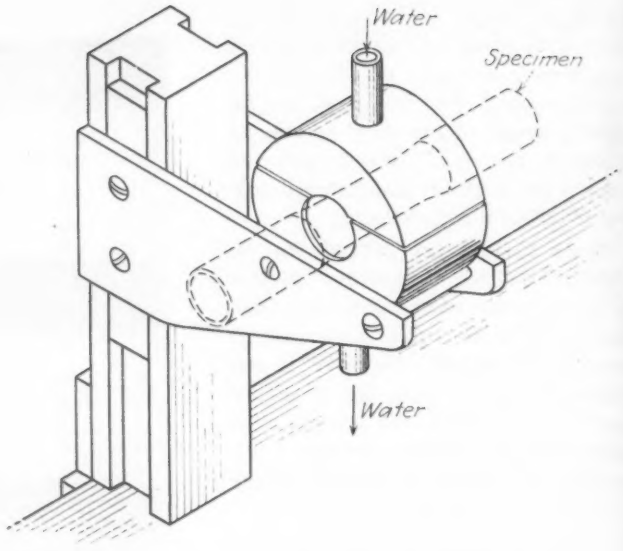
Chafing Fatigue Tests

The effect of lateral pressure as a stress raiser in fatigue can be determined in a particularly simple manner.[4] A suitable length, 4 in., of the tubing can be tested without any machining Fig. 8. The pressure of the gripping collets constitutes an efficient stress raiser, resulting in pitting and abrasion, called "chafing," or "fretting," and in fatigue breaks at the edge of the contact under comparatively low vibrating stresses.

The values of the chafing fatigue strength, Fig. 9, for the various tubing were found to be between 24,000 and 17,000 lb. per sq. in., and within the common limits of the values determined for small size round and flat rods of steels having the same strength as the SAE X4130 steel.[4]

The chafing fatigue strength values were again considerably higher for the stress relieved than for the normalized tubing. The difference, for





either size, is approximately 5000 lb. per sq. in., or about 20 per cent of the higher value.

The 9/16-in. diameter tubing showed a slightly lower chafing fatigue strength value than the ⅜-in. diameter tubing, Fig. 9, in both the stress relieved and normalized conditions. However, this difference of 2000 lb. per sq. in. exceeds only slightly the tolerance of the results, which is probably ± 2000 lb. per sq. in.

The ratio between chafing fatigue strength and regular fatigue strength was much higher for the 9/16-in. diameter tubing, almost 50 per cent, than for the ⅜-in. diameter tubing, about 35 per cent.

A few of the broached regular fatigue specimens also broke at the grips, yielding some chafing fatigue test values. The chafing fatigue strength of both the stress relieved and the normalized tubing, as indicated by such values, Fig. 10, differed slightly from the values for unbroached specimens, Fig. 9. As with regular fatigue properties, the broaching appears to eliminate or reduce the superiority of the stress relieved condition over the normalized condition regarding the chafing fatigue strength. However, this effect does not exceed the limits of accuracy and is, therefore, doubtful.

Corrosion Fatigue

Specimens of the same shape as used for the regular fatigue tests, see Figs. 3 and 4, were subjected simultaneously to rotational bending and to corrosion by running tap water, using the attachment illustrated in Fig. 11.

The stress relieved tubing appeared to possess only a slightly higher corrosion fatigue strength, 26,000 lb. per sq. in., than the normalized tubing, 25,000 lb. per sq. in., Fig. 12. The small difference is within the limits of scattering of the results. However, considering the comparatively low tensile strength of the stress relieved tubing (Lot B-1), Table I, this condition was found again to be superior to the normalized condition.

UPPER LEFT

FIG. 10.—Effect of broaching on chafing fatigue strength of SAE X4130 tubing.

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UPPER RIGHT

FIG. 11 — Attachment for corrosion fatigue tests.

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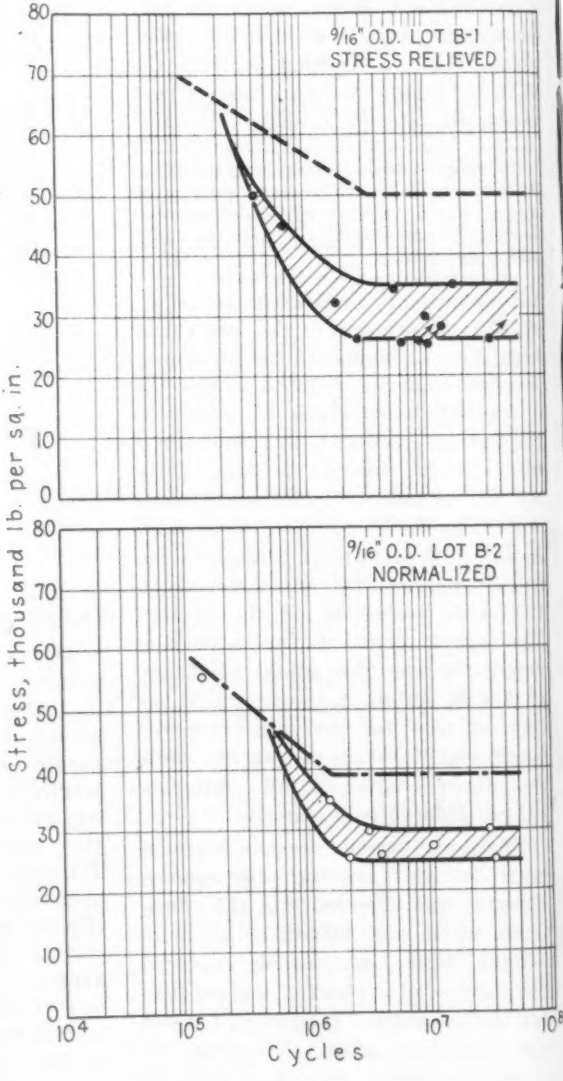
RIGHT

FIG. 12—Corrosion fatigue strength of SAE X4130 tubing.



The absolute values of corrosion fatigue strength were surprisingly high in comparison to the values of the chafing and notch fatigue tests. This might be correlated with the observation that the corrosion fatigue breaks frequently occurred in the radius adjoining the reduced section of the tubing specimens, rather than in the cylindrical portion. In a number of specimens the cross section at the point of failure was greater than that of the cylindrical reduced portion. It appears that the corrosive attack is

more effective where it can progress in the longitudinal direction than where it can proceed only in the circumferential direction.

Tests on Welded Tubing

A few specimens, circumferentially butt welded with low carbon iron rod and SAE X4130 rod, failed at the grips. This showed the welds to be stronger with respect to vibrational strain than the portion of the tubing which was subjected to chafing.

Summary

SAE X4130 tubing, processed to a minimum tensile strength of 95,000 lb. per sq. in., was found to possess different fatigue strength properties, depending upon the manufacturing procedure.

The regular fatigue strength, notch fatigue strength, chafing fatigue strength and corrosion fatigue strength were always higher, in proportion to the tensile strength, for stress relieved than for normalized tubing.

Rather low regular fatigue strength values were determined for tubing having a very thin wall.

Broaching of the inside increased the various fatigue strength values of thin walled tubing, particularly in the normalized condition.

The results obtained show that numerous, as yet not entirely recognized factors, determine the fatigue strength properties of tubular structures. More extensive tests will be required to clarify the relations.

Acknowledgment

The authors are indebted to W. C. Connelly, president, and H. R. Lewis, chief metallurgist, of the Ohio Seamless Tube Co., Shelby, Ohio, for their cooperation and the permission to publish the results of this work, and also to B. A. Kornhauser, J. B. Lubahn and F. J. Miller, who participated in the tests.

Bibliography

1. Johnson, J. B., "Dependence of Aviation on Metallurgy," Metals and Alloys, Vol. 1 (1930), pp. 450-454.

2. Battelle Memorial Institute (Bureau of Aeronautics, Navy Department), "Prevention of the Failure of Metals under Repeated Stress," John Wiley & Sons, Inc., New York, 1941.

3. Sachs, G., "Stress Raisers," THE IRON AGE, Vol. 146 (1940), Aug. 1, pp. 31-34; Aug. 8, pp. 34-37.

4. Sachs, G., and Stefan, P., "Chafing Fatigue Strength of Some Metals and Alloys," Trans. Am. Soc. for Metals, Vol. 29 (1941), pp. 373-401.

TABLE I Mechanical Properties of SAE X4130 Tubing

Lot Condition	Manufacturing Procedure	Tensile Strength, 1000 lb. per sq. in.	Yield Strength, 1000 lb. per sq. in.	Elongation on 2 in. per cent	Hardness Rockwell "B"
Normalized	Spec. (ANC-5)	95.0	70.0	..	...
	LOT A 9/16 in. Diameter, 0.049 in. Wall Thickness C 0.305, Mn 0.54, P 0.009, S 0.017, Cr 1.01, Mo 0.22				
A-1 Stress Relieved	(3/4 in. x 17 gage Annealed 1350 deg. F. Drawn to 9/16 in. x 18 gage) Annealed 1150 deg. F.	124.6	111.7	18	104
A-2 Normalized	(Same as above) Normalized 1700 deg. F. Tempered 900 deg. F.	122.0	98.5	18	103
	LOT B 9/16 in. Diameter, 0.049 in. Wall Thickness C 0.29, Mn 0.53, P 0.010, S 0.016, Si 0.30, Cr 0.96, Mo 0.20				
B-1 Stress Relieved	(3/4 in. x 16 gage Annealed 1350 deg. F. Drawn to 9/16 in. x 18 gage) Annealed 1050 deg. F.	108.0	98.9	17	...
B-2 Normalized	(Same as above) Normalized 1700 deg. F. Tempered 975 deg. F.	119.5	88.2	21	...
	LOT C 3/8 in. Diameter, 0.060 in. Wall Thickness C 0.30, Mn 0.53, P 0.009, S 0.014, Cr 0.99, Mo 0.23				
C-1 Stress Relieved	(1/2 in. x 16 gage Normalized 1650 deg. F. Drawn to 3/8 in. x 16 gage) Annealed 1150 deg. F.	122.5	112.7	18	106
C-2 Normalized	(Same as above) Normalized 1700 deg. F. Tempered 900 deg. F.	123.6	100.1	14.5	107

TABLE II Fatigue Strength of SAE X4130 Tubing Without and With Various Types of Stress Raisers

	9/16 in. o. d. Tubing				3/8 in. o. d. Tubing			
	Stress Relieved		Normalized		Stress Relieved		Normalized	
Type of Fatigue Tests	Fatigue Stress 1000 lb. per sq. in.	Fatigue Stress RATIO*	Fatigue Stress 1000 lb. per sq. in.	Fatigue Stress RATIO*	Fatigue Stress 1000 lb. per sq. in.	Fatigue Stress RATIO*	Fatigue Stress 1000 lb. per sq. in.	Fatigue Stress RATIO*
Regular Normal Inside	50	0.40	39	0.32	60	0.49	49	0.39
Broached Inside	48	0.44	46	0.39	..	....	..	....
Notched	24	0.22	15	0.13	..	....	..	....
Chafing: Normal Inside	24	0.19	19	0.16	22	0.18	17	0.14
Broached Inside	20	0.19	20	0.17	..	....	..	....
Corrosion	26	0.24	25	0.21	..	....	..	....

* Ratio of fatigue strength to tensile strength.

Measuring Errors in Involute S

HOW many of us have seen a machinist or an engineer pick up a pair of mating involute gears hold one in each hand, mesh them tightly together through a considerable arc and then pronounce them good or bad, according to how they "feel"? Such methods of inspection are at all times of doubtful value and not to be tolerated in modern industry. Involute gears will accommodate considerable variation in center distance, but because of this flexibility spur gears of the involute system are frequently subjected to much abuse and misunderstanding especially in regard to interpretation of errors.

If the errors in involute spur gears are to be correctly measured and interpreted, the purpose for which the gears are intended should be kept in mind. Spur gears are the practical solution to the mechanical problem of transmitting uniform rotary motion from one shaft to another parallel shaft at a definite ratio of rotative speeds. A spur gear may fail to transmit uniform rotary motion to its mating gear because of errors in itself or in its mate or both. If a gear fails to transmit uniform rotary motion that is, causes acceleration and deceleration in its mate, the section in itself will not only be objectionable but also will tend to induce failure of various types in the gears as well as other parts of the mechanism. Furthermore, if errors prevent a full bearing across the faces of the teeth stress concentration may cause rapid wear on surface fatigue.

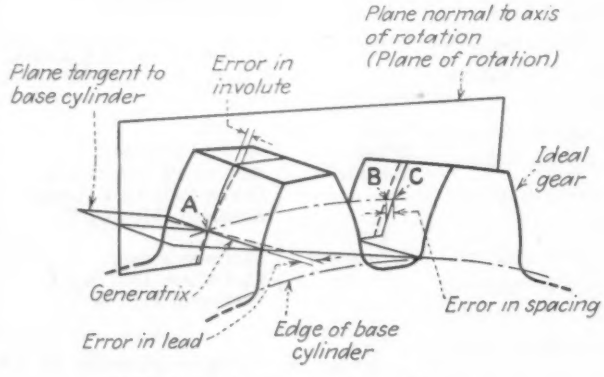
Like any other man-made object a gear must be allowed certain tolerances or departures from the ideal. Manufacturers are often confronted by more or less arbitrarily adopted tolerances listed under the headings of pitch-line runout, maximum spacing error, maximum involute error, maximum lead error, etc. The significance of various tolerances in relation to the gear's ability to transmit uniform rotary motion is more easily visualized through the conception of the ideal gear. Since almost without exception modern spur gears are based on the involute system, only involute spur gears will be considered.

The Ideal Gear

In order to analyze spur gear errors an imaginary gear which has no errors at all is used for reference. This ideal gear is assumed to be any involute gear with any fixed amount of modification that the designer may specify in order to transmit uniform rotary motion under load. It should be emphasized that modifications cannot be considered as errors but variations from a true or a modified form are errors whether within tolerances or not. Thus a heavily loaded pinion which has been designed with a profile that is 0.0003 in. above the true involute at the tip of the gear and 0.0000 in. above the involute at the lowest point of contact (in order to allow for deflections in operation) would be considered in this case as an ideal gear if no other variations were involved. But with a tolerance of + or — 0.0002 in. on profile, a pinion having 0.0005 in. "kick-up" to the tip would depart from the ideal gear by 0.0002 in. and would be 0.0002 in. in error.

In referring the ideal gear to an actual gear the outside diameter, root diameter, fillet radius, chamfer, and mean tooth thickness are adjusted on the ideal gear to equal those of the actual gear. Variations in these dimensions if within tolerances specified by the designer should not materially affect the action of the gear. If the design permits involute or fillet interference and thus prevents the transmission of uniform rotary motion to or from the mating gear, then an ideal gear cannot exist and further investigation into errors is useless until the shortcomings of the design have been removed. Having established a reference point in the form of an ideal gear we now can look at the general classification of spur gear errors.

Error in profile, error in spacing and error in lead are three fundamental types of errors which if integrated will completely describe deviations of the actual gear from the ideal gear. Fig. 1 shows the three fundamental errors. As the errors may vary at various points on the tooth surface, elements of which the surface is made up must be determined.



NOTE: Dotted lines show intersections of planes with non-ideal gears

FIG. 1—The deviations illustrate the variations of the actual gear when compared with the ideal gear.

The profile element is the intersection of the tooth surface with a plane normal to the axis of rotation, or as it is sometimes called the plane of rotation. By rotating the ideal gear around its axis the ideal profile element and the actual profile element in the same plane can be made to intersect at one or more points. With reference to one of the points of intersection, the error in profile at any other point on the profile element of the actual gear is equal to the normal distance to the profile element of the ideal gear. In Fig. 2 the involute

Spur Gears . . .

By SIDNEY CORNELL
Gear Engineer, Pratt & Whitney Aircraft Division, United Aircraft Corp.

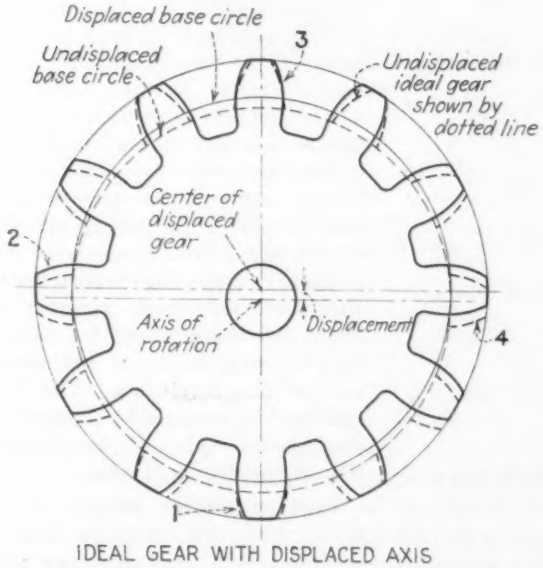
. . . In order to set up measuring standards for spur gears, the author presents a picture of an ideal gear which has no errors and using this imaginary gear as a reference point he skillfully presents a general classication of spur gear errors and outlines a method of recording and evaluating the deviations.

chart shows the involute errors on four different profile elements. Any horizontal line represents a profile element of the ideal involute gear in different rotative positions. The heavier slanting lines represent the profile elements of the actual gear. Thus the top horizontal line represents a profile element of an ideal gear that has been rotated to intersect the profile element of tooth No. 1 of the actual gear at the base circle. According to the scale on the chart the profile elements of the actual gear at the tip of the gear is about 0.0018 in. below the profile of the ideal gear. The error at the tip can be written as —0.0018 in. with respect to the base circle.

Error in profile can be caused by the general displacement of the ideal profile. Thus a geometrically perfect involute profile element when displaced radially or tipped in any direction with respect to a tangent line to the axis of rotation will be in error because it cannot be made to coincide with the profile element of the undisplaced ideal gear. In Fig. 2 profile No. 1 shows an example of radial displacement of the ideal profile.

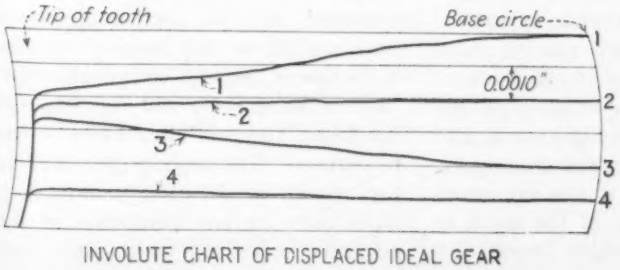
Another type of error in profile is a distortion from the ideal which may be caused by an error in base circle. If the base circle of the actual gear is larger than that of the ideal gear, it will show a *strong* involute with respect to the ideal gear. If the base circle of the actual gear is smaller than that of the ideal gear then a *weak* involute will result. In either case the error will not vary from tooth to tooth around the gear unless other sources of error are present. The departure of the actual profile from any point on the ideal profile with reference to the base circle is very nearly equal to the error in base circle radius per unit of ideal base circle radius, times the distance from the point on the ideal gear to the base circle along a line tangent to the base circle. The horizontal element of the surface shown in Fig. 1 is the intersection of the tooth surface and a plane tangent to the base cylinder of the ideal gear and is called the generatrix. The generatrix of the true involute spur gear is a straight line parallel to the axis of rotation. The ideal gear may be modified to compensate for deflection under load so that the tooth has a *lead*. The generatrix will then not be parallel to the axis of rotation but will still be in the plane tangent to the base circle. If the tooth of the ideal gear is *crowned* the generatrix will be curved.

As in the case of the error in profile, the ideal gear can be rotated around its axis until the ideal generatrix and the actual generatrix intersect. With reference to one of the points of intersection (usually taken at either of the outer faces of the gear) the error in lead at any other point on the generatrix of the actual gear is equal to the shortest distance to the generatrix of the ideal gear in the plane of rotation. Error in spacing occurs when corresponding points on the profile elements of consecutive teeth of the actual gear are not spaced as on the ideal gear. By corresponding points is meant points which are the same distance from the axis of rotation in the same plane of rotation. This is illustrated in Fig. 1. Points *A*, *B*, and *C* are corresponding points on either the actual



IDEAL GEAR WITH DISPLACED AXIS

FIG. 2 — Displacement of geometric axis which results in the irregular transmission of rotary motion. The deviation of four different profile elements is also recorded.



INVOLUTE CHART OF DISPLACED IDEAL GEAR

gear, the ideal gear, or both as they lie on an arc swung from the axis of rotation in the plane of rotation. The ideal gear has been rotated about its axis so that the points in question on the first actual tooth and the first ideal tooth coincide at A. The distance along the arc from B on the second actual tooth to point C on the second ideal tooth is a measure of the error in spacing.

There are basically four different ways of recording errors in spacing. Any of the four ways may involve either the linear or angular measurements of arcs, such as arc BC, but the linear measurements are by far the most common. The four ways of recording the errors may be called for convenience the absolute spacing error, the true circular pitch error, the relative circular pitch error, and tooth to tooth jump. If in Fig. 1 a third actual tooth with intersection D and a third ideal tooth with intersection E on the same arc as A, B, and C are visualized, then arc lengths BC and DE are the absolute circular pitch errors on the second and third teeth respectively with reference to point A. The absolute errors on the remaining teeth may be found in the same way. Any convenient point may be used for reference and the absolute error recorded with respect to that point. To find the true circular pitch error the difference in length of arcs AB, BD, etc., and the true circular pitch (arc AC) is determined. Thus arc BC is a true circular pitch error but arc DE is not. If B and E were coincident, then arc DE would be the true circular pitch error on the third tooth. The relative circular pitch error is determined in the same way as the true circular pitch error except that the arcs AB, BC, etc., are compared with an arbitrarily chosen arc, such as arc AB. The tooth to tooth jump is the variation in either the true or relative circular pitch from tooth to tooth.

The relation between these four different ways of recording errors in spacing and their significance can best be expressed algebraically as follows:

N = Number of teeth in the gear

n = Number of tooth in question with respect to arbitrarily chosen reference tooth (No. 1, No. 2, etc.)

ΔS_n = Absolute spacing error n teeth from reference tooth

ΔCP_n = True circular pitch error at tooth n

$\Delta Rel.\ CP_n$ = Relative circular pitch error at tooth n

J_n = Tooth-to-tooth jump at tooth n

ΔT = Time for ideal gear to turn through one true circular pitch arc

S_n = Distance along arc of measurement from reference tooth to tooth n

V_n = Mean linear velocity of gear along measurement arc when tooth n is in engagement

a_n = Mean linear acceleration of gear along measurement arc when tooth n is in engagement

CP = Circular pitch of ideal gear at arc of measurement and equal to the circumference of measurement circle divided by N

1. $\Delta S_n = S_n - n \cdot CP$ (definition)

2. $\Delta CP_n = \Delta S_n - \Delta S_{(n-1)}$ (definition and 1)

3. $\Sigma_o^N (\Delta CP + CP)$ = circumference of measurement circle (from definition of CP and ΔCP)

$\Sigma_o^N (CP)$ = circumference of measurement circle (from definition of CP)

$\therefore \Sigma_o^N \Delta CP = O$ (subtraction)

4. $\Delta\ Rel.\ CP_n = \Delta CP_n +$ Constant (definition and 1 and 2)

$$\text{Constant} = \Sigma_o^N \Delta Rel.\ CP/N \quad \ldots\ldots (3)$$

5. $J_n = \Delta CP_n - \Delta CP_{(n-1)}$ (definition)

6. $J_n = \Delta\ Rel.\ CP_n - \Delta\ Rel.\ CP_{(n-1)}$ $\ldots\ldots\ldots$ (4 and 5)

7. Distance $S_n = \Delta S_n + n \cdot CP$ (1)

8. Velocity $V_n = \dfrac{S_n - S_{(n-1)}}{\Delta T}$ (rate of change of distance)

$$= \frac{CP}{\Delta T} + \frac{(\Delta S_n - \Delta S_{(n-1)}}{\Delta T} \quad (7)$$

$$= \frac{CP}{\Delta T} + \frac{\Delta CP_n}{\Delta T} \quad (2)$$

9. Acceleration $a_n = \dfrac{V_n - V_{(n-1)}}{\Delta T}$ (rate of change of velocity)

$$= \frac{\Delta CP_n - \Delta CP_{(n-1)}}{\Delta T^2} \quad (8)$$

$$= \frac{J_n}{\Delta T^2} \quad (5)$$

It can be seen from the above that the position of the tooth profiles of the actual gear is measured by the absolute error, the velocity transmitted to or from the gear is related to the circular pitch error, and the acceleration is a function of the tooth to tooth jump. These conclusions are based on average conditions only and are arrived at through the assumption that profile and lead errors are small. The maximum value of the tooth to tooth jump is of major importance because it is directly related to the maximum average acceleration and, therefore, the maximum loads on the gear and its mate as well as the mechanism to which they are connected. The maximum (or minimum) value of the true circular pitch error is also important because smoothness of engagement is markedly affected by errors of this type. Impact loads not detected through the average values shown by the tooth to tooth jump can be controlled by controlling the true circular pitch error. Values of the absolute spacing error, while of major importance in connection with involute splines, are of secondary importance in regard to involute spur gears.

In a given gear any combination of profile, spacing and lead errors may exist and the values may vary around the gear and across the face of the teeth. In many instances the variation in the errors follows a definite pattern. These patterns will be found to be characteristic of the displaced ideal gear, the general distortion of the ideal gear, the local distortion of the ideal gear, or any combination of the three.

Displacement of Ideal Gear

The most simple pattern and one that is frequently encountered is the high quality gear which is geometrically the same as the ideal gear except that the axis of rotation has been displaced parallel to the geometric axis. This type of displacement is shown in Fig. 2. Irregular transmission of rotary motion to the mating gear is the result, because the involute system permits variation in center distance without affecting conjugate action, full tooth bearing will still be had with this type of error. If the profile of the gear is checked with respect to its axis of rotation it will be found to vary as shown on the involute chart in Fig. 2. Also the tooth spacing error (true circular pitch error and tooth to tooth jump) will vary through maximum and minimum once in one revolution. The mating gear will go through an acceleration—deceleration cycle once in one revolution of the displaced gear.

Another similar pattern of error occurs when an otherwise ideal gear is tipped with respect to the axis of rotation. A plane section of such a gear normal to the axis of rotation will show a general elliptical shape. Tooth spacing error will vary through maximum and minimum twice in one revolution. The mating gear will go through an acceleration—deceleration cycle twice in one revolution of the displaced gear and will also show

a minor acceleration — deceleration phase as each tooth meshes due to the non-conjugate action of the tipped involute. A full tooth bearing cannot be expected and the bearing will move from one edge to the other as the gear rotates. Involute displacement and therefore involute error will

be found to vary across the face width of any given tooth. This error will be super-imposed on the error caused by the tipping of the involute. Spacing error will also be affected by position on the tooth face. Error in lead is introduced by the tipped axis and will vary in the same way as the spacing error.

General Distortion of Ideal Gear

Another class of errors frequently encountered is found in the general distortion of the ideal gear. The elliptical type of distortion may occur from heat treating or from the machining of the gear. When this type of distortion occurs, the effect is similar to that of the tipped ideal gear except that the bearing does not wander back and forth on the face. Conjugate action may still be had in some form of elliptical distortion if the gear is generated under certain conditions. In cases where one end of a gear is distorted to an elliptical shape and the other end remains circular a variable error in lead will be found. In addition to the elliptical type of distortion there are, of course, any number of possibilities of irregular distortion producing any number of acceleration and deceleration cycles per revolution of the gear.

The local distortion of the ideal gear may be either repetitive or random. For instance an otherwise ideal gear may have one tooth displaced causing a random error in spacing. A gear cut with an incorrectly sharpened hob may have a repetitive error in involute. A distortion in lead alone sometimes occurs and is usually uniform around the gear if it is the result of generating. This type of error affects the profile in the plane of rotation if the error occurs in generating the teeth, but the effect is negligible even with wide tolerances in lead. Uniform error in lead will therefore not affect the gear action but will tend to produce an edge bearing. Uniform error in lead could also be classified as a general distortion of the ideal gear as it could be visualized as the general twisting of the ideal gear around its axis.

In actual practice combinations of two or more classes of errors are often found. A gear may be found with a displaced axis of rotation plus an elliptical distortion. A gear tipped with respect to the axis of rotation may have random indexing errors. Acceleration and deceleration patterns will be a summation of the patterns of the two types of distortion.

Measurement of Errors

There are three fundamental methods of determining the overall quality of spur gears namely the direct measurement method, the functional method and a third method which can best be described as a double-sided method. Practically all of the many machines and fixtures on the market today for measuring gear quality fall into one of the above classifications. In tooling for quality control, it is helpful to keep in mind these three general methods in order to insure complete control.

o o o

LEFT

FIG. 3 — Involute measuring machine with electrical recording device.

o o o

RIGHT

FIG. 4—The spacing checker measures the relative circular pitch error and tooth-to-tooth jump.

o o o

Direct Measurement Method

The direct measurement methods cover the actual measurement of involute profile, spacing and lead. As full integration of these measurements is seldom practical representative measurements are usually relied upon. The involute profile is usually measured mechanically with a pointer contacting the profile and by any of various mechanical means made to move over it following a true involute path. Fig. 3 shows one of these machines with the pointer in contact with the gear tooth profile. The deviation from the true path by the actual

profile is registered on a dial indicator or automatically recorded on charting paper. One of these automatically recorded charts is shown in Fig. 2. By using the involute measuring machine, the error in the actual profile element can be determined.

The involute profile can also be measured with an optical comparator if the face width of the gear is not too great, and if there are no shoulders on the gear blank which would interfere with the passage of the light. In this method the magnified shadow of the profile element at the inner or outer face of the gear profile is cast on a screen and compared with a layout of the ideal profile made to the same scale as the magnification. While this optical method has been found to be excellent for measuring tooth thickness, root radius, and other dimensions, it is not in general use for checking involute profile principally because the concentration required to observe variations in tenths even with large magnifications would be too fatiguing for general quality control.

The principle of the involute as a constant rise cam is sometimes used in measuring profile. The gear is turned through arbitrarily selected angular increments by means of a precision dividing head. The amount of rise of the involute of the ideal gear is computed for each angular increment and the actual rise of the involute of the actual gear is measured with a surface gage and indicator and compared with the computed figures. This method is rather slow but has been used with success on master gears.

The absolute spacing error can also be measured with a precision dividing head with which the angular displacement of each ideal gear tooth can be controlled and the amount the actual tooth is out of position can be measured with an indicator. This is a relatively slow method and is seldom used for production work. A more rapid method around which several machines on the market have been designed consists of comparing the distances between two points identically located on successive teeth with similar measurements all around the gear. In other words, this type of machine measures the relative circular pitch error in spacing around the gear. The tooth to tooth jump may also be read directly. One of these machines is shown in Fig. 4. Some of these machines can also be adjusted to measure relative normal circular pitch or base pitch. This means that they compare the variation in spacing from one tooth to the next along the line of action. This latter type of measurement gives a combination of errors in relative circular pitch and involute. The odontometer is a portable instrument which also measures relative base pitch errors and which can be applied directly to a gear in the process of manufacture. By comparing normal circular pitch readings on the gear in question with normal circular pitch readings on a master gear, involute errors as well as spacing errors can be detected.

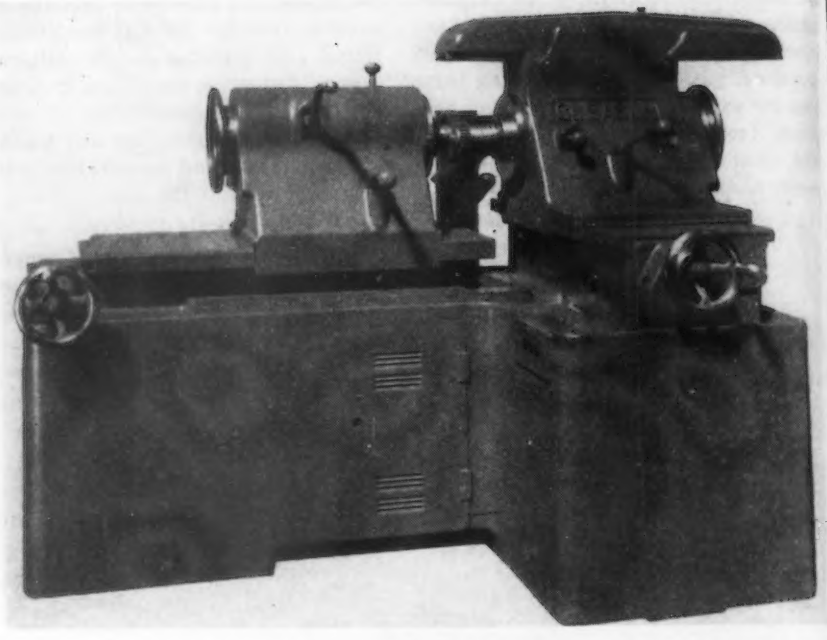


Fig. 5—Spur gear testing machine sometimes called "power tester."

Frequently tooth spacing is checked between non-consecutive teeth. The significance of this type of check is not as great as it may seem since direct measurement of the variation in spacing between adjacent teeth will indicate completely the quality of the spacing. Since the tooth action is from one tooth to its neighbor, the relation between one tooth and a tooth three teeth away has only indirect effect on the action of the gear and its mate.

The last fundamental type of gear tooth error is the error in lead. On a spur gear the simplest type of machine can be used for measuring this type of error. Lead checkers are on the market designed to handle helical gears and, of course, can be used on spur gears since a spur gear is nothing more than a helical gear with a zero degree helix angle. However, if spur gears only are to be handled, the gear can be mounted on centers and an indicator finger in contact with the tooth surface can be moved back and forth on a slide running parallel to the centers. Such a device constitutes a simple spur gear lead checking fixture. Another even simpler but less speedy method is to mount the gear on bench centers which have a wide enough bed, scraped parallel to the line of centers, so that a surface gage with an indicator can be placed to measure the maximum height of the involute in an above center position at each end of the tooth.

Functional Methods

A common functional method in inspecting gears is to run the gear with its mate (especially if the gears are to be kept in sets) or with a master gear which will duplicate the action of the mating gear. Several machines are on the market for running a pair of spur gears together under simulated operating conditions. These machines, an example of which is shown in Fig. 5, are sometimes called "power testers." Experienced operators can determine a good deal about the quality of the gears by their sound, but a more thorough method often supplemented by sound testing is to coat one or both gears with red or blue lead, or a similar compound, and to examine the *bearing* produced after the gears have been run under a pre-determined amount of load at the correct center distance. The thickness of the lead coating, the speed, brake pressure and the length of time the gears are run together will have a considerable effect on the appearance of the bearing. Consequently this type of inspection should be carried

out by an experienced operator and in conjunction with occasional checks of profile, lead and spacing. The marked advantage of this method is that the overall quality of the gear can be quickly determined. Lead and involute errors are easily detected. Spacing error especially of a progressive nature is not so noticeable from the bearing but can be often determined from the sound.

Another functional method or near functional occasionally used by "old timers" is to mount the gear and master on parallel arbors at standard center distance. The gears are then spun by hand and a slight drag applied to one to keep the driving sides in contact. The vibration felt by the finger tips on one of the arbors is then roughly interpreted as a function of gear errors.

Double-Sided Methods

Double-sided methods of measuring the quality of spur gears are methods in which the indications of error are determined solely by the relation between the errors on the *drive* side and the errors on the *coast* side of the teeth. As the *drive* and *coast* sides of the gear teeth may have independent errors, it is possible for the errors of one side to cancel or augment the errors of the other side when the two are inspected simultaneously with any of the double-sided methods. Because of this it is difficult or impossible to accurately determine the values of fundamental errors with any of the double-sided methods, but owing to their speed and simplicity such methods are extensively used and for certain types of quality control definitely workable.

There are two general types of double-sided inspection methods for spur gears. The first type consists of running the gear to be inspected with a master gear with center to center pressure to keep the gears tightly meshed. This method is not truly a functional method although it is sometimes referred to as such. It does not approximate actual operating conditions in regard to rotative speeds or tooth loading, and it operates with both sides of the teeth in action. In actual practice spur gears operate on only one side of the teeth at a time (except in certain unusual no-backlash installations).

The tooth thickness of the master gear is usually *built up* so that when tightly meshed with the gear to be inspected, the design center distance will be approximately maintained. If this is not done bottoming of the gears may occur or false indications of fillet interference or involute interference may appear. Devices for this type of double-sided inspection are known as hand-rolling fixtures or machines and consist of two arbors the distance between which can be varied with slight pressure. The variation in the distance between the arbors when the tightly meshed gear and master are rolled around together by hand is recorded on a dial indicator. Errors which decrease the tooth space will increase the center distance and vice versa. The flickering of the indicator needle as the gears are rolled together indicates the presence of local spacing errors or profile errors. General distortion of the ideal gear will sometimes be recorded in the full reading of the indicator. The Fellows Red Liner also employs the principle of the tightly meshed master gear and adds the feature of automatically recording the center distance variation. In this way a better picture of local errors can be obtained as momentary changes in center distance make definite indications on a chart which would appear only as the flicker of the indicator on a hand rolling-fixture.

The overall movement of the indicator on the hand-rolling fixture is sometimes referred to as *pitch-line runout*. This is a convenient term but because double-sided methods emphasize or minimize errors in action, and because of other kinematic reasons, the runout thus measured is not the true indication of pitch-line distortion. For instance in the generated type of elliptical distortion of the ideal gear, it is possible for the tightly meshed master gear to be accelerated and decelerated with respect to the gear being tested without any change in center distance, and thus show no indication of the error. Elliptical distortion of an ideal gear that has been sprung *out of round* will show an exaggerated variation in center distance with the master out of proportion with the acceleration and deceleration that would be imparted to its mate.

The second type of double-sided inspection is a method which does not attempt to measure profile errors. It consists of measuring *pitch-line runout* with a pin, ball, cone, rack tooth, or rack space. The same objections hold true for this type as for the master gear type of double-sided inspection. The virtues of the two types differ in that the first type is one of

(CONCLUDED ON PAGE 144)

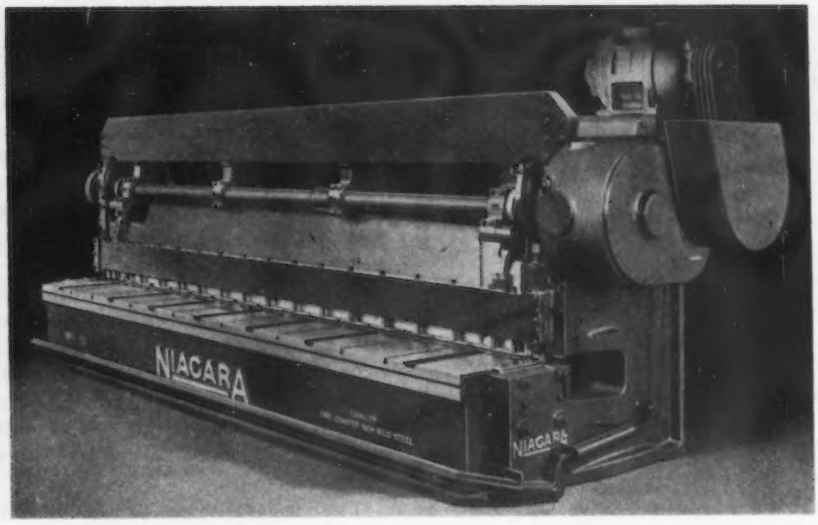
	INSPECTION EQUIPMENT FOR SPUR GEARS	QUALITY			
		FAIR QUALITY SUCH AS GEARS FOR SLOW SPEED MACHINERY	GOOD QUALITY SUCH AS GEARS FOR MACHINE TOOLS	SUPERIOR QUALITY SUCH AS GEARS FOR AIRCRAFT ENGINES	TEST QUALITY MASTER GEARS
QUANTITY	INTERMITTENT PRODUCTION OF SMALL LOTS	BENCH CENTERS WITH INDICATOR, STAND, AND PIN TO CHECK RUNOUT	AS AT LEFT. IN ADDITION BENCH CENTERS TO HAVE WIDE SCRAPED BED FOR LEAD CHECK WITH SURFACE GAGE	AS AT LEFT. IN ADDITION OPTICAL COMPARATOR TO BE USED FOR PROFILE CHECK	AS AT LEFT. SPACING CHECKER ALSO DESIRABLE
	CONTINUOUS PRODUCTION OF SMALL LOTS	CONE CHECKER	HAND ROLLING FIXTURE USING MATING GEAR AND RED LEAD TO CHECK TOOTH BEARING. CONE CHECKER FOR RUNOUT	INVOLUTE CHECKER, LEAD CHECKER, AND SPACING CHECKER	AS AT LEFT. CONE CHECKER ALSO DESIRABLE
	QUANTITY PRODUCTION OF FREQUENTLY CHANGING DESIGNS	BASE PITCH CHECKING MACHINE	AS AT LEFT. IN ADDITION USE SIMPLE SPUR LEAD CHECKER	AS ABOVE. SUPPLEMENTED BY POWER TESTER USING MASTER GEARS	AS ABOVE
	MASS PRODUCTION OF RELATIVELY STABLE DESIGNS	HAND ROLLING MACHINE USING MASTER GEARS	RED LINER USING MASTER GEARS, SPUR LEAD CHECKER	POWER TESTER USING MASTER GEARS, SUPPLEMENTED BY SPACING CHECKER, INVOLUTE CHECKER, AND LEAD CHECKER	(NOT MADE IN MASS PRODUCTION)

FIG. 6—This table may be used to select inspection equipment to meet various conditions.

New Equipment . . .

Presses

. . . Description of new developments in hydraulic and hand presses and related sheet metal machinery is continued in the following pages from last week's issue.

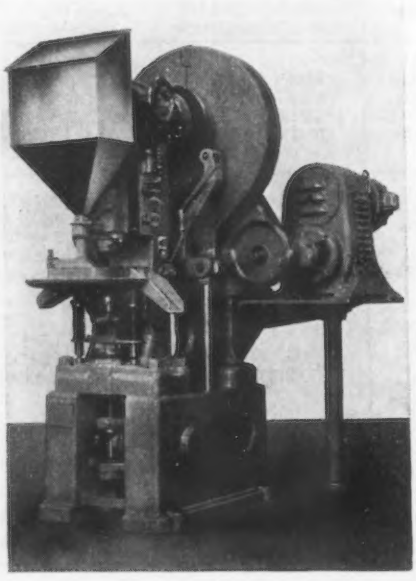


Squaring Shear

A NEW long-length power squaring shear has been added to the Series L line made by the *Niagara Machine & Tool Works*, Buffalo. This shear has a cutting length of 20 ft. and, by utilizing the gap in the housings, even longer sheets can be squared, trimmed and split. The massive bed and housings together with triangular section crosshead maintain straightness and correct clearance of knives throughout the cutting length. Convenient operation and quick gaging speed up handling of stock and reduce operators' fatigue. Self-measuring, ball bearing, parallel back gage measures in increments of 1/128 in. Full visibility of cutting line facilitates cutting to a scribed line. Drive mechanism operates on anti-friction bearings and is completely enclosed in an oil-tight case.

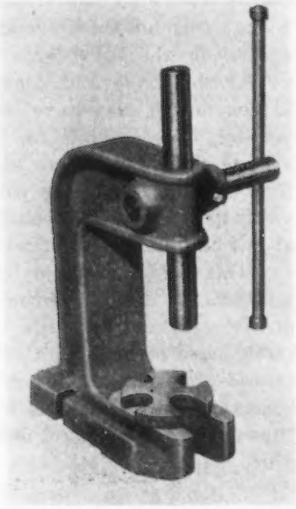
Automatic Powder Press

AN improved model of automatic press for production of powdered metal parts and Steatite and other dry-mix ceramics in which accuracy in dimension and exacting control of density are primary requisites has been brought out by the *F. J. Stokes Machine Co.*, Tabor Road, Olney P.O., Philadelphia. Pieces up to 3 in. diameter with a die-fill of 2⅝ in. are compressed by this machine at rates of 15 to 45 per min. at pressures up to 20 tons. Pressure adjustments may be made while the press is operating, assuring uniform density. Either the desired porosity in oil-impregnated bearings or the extreme density necessary in a hard carbide tool bit is readily obtainable, it is claimed.



Hand Arbor Presses

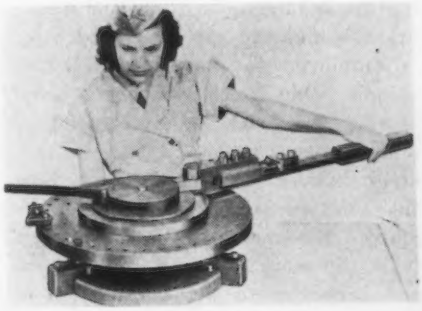
NEW 2 and 3-ton bench type arbor presses have been put on the market by *Lempco Products, Inc.*, 5682 Dunham Road, Bedford, Ohio. Snap ball check permits ram to be spun down to work. Heavy wrought steel pressing block is notched with 1⅛, 1⅞ and 2 in. openings. Large



machined table surface provides ample opening and support, taking work up to 14 in. diameter. It is claimed to be efficient for assembling, disassembling, bending, straightening and all kinds of operations requiring up to 3 tons pressure, and is made in both bench and wall types.

Pipe Bender

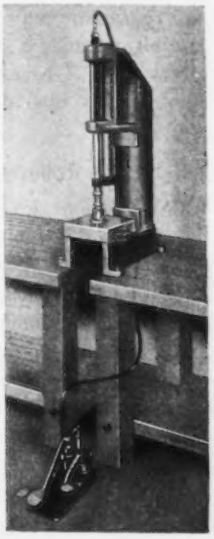
THE Di-Acro Bender No. 3 has been produced by *O'Neil-Irwin Mfg. Co.*, 317 Eighth Avenue, South, Minneapolis 15, especially for aircraft and marine work. Incorporating all the features of the smaller models, the new unit is more rugged throughout and has a considerably greater radius forming capacity. A 7-in. circle and two right angle bends can be obtained in one operation. Although especially useful in forming aircraft tubing, the



unit is capable of forming a ½ in. cold rolled steel bar to a 1 in. radius or larger. Operating leverage is 35 in. and may be increased up to 80 in.

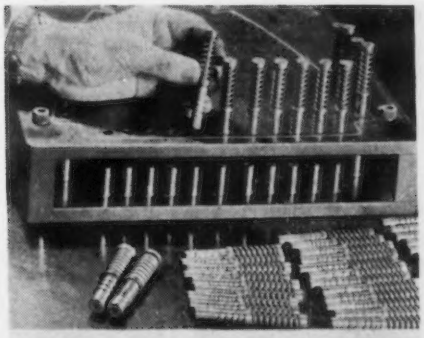
Hydraulic Arbor Press

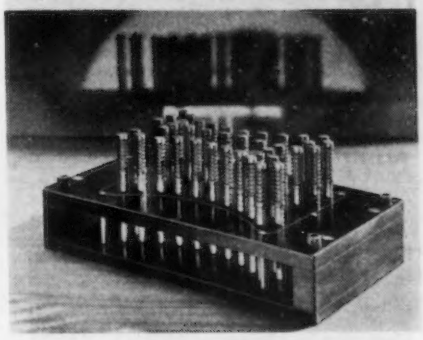
A COMPLETELY new Speedpress, a hydraulic arbor press, has just been announced by *Studebaker Machine Co.*, 9 South Clinton Street, Chicago, Ill. It is foot-controlled, leaving the operator's hands wholly free for the work. Pressures from zero to 20,000 lb. are obtained by pedal of hydraulic control base, connected with press by steel tube. One movement of the applicator pedal and the ram moves downward to contact with the work. Another foot pressure on the booster pedal, and any holding grip desired up to 20,000 lb. is applied. A release pedal breaks the pressure, and the ram automatically returns to the top of its travel.



Punch Plate System

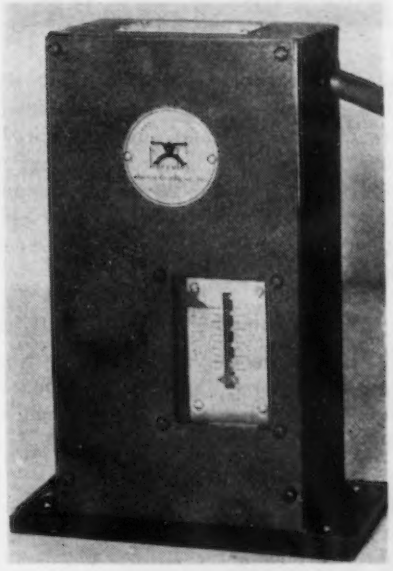
NEW equipment for punching holes arranged in any desired pattern in sheet material up to 43 x 45 in. in size has been brought out by *Wales-Strippit Corp.*, 345 Payne Avenue, North Tonawanda, N. Y. The plate set system uses Walesite plate sets and PS punch assemblies and dies to form self-contained punching units that are ready for use as soon as they are placed in the press. Being interchangeable, changing from one punching job to another is easily accomplished. A master template for locating the punch centers on the top plate of the set is provided. Two plates of Walesite are separated by spacer bars and are held together rigidly by bolts and dowel pins. The sets are made in 48 sizes.





Pressure Switch

A NEW type of electrical pressure switch with pressure ranges from 5 to 5000 lb. has been developed by *Hercules Electric & Mfg. Co.*, 2416 Atlantic Avenue, Brooklyn 33. It is equipped with a direct action gage for hydraulic pressures operating a very sensitive electrical switch. The overall dimensions are approximately 10 x 7 x 3 in.



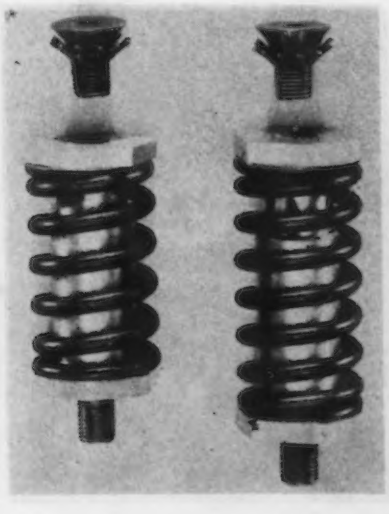
Wire Reel

A POWER-OPERATED wire reel to replace manually loaded ones has been produced by the *F. J. Littell Machine Co.*, 4151 Ravenswood Avenue, Chicago, especially for women operators. A drop center and motor drive on the Powertilt does the hard work of elevating the coil from the floor up to the working level automatically. The drop center permits the operator to roll the coil upon the floor and simply tip it onto the reel

core. A slight push against the coil centers it and the drop center is locked by throwing over a U-shaped bar. The reel will handle coils up to 25 lb.

Spring Stripping Units

SPRING stripping units called Strippits, which allow the removal and replacement of the stripper plate or dulled or broken punches without taking the die out of the press or disturbing any part of the setup, have been announced by *Wales-Strippit Corp.*, North Tonawanda, New York. The use of thinner, easier-to-handle, less expensive stripper plate is possible because pressure is exerted on the plate only when the die is punching, it is said. No stripper plate is required for stripping scrap from die. The built-in spring is held compressed by a retainer and assembly link.

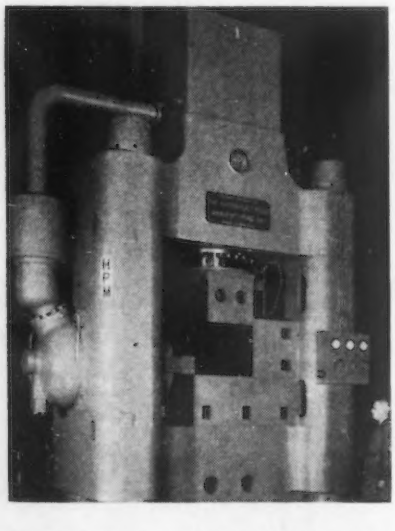


Inclinable Press

THE 150-ton C36½ press has been added to the line of open-back inclinable presses made by the *Ferracute Machine Co.*, Bridgeton, N. J. It is of the geared type with jaw clutch but can be had with pneumatic friction clutch and brake. The press frame casting is of steel, which reduces the weight of the press and the floor space required without sacrificing strength and rigidity. The stroke ranges from 6 to 13 in. Bed measures 32 in. front to back by 50 in. right to left. The entire series comprises 15 sizes ranging from 1¼ to 7 in. diameter shaft. They can be had in various combinations of special features that permit them to operate fully automatic, with finger tip controls.

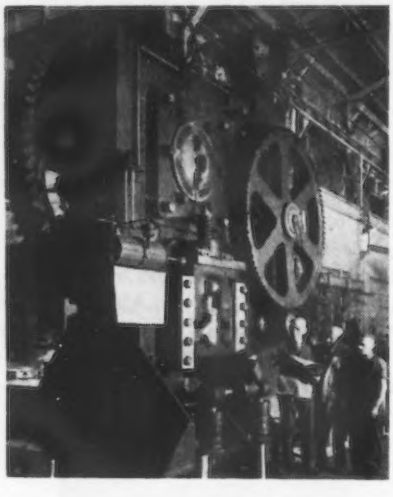
Powder Metallurgy Press

THE completion of one of the largest hydraulic presses ever built for briquetting powdered carbides of tungsten, titanium or tantulum for carbide cutting tools, dies and inspection gages is announced by the *Hydraulic Press Mfg. Co.*, Mount Gilead, Ohio. The press is also suited to other powdered metal forming which requires the application of high pressure from two different points. It will exert a 1500-ton downward acting force and a 1000-ton horizontal acting force. It is completely self-contained, being equipped with two H-P-M Hydro-Power radial hydraulic pumps which generate the operating pressure.



Billet Shear

DESIGNED and built by *Buffalo Forge Co.*, Buffalo, the No. 17 billet shear is believed to be the largest machine of its type ever constructed. Weighing over 80 tons, the machine has an electrically welded "Armor-Plate" frame. Pressure on the knives is 4,500,000 lb., cutting



10-in. steel bars at the rate of six cuts per min. Clutch and hold-down are air operated and automatic pressure lubrication is provided by a lubricator mounted on the machine. The whole unit is operated by a 125 hp. motor which drives the flywheel through multiple V-belts.

Spinning Lathe

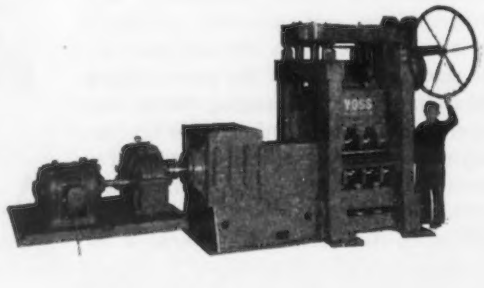
THE Ferracute spinning lathe No. 224, offered by the *Ferracute Machine Co.*, Bridgeton, N. J., has a two-speed motor which permits adjustment between 200 and 1000 rpm. The speed can be varied while the lathe is running. The motor is started and the transmission is set at the desired working speed before the headstock spindle is started. A control lever engages a dry-disk clutch, bringing the spindle up to speed and a cone brake brings the spindle to rest. Air is employed to move the tailstock spindle. One directional control lever, located for right-hand control, is moved toward the work, and the tailstock spindle travels forward. Further movement locks the spindle in place. Movement of the lever away from the work unclamps the spindle and causes it to withdraw. Use of tapered headstock spindle with a corresponding taper in the faceplate offers true-center mounting. The two members are keyed and held in place by a spanner nut, providing for quick removal of the faceplate.

Hydraulic Fittings

A LINE of high pressure hydraulic fittings is announced by the *Anker-Holth Mfg. Co.*, 332 South Michigan Avenue, Chicago 4. Standard assemblies for working pressures up to 3000 lb. include a check valve which is reversible by placing the steel ball ahead of the spring; a safety valve, which is spring loaded and adjustable; a straight connection; elbow and T-assemblies and ⅜ and ¼ in 4-way operating valves.

Roller Leveler

TWO roller leveler machines built to handle armor plate have been completed by *Voss Machinery Co.*, 2888 West Liberty Avenue, Pittsburgh. The machine pictured can take care of ¾ in. armor plate in continuous sheets, and up to 1 in. in some other steels. It can also be designed and built for much heavier and wider plates. Similar to the other roller levelers manufactured by the company, the straightener is of heavier construction and incorporates improvements in design. An armor plate leveler, said to be the largest and heaviest of its type ever built, has been completed by the company. The new big leveler has all the features of the former machines and is regarded as the forerunner of more heavy and powerful levelers.



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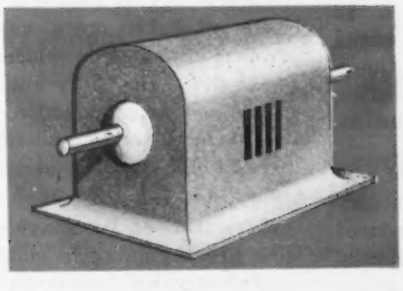

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• Goodyear's Jackson tire plant reconversion offers a previewing of the picture ahead . . . Truck tire needs throw long shadow over plans for 1944 production of civilian vehicles.

DETROIT—A prototype for reconversion is at hand in the Jackson, Mich., plant of the Goodyear Tire & Rubber Co. This plant was a prime prewar producer of original equipment tires sold by Goodyear; when war came on it converted to output of 3-in. guns and fuel cells. Now it is reconverting to manufacture of tires. The use of the tires is mainly for military and essential commercial wheels, but the move is definitely a reconversion, and as such previews some of the problems of the future.

In this particular case, physical reconversion costs were not a factor. Government contract provision for rehabilitation expense is caring for re-installation of machines, etc., and all old equipment was put back into use. In addition, Goodyear is investing around $4,000,000 in new equipment, which should logically be charged to expansion rather than reconversion, for the Jackson Goodyear plant was built in 1937, was up to the minute, and had few worn-out or obsolete facilities.

The effect of reconversion on the workers is interesting. Payrolls had swollen to almost triple their former size at the peak of the war production program, gaining to 2300 men and women. Today they stand at about 675, and will reach no more than 1000 when the reconversion and expansion is completed.

The bulk of the increased payroll was secured from the Jackson area population. A comparatively small number of men from other areas, particularly the rather thinly war converted western Michigan section, took over machining operations of major complications; operators for the other machines were trained among local workers. Substantial numbers of women were hired.

The in-migrants, for the most part, have already left Jackson. Most have gone to other industrial centers—Detroit has attracted a large proportion. This is extremely interesting if it portends a general development that migrant war workers will leave the areas to which they flocked.

Not typical in forthcoming broad reconversion is the situation of the workers now laid off. Increases in subcontracts at Reynolds Spring Co. and other Jackson plants made jobs for most of these, and they switched. Those since called back to work at the Goodyear plant have returned readily, to protect seniority.

ONE problem at Goodyear which will be general when national reconversion starts has been the matter of pay rates. As rubber workers, the Goodyear employee pay scales were lower than the rates paid them for machine operations. Going back to their original jobs, they are grumbling about the concurrent pay reductions. Thus far there has been no adjustment of this situation; WLB is standing on its pay classification lines and gives no indication of changing them.

Mention was made of expanded facilities. A part of this lies in a new building which Goodyear is putting up. Its cost runs around $1 to $2 more per square foot than would have been expected in prewar times. Reconstruction costs within existing plants are above that proportion, however.

From this picture the shape of several reconversion factors can be dimly made out—complaints over reduced pay scales which, although rejected now might become loud enough in national volume to hold postwar wage levels at their present stand, even though the classifications of work are lower; higher costs for physical refurbishing of plants than were required to transform them for war work; less of an in-migrant problem than has been expected. These indications cannot be considered positive, but confirmatory evidence should be watched for.

The Goodyear reconversion calls attention anew to worries over supplies of heavy duty tires, which are now beginning to shape up as a prime bottleneck in the 1944 truck program. Original projections called for upward of 20,000,000 truck tires to be produced this year; since then the indications are that the total will be below 18,000,000. Of these, approximately 5,000,000 were earmarked for original equipment; this total is now down around 3,500,000. Inasmuch as a proportion of about 25 per cent natural crude must be inter-mixed with the synthetic used to make truck tires, in order to withstand the greater operating load placed on the heavier casings, these curtailed figures seem to be maximums. Also imposing a positive limitation on production is the fact that molds for processing heavy tires are quite definitely in limited quantity, and therefore offer a positive check on production.

AS a result, truck tires have gone under an allocations system just as stringent as CMP. There are eight claimant agencies involved. The manufacturers of vehicles for any of these agencies must file their wants in Washington on the first day of the second month in each quarter. Allotments to claimants will come back 15 days later, and in the 30 succeeding days orders must be placed by vehicle manufacturers with suppliers. Schedules are frozen as of the start of the quarter.

To fit the shortages of truck tires, the much-juggled 1944 truck program has been shaken down more than 15 per cent in the Army vehicle category. Of the 742,433 military units originally planned for production this year, 123,149 have been eliminated, including 42,013 medium and 81,136 light trucks.

More facts on the shape of the cutback are beginning to come to light. Jeep production apparently was most severely reduced, curtailments being sent out on the heels of a small increase granted to Willys previously. As was said here earlier, Dodge was substantially sliced, and the entire half-track program, participated in by White Diamond T and Autocar, was all but eliminated. There were reductions among the very small truck makers as well as these large ones.

In theory at least, the military cutbacks make possible the increase of

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civilian truck production by that quantity or more. In fact, however, no such thing will ensue, because of the tire shortages and their superimposition on bottlenecks of bearings, transmissions and axles.

The 15 per cent Army reduction may likely be moved onto the schedules for commercial trucks, but is less likely to be translated into finished production. In fact, the Army cutbacks bring aggregate vehicle production in all categories for 1944 just about to the extreme limit indicated by 3,500,000 available original equipment casings—in other words, around 900,000 vehicles, none equipped with spare tire.

Those who hoped that civilian vehicle production would get off to a good start were cautioned by their more realistic fellows, and the January and February showings bear out the pessimists. As reported here earlier, actual January production of civilian vehicles fell below more than 2000 units. February output was somewhat higher, but it was still farther away from the month's quota than was the case in January.

This all serves to put the truck industry in a rather irritated frame of mind these days, and their composure is not at all aided by the newly announced ODT program for rebuilding motors, transmissions and axles to keep the nation's trucking fleets operating.

ODT reports that it has prevailed on WPB to allocate enough steel to produce 138,000 engines, 18,000 transmissions and 7000 rear axle assemblies. These quantities, theoretically, will be pro-rated among various manufacturing interests and produced as new goods. They will be installed on truck fleets where needed, and the units they replace will be returned to the factories for rebuilding and subsequent distribution in the field.

Truck people have promised to go along with this program, but in private they criticize it as buck passing by ODT. They point out in the first place that the quantities are too small to do much good when spread out over the country among many different manufacturers. They point out, second, that although some of them have facilities for rebuilding motors, as in the prewar days, none has ever had any experience rebuilding transmissions and rear axles. Conceivably the professional motor rebuilders will aid in this latter branch of operations, but establishment of new facilities will likely be necessary in any case, and the difficulties of obtaining new facilities are enough within themselves to cast a shadow over the outlook for this new program.

Great Postwar Prosperity Predicted by George Bacon

• • • **George W. Bacon**, of Ford, Bacon & Davis, Inc., New York, predicted on March 15 that this country will enjoy a postwar era of unprecedented prosperity.

Mr. Bacon, a founder of the company, was the central figure in a celebration, held in its general offices at 39 Broadway, New York, on the company's 50th anniversary. Another founder, George H. Davis, now retired, was present when James F. Towers, president of the firm, presented Mr. Bacon with a commemorative medal on behalf of his associates. The occasion drew many leaders of the industrial, utility and banking worlds.

Ore Shipments to Upper Lake Ports Total 86,413,141 Tons

Cleveland

• • • **Mine shipments** of Lake Superior iron ore for 1943 by railroad to upper lake ports and all-rail to consumers totaled 86,413,141 tons according to the Lake Superior Iron Ore Association, of which 85,962,168 tons came from U. S. ranges and 450,973 tons came from Canada. The U. S. range shipments constituted 99.48 per cent of the total. All-rail shipments direct to consumers located entirely in the upper lake regions totaled 2,016,161 tons, of which 820 tons came from Canadian ranges and 2,015,341 tons came from American ranges.

Beneficiated Superior ores for 1943 totaled 15,904,756 tons. Of this, 15,453,783 tons originated in U. S. ranges and 450,973 tons originated in Canada. Minnesota ores show a slightly higher rate of beneficiation than required of over-all Lake Superior ore shipments. Of total ores shipped from the Minnesota region, the association's report shows that 22.09 per cent were beneficiated. According to the report, 18.40 per cent of all Lake Superior ores shipped in 1943 were beneficiated.

Falck Succeeds Black As Head of Production Group

Washington

• • • **Edward Falck** has been appointed executive director of the Combined Production and Resources Board, succeeding William M. Black who resigned recently. Mr. Falck has been with WPB and its predecessor, OPM, since July, 1941.

Plane Output 350 Per Day In U. S., C. E. Wilson Says

• • • **The aircraft** industry has produced 153,061 planes during the past three years, and present production is at the rate of 350 planes per day, Charles E. Wilson, chairman of the Aircraft Production Board of WPB, said March 14.

The volume and effectiveness of American plane output was pointed out in the following statement by Wilson:

"Against the declining effectiveness of German aerial strength, the production power of the Allies stands in stark contrast. British Production Minister Oliver W. Lyttelton recently told the House of Commons that Britain had produced 90,000 planes through the end of 1943. In three years, the United States aircraft industry has produced 153,061 planes of which 105,126 were combat planes. We have retained over 122,000 of these planes and we have sent approximately 28,000 planes to our Allies. And we are adding to our output of planes at the rate of 350 per day.

C. E. Noyes New Director of OCR Civilian Relations Div.

Washington

• • • **Charles E. Noyes** will succeed Dr. Austin Grimshaw, who recently resigned as director of the Civilian Relations Division of the Office of Civilian Requirements, WPB has announced. Mr. Noyes has been assistant director of the division since last June. Dr. Grimshaw, Cambridge, Mass., educator and business consultant, will assume new duties in the office of the vice-chairman.

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During the past year, Carburs have found wide acceptance among the country's leading manufacturers. These tools, the first of their kind ever to be produced, have proved their ability to offer at least fifty times the life of ordinary rotary files.

With the merger of Carbur, Inc. with Lincoln Park Industries, facilities are now available for greater and more varied production of Carburs. The experience gained by the Lincoln Park organization over a period of many years in manufacturing high precision inspection and production equipment now promises even finer quality cemented-carbide rotary files than were possible before.

At the present time, Carburs can be manufactured in shapes and sizes to meet almost any need. We'll be glad to supply you with full information.

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Washington . . .

• Government pokes its nose into everything else but lets local draft boards sweat it out alone . . . Either military programs must be slimmed or size of the armed services must be trimmed.

WASHINGTON — The manpower muddle is approaching the place the material situation found itself in early last year. Much talk is heard of shortages, and there are many fancy schemes floating in air, overstatement of labor needs by manufacturers, and general maldistribution.

Then in materials, as now in manpower, individual bad spots caused over emphasis of situation. Officials are privately saying that if military procurement is sliced back to realistic levels, as it was to "cure" the steel shortage, the manpower inflation bubble will be pricked too, and the country will turn up with manpower surpluses.

Either military programs must be slimmed, or armed service size must be trimmed temporarily to manpower supply. Cutbacks and cancellations already are causing unemployment pockets, and the trouble is no agency dealing with manpower has any idea of the effect of breaking prime contracts on subcontracts.

Then there is a lot of bearish talk by the services calculated to swing public opinion in favor of universal draft. Selective Service, WPB and manpower officials are complaining draft boards are deferring men not entitled to be deferred under existing directives, are favoring men with dependents.

ELECTION year politics are seen in the fact that Washington does not call for lists of deferred men and advise boards of the number and kind of improper deferments. The excuse is that it is against the policy of letting local boards be self-governing. Yet the government does not hesitate to poke its nose into all manner and kinds of employer-employee relationships which are of even more local and private character.

Equally inconsistent is the excuse for not giving 4F's limited service, as the President's medical commission opposed, the late combing of governmental and farm deferments. Congressmen have the feeling that government can't be too sincere in its attempts to clean up manpower.

The recent flare up over local boards' "misinterpretation" of the President's order for review of deferments and in particular of those of young men up to 26 years old is ending up with the establishment of a list of critical industries, to go with the list of critical occupations. It is predicted that there will be a mad scramble by industries to get on the critical list and the wind-up will see a new list nearly as long as the original essential list.

* * *

• The President is now siding with the Army view that civilian production increase should not come just yet. At least this is the impression correspondents were given last week when the President was asked about the dispute over civilian production timing between WPB, the Truman Committee and the Army.

* * *

• Don't look for Congress to press for the early establishment of the Office of Civilian Demobilization which would curb Army say-so on the "when" of Reconversion Day. Word is out from the White House, and even a President-bucking Congress will dare not to disregard practical politics.

If some military program slipped this would give the White House the chance for making political capital of a Congressional boner in starting civilian production too soon.

The upshot is that the period of quiet planning will continue until after the invasion with little action taken until then, unless organized labor starts throwing its weight around. WPB chairman Donald M. Nelson will go as far as he can, though.

The first WPB step will be OK for the regional surplus plan, but this will not come right away. The great obstacle to Nelson is the fact that the public does not know the extent of cutbacks, or their effect, and unofficial censorship still blankets cancellation moves. Also, no accurate manpower statistics are available in the government.

NEW ODT CHIEF: *Brig. Gen. Charles D. Young, deputy director of the Office of Defense Transportation, will assume the duties of director, succeeding Joseph B. Eastman, who died on March 15.*

The Truman report said that cancellations are running at the rate of $1,500,000,000 a month for the first half of this year. At this pace, more than $17,000,000,000 worth of contracts will have been canceled by the Army alone by June.

But no government official will say that cutbacks add labor to manpower supply. Manpower people say that the services will need all men freed through cancellations and this is just what the War Department says, too.

* * *

Along with postwar plans of personal subsidies of $10,000 each for every male adult, to be certified by the government, some of the bright boys remaining in the New Deal are thinking about a World Resettlement Administration. The looming prospect of a world shipping surplus,

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Transparency permits "on the job" adjustments . . . *tool life up 33%*

Minutes saved in machine shops today mean lives saved on the battlefields tomorrow . . . and here's how a large plant saves 120 of those minutes on a certain operation.

Transparency of Sunicut makes it possible. Previously they had to stop the machines during the operation to make various tool adjustments . . . requiring 2 hours set-up time. At the suggestion of a Sun Cutting Oil Engineer they made a change in cutting oil — to Sunicut, the transparent, straight sulphurized cutting oil.

Now two hours are saved. Sunicut permits a clear view of tools and work . . . adjustments are made without stopping machines . . . two hours idle set-up time turned into two hours vital production.

Added savings in tool life are realized . . . with Sunicut tools cut 33% longer. Operators find Sunicut cleaner to work with . . . and an estimated $5000 yearly saving has been effected since Sunicut requires no mixing with an expensive base.

As a result of this record Sunicut has been adopted throughout this plant. Save production time and money in your plant, too. Apply the advantages of Sunicut to your cutting oil problems. A Sun Engineer can give you full information. Write

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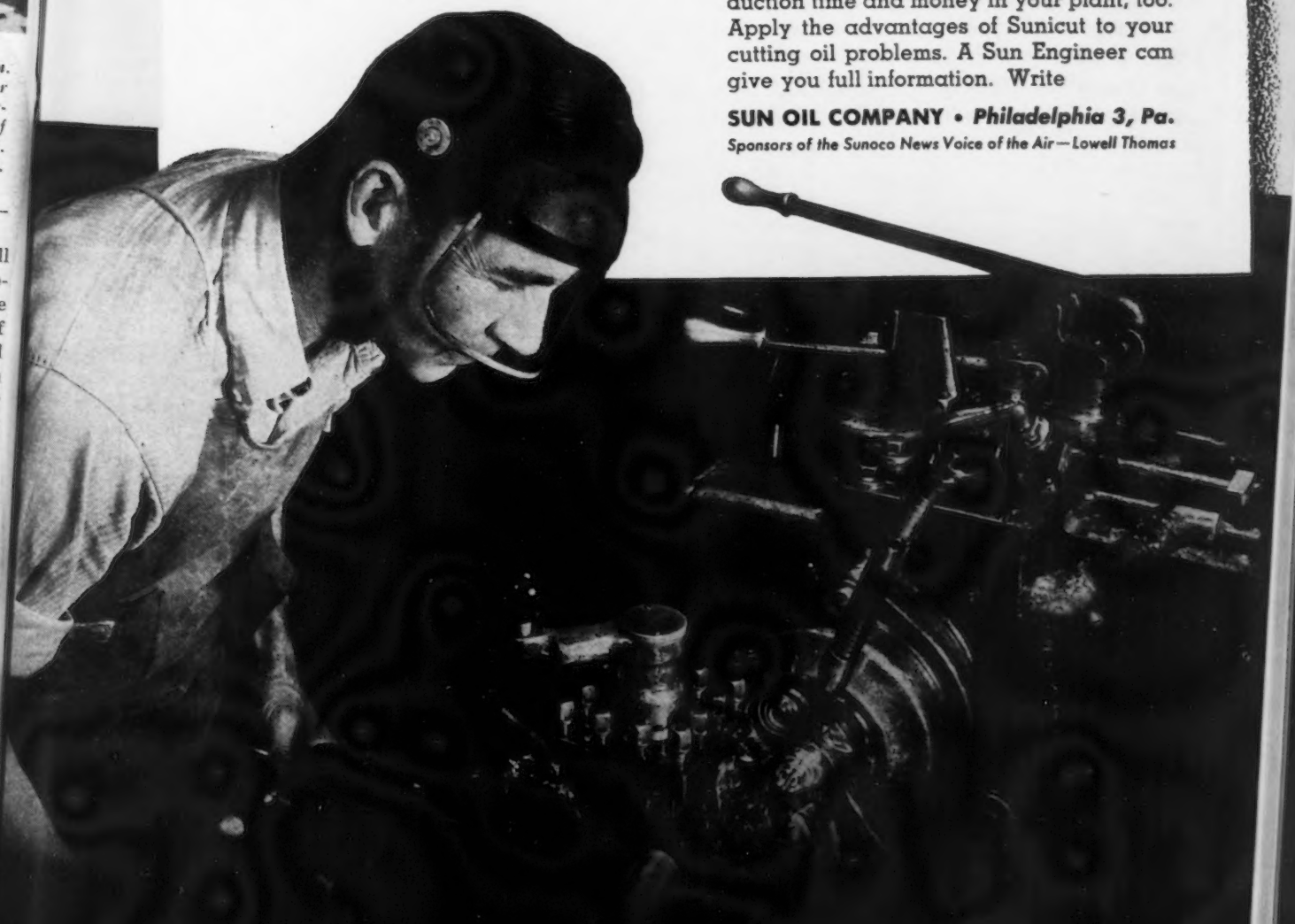


SUNOCO

SUN INDUSTRIAL PRODUCTS HELPING INDUSTRY HELP AMERICA

largely American-built Liberties, is the genesis of the notion.

A curious idea is that while some economists are stewing about surplus American war goods, others are thinking of how to get rid of surplus Americans by shipping them to sparsely populated areas where colonization can be promoted and made popular. It is a neat way of solving unemployment. It is a good bet that Europeans are thinking even more about the idea than American government officials. At the same time, wide use of cheap transportation on maritime fleets will go a long way toward offsetting costs of subsidization of the shipping industry after the war.

Colonization targets may be South America, Canada, Australia, the temperate parts of Africa, and the less rigorous portions of Alaska. The whole thing depends upon United Nations agreement and some countries may be reluctant to receive a lot of emigrants.

* * *

• P.S. The Steel Division, which at one time had 800 employees, has now less than 450.

* * *

• Representative Wright Patman, Democrat of Texas, won't get very far with his campaign to remove his compatriot, Will L. Clayton, from the job of Surplus Property Administrator and replace him with Jesse Jones.

* * *

• Representative Carl Vinson, chairman of the Naval Affairs Committee, and Representative Andrew May, chairman of the Military Affairs Committee, are having a race to get termination bills to the floor of the House first. Both want to beat the George-Murray bill now before the Senate, and each other.

J. & L. Supply Co. Is New Name for Frick-Reid

• • • **The** Jones & Laughlin Supply Co. has succeeded Frick-Reid Supply Corp., a wholly-owned Jones & Laughlin subsidiary. The change in name was made to identify more clearly the supply company's activities and its relationship to the corporation. The principal office of the new company will remain at Tulsa, Okla.

The new company is exclusive distributor of Jones & Laughlin oil country tubular products east of the Rocky Mountains. In recent years its activities have been enlarged to include process engineering and construction of refineries, gasoline plants, recycling, repressuring and other types of plants for the oil and gas industries.

J. L. Shakely, who has been with Frick-Reid more than 30 years, and president since 1938, has been elected president of the new company. Other officers, including Robert McCoy, Jr., executive vice-president; H. H. Wilson, vice-president, and P. R. Warner, treasurer, have also been elected to serve in identical capacities with the new company.

R. J. Woods will be manager of tube sales of the supply company in the mid-continent area, with headquarters in Tulsa. He formerly was district sales manager for J. & L Steel Corp. in Tulsa and has been succeeded in that capacity by J. H. Tice.

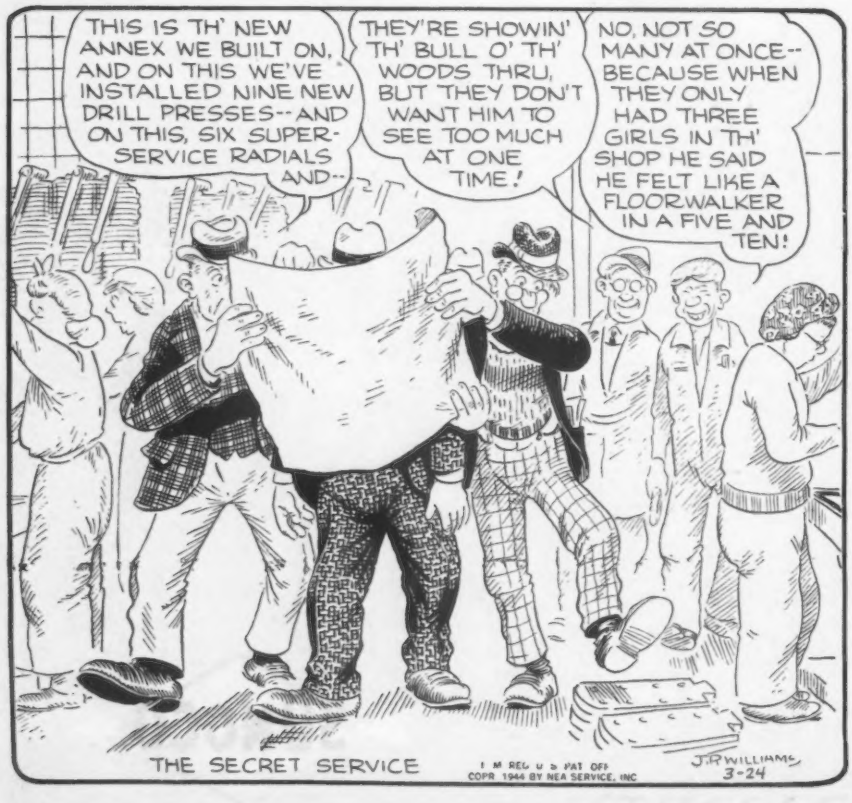
Henry J. McAdams, formerly in New York City, has been appointed manager of Jones & Laughlin Supply Co., New York office.

H. E. Wagner, district sales manager in the eastern oil and gas fields for the supply company, is being transferred from headquarters at Bradford, Pa., to the supply company's offices at 311 Ross Street, Pittsburgh, J. K. Lytle continues in the capacity of assistant to Mr. Wagner.

The Houston office will continue under the direct supervision of H. H. Wilson, vice-president, with T. L. Lewis, who recently joined the organization, as district manager of tube sales. They will be assisted by C. B. Moore, city sales manager; G. S. Emerson, salesman; G. E. Tyson, salesman, and J. T. Batchelor, chief clerk. The latter two were formerly in the tube sales department of Jones & Laughlin Steel Corp.

F. D. Winslow, district sales manager for Jones & Laughlin Steel Corp. in Houston, continues in that capacity, having charge of the sale of all steel products other than oil country tubular goods.

THE BULL OF THE WOODS — BY J. R. WILLIAMS



New Container Institute Is Headed by Keplinger

• • • **Formation** of the Steel Shipping Container Institute Inc., was completed March 16 at New York. L. R. Keplinger, vice president of Rheem Mfg. Co., was elected president. Officers include these vice presidents:

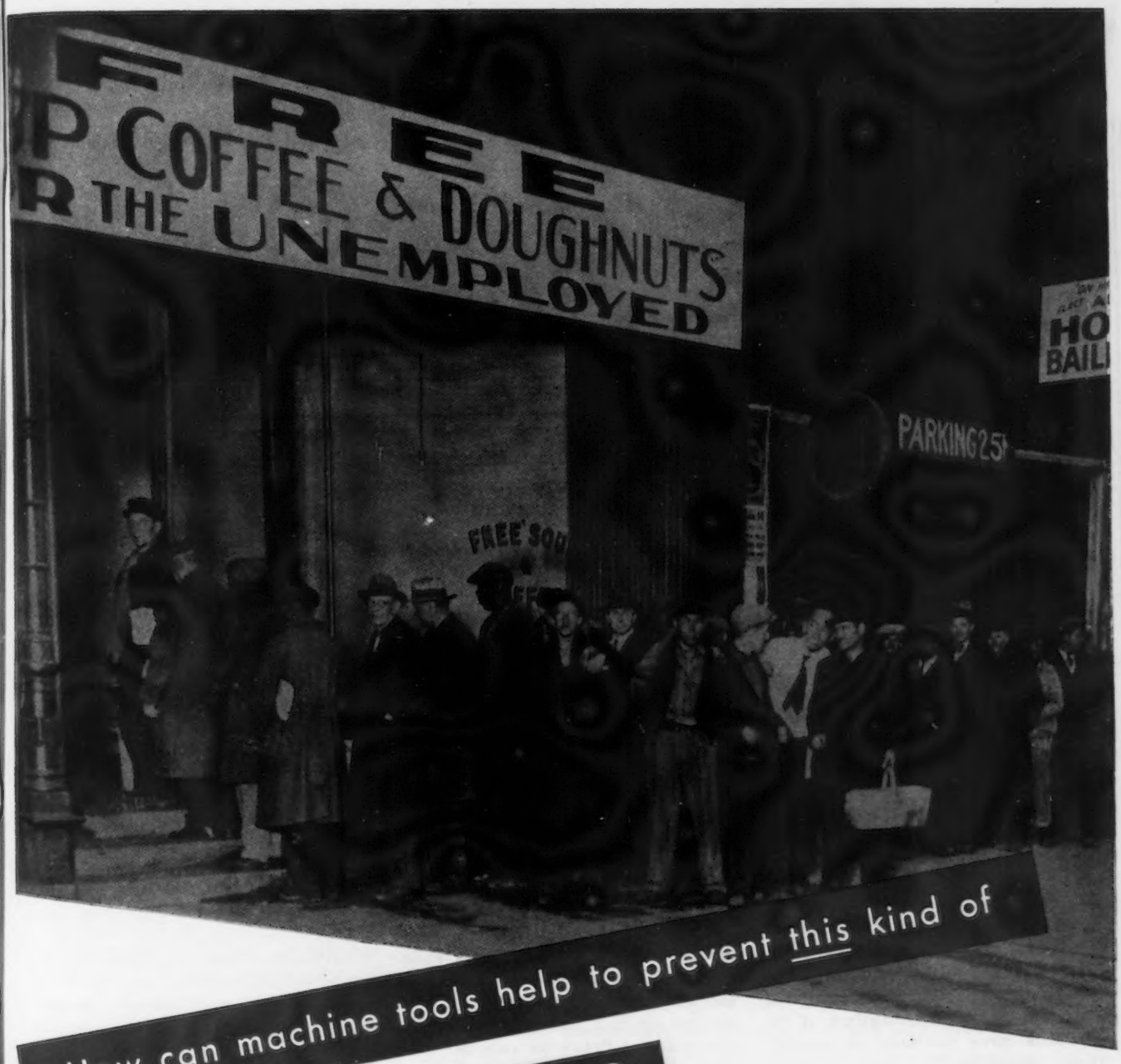
H. N. Lees, president, Draper Mfg. Co., Cleveland; John Hauerwaas, president, United States Steel Products Co., New York; E. C. Gardner, vice-president, National Enameling & Stamping Co., Granite City, Ill.

The board of directors, in addition to those mentioned, comprises the following:

S. A. Bennett, president, Bennett Mfg. Company, Chicago; F. O. Wahlstrom, president, Southern States Iron Roofing Co., Savannah, Ga.; R. P. Dieckelman, vice-president, Pressed Steel Tank Co., Milwaukee; E. D. Thompson, president, Stevens Metal Products Co., Niles, Ohio; J. H. Kerr, vice-president, Ohio Corrugating Co., Warren, Ohio; F. T. Barton, president, J. & L. Steel Barrel Co., New York, and F. J. Nesbitt, president, Owens-Illinois Can Co., Toledo, Ohio.

Exide Maps Supply Lines

• • • **Exide News** published by Electric Storage Battery Co., Philadelphia 32, contains a large diagram titled "How Battles Are Won," showing how men and supplies flow into action. Copies are available upon request.



How can machine tools help to prevent this kind of Victory?

Remember the big parade of the breadline— the march of the bonus army — the victorious men selling apples? Many an American hero tasted those bitter fruits of victory, and the war to end war ended nothing.

What kind of victory will this one be? It can be the great one American boys are giving their lives for — but they alone can't make it so. For victory in peace, as in war, must be planned ahead . . . and in peace, you're one of the Generals.

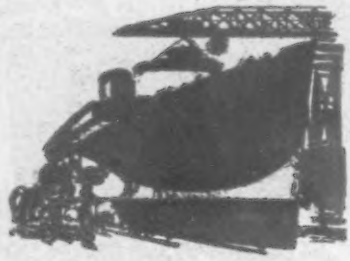
If you are a manufacturer, there is a small group of basic machine tool engineers who can help you to plan now for the kind of victory we've told our sons they're fighting for.

One of these engineers is a Bryant man. We urge you to call him today. For his specialized knowledge of internal grinding machinery is important to the manufacture of literally *everything* that will make this country a finer place: this victory a victory that we shall not be ashamed of.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.

WEST COAST . . . OSGOOD MURDOCK

• All Utah rejoices and faces destiny unafraid since WPB authorized completion of structural mill at Geneva . . . Major California scrap dealers completely vindicated by Federal courts.



SAN FRANCISCO—Balm has been flowing as from an artesian well throughout the intermountain Gilead of Utah since the cryptic announcement came from Washington that WPB has changed its mind of three months ago and will now authorize the completion of the structural steel mill at the Geneva plant. Senators, Congressmen, the Governor, the State University, Chambers of Commerce and representatives of the railroads have combined in making their representations and carrying the appeal to Washington through every channel and pipeline available. Salt Lake newspapers have so headlined the affair that citizens or Utah generally have become well acquainted with complexities of the steel industry to a surprising extent.

Vice President E. M. Barber of Columbia Steel Co,., construction contractors for DPC, estimates that between 60 and 70 per cent of the machinery and equipment for the structural mill is now stored in the great building, which is about 90 per cent complete. Practically no erection or installation has been done and if and when all additional facilities are delivered the mill could be operating within about 90 days, after construction is resumed. Ample labor is now available, but material priorities will have to be reinstated and many suppliers have substituted other orders since the stop order was issued early in December. The 26 inch mill when complete will have an annual capacity of 200,000 net tons of structural shapes, billets and rounds. Present prospect indicates that first products may be available late in the summer or early in the fall.

From an operating standpoint, principal advantage of the structural mill is to balance the operation and utilize most efficiently the three blast furnaces and nine open hearths designed to supply ingots for the structural mill as well as the big plate capacity. Furthermore, in connection with postwar conversion, it is generally expected that the demand for plate will cut off when ship construction is terminated, and while plate facilities are being converted to roll strip and sheets, the structural mill would be an anchor to hold the organization and continue operation.

TRAFFIC experts from Utah have been in Washington conferring with DPC and ICC agencies over the crucial question of freight rates on finished steel products to the West Coast. The present rate per gross ton on pig iron from Geneva to Los Angeles, San Francisco, Portland or Seattle is $4.95 and on ingots $5.78. This is reasonable and satisfactory and considerable tonnages have been moving on this basis. On cast iron pipe made at Provo the rate has been $6.60 although no great volume moved during normal times because of the lower water rate from Birmingham. On finished steel, plates, shapes and bars, the book rate now stands at $12 per net ton, somewhat in line with the rate of $17 per ton from Minnequa (Pueblo) Colo., and $22 per net ton all rail from Chicago or Birmingham.

Recently Kaiser steel was granted a rate of $4.40 on plates from Fontana to San Francisco, a distance of 518 miles. On the basis of this rate and other considerations, the Utah traffic authorities urge a rate of $5.31 from Geneva to Pacific Coast ports. Recently DPC rate experts submitted a suggested schedule to the railroads as follows: Geneva to Los Angeles $5.95—to San Francisco $7.30—to Portland $7.75—to Seattle $8.00. The respective rail mileages involved are 746 miles to Los Angeles, 849 miles to San Francisco, 922 to Portland and 1009 miles to Seattle. In direct ratio to these mileages, on the basis of the recent Fontana to San Francisco rate of $4.40 the respective rates to Los Angeles, San Francisco, Portland and Seattle from Geneva would be $6.35, $7.20, $7.80 and $8.50. A single, equalized uniform rate to all four principal Pacific Coast ports seems desirable and the probable volume and industrial possibilities justify close and careful consideration. In fact the entire economy and future of the Geneva operation depend almost entirely on what the rail rate to Coast points may be. However, competitive implications are such that the adaption of this rate is such a crucial factor in the future industrialization of the West Coast that whatever the final decision, it will be frightfully unsatisfactory and violently distasteful to various interests involved.

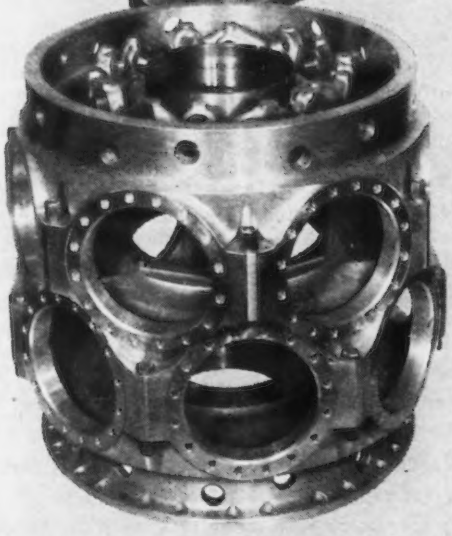
ON the basis of the long awaited decision of the United States Supreme Court in the Hecht case two California Federal District judges promptly and decisively found in favor of the defendants and against OPA in the tedious but important actions involving principal scrap iron suppliers.

California Scrap Iron Corp. of Oakland, San Francisco and Pittsburg and its able, outstanding president Marshall A. Shapiro were completely vindicated and exonerated by judge Louis A. Goodman who promptly vacated his former judgment and found in favor of the defendant. In Los Angeles Judge Ben Harrison had held the case of OPA versus Berg Metals Corp. under submission "for a considerable length of time because I was dissatisfied with the holdings in Brown versus Hecht."

Judge Harrison, the very next day after the Hecht decision was announced, issued memorandum opinion in part as follows:

"Now that the Supreme Court of the United States in a very salutary and wholesome decision has reversed the Hecht case and held in effect that the trial courts were not rubber stamps for OPA I shall proceed to dispose of the issues: I find that . . . shipments in violation . . . occurred through inadvertance and an honest misunderstanding . . . clarified by amended regulations . . . at the time of filing was in full compliance . . .

There's no substitute for EXPERIENCE!



Increased production attained in precision machining of this aircraft crankcase on the above Ex-Cell-O special-purpose machine.

Ex-Cell-O's wide experience in designing and building special machines to increase output and lower costs assures you practical advantages in your immediate or near future production

You have a substantial background of experience to draw from when you bring to Ex-Cell-O your problem in the *precision* machining of metal parts on a high production basis . . . whether it concerns an immediate war production job or a future product you are now planning. The more economical production of accurate metal parts necessitates single-purpose machines of improved efficiency, capable of giving greater output and reducing unit cost. For years Ex-Cell-O has been an acknowledged leader in the field of special-purpose machines . . . *precision* machines with exclusive features that represent the utmost in accuracy, production, operating ease, rigidity, and durability. This is why you should utilize Ex-Cell-O's experienced engineering and manufacturing facilities. Ex-Cell-O has representatives in all of the nation's principal manufacturing centers. Consult the one nearest you, or write to Ex-Cell-O Corporation Head Office in Detroit.

EX-CELL-O CORPORATION • DETROIT 6, MICH.

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O *for* PRECISION

no evidence indicating any further violations.

"The plaintiff (OPA) presented this case on the theory that he was entitled to an injunction as a matter of right upon the establishment of any violation of any provision of the regulations and stipulated that at the time of trial the defendants were in full compliance and that he had no evidence indicating the necessity of an injunction.

"As to other alleged violations, I find against the plaintiff.

"In view of the fact that the issuance of injunction in cases of this character are still a matter of discretion, the application for injunction against the above defendants is denied."

THESE simultaneous, decisive actions by the two courts finally disposed of matters that have hung fire for nearly two years, during which the left wing legal staff of the OPA regional office at San Francisco has been backed further and further onto an untenable limb now mercifully sawed off. The two largest, most reputable and most important suppliers of scrap metal on the Pacific Coast were singled out and hauled into court for minor technical violations of a complicated regulation, involving trivial and inconsequential amounts, representing no profit or advantage and accomplishing no purpose in the war emergency. Fortunately the two firms involved had sufficient material resources and self respect to refuse to sign consent decrees and to resist through the Federal courts where the judge previously commented "if the rules of equity were controlling the court would not grant an injunction in this case."

Despite the discomfort, hardship, cost and seemingly unnecessary onus of these actions, the firms accused and others have continued to observe scrupulously the letter and spirit of OPA scrap ceilings and regulations, and fortunately the vindictive and technically sacrosanct attitude of the OPA legal department has not permeated the price section which has been practical, understanding and reasonable. The firms accused have actually gained prestige by the experience, in the respect of fellow members of the trade and in carrying the torch for the entire industry.

WHEN President P. G. Johnson of Boeing and J. H. Kindelberger of North American attended a recent Los Angeles meeting of the Aircraft War Production Council they jointly and officially made important and encouraging summaries of the general West Coast aircraft situation. For southern California only 3000 workers are short now, and a few months ago it was supposed to be some 30,000. Boeing is now short 2000 at Seattle but it was 8000 or 10,000 desperately plugged by the entire Pacific Northwest last fall. Less than one half of one per cent of all aircraft employees are in the 18 to 21 age group. All men under 22, including pre-Pearl Harbor fathers, add up to a little over 3200, a negligible percentage. But there are 15,000 men in the 23, 24 and 25 year brackets, most of them key workers and virtually irreplaceable, at least during the emergency. As to surplus materials and idle inventory, Mr. Johnson states that inventories have been steadily reduced by all council companies in the last year. "Actual surplus material of this type for each of the ten West Coast prime airframe plants is insignificant in comparison with the dollar value volume of work in process and on order with suppliers and vendors throughout the nation. Hence the major disposal problem in aircraft material at the war's end will concern raw materials in process, semi-fabricated or in transit, rather than the present surplus inventories."

West Coast Aircraft Output Soars to New High in February

Los Angeles

• • • **West Coast aircraft** production for February again points to the trend toward bigger, heavier, and deadlier planes. Despite the shorter month and inclement weather, output jumped to an all-time high of 32,469,000 lb., or 2569 planes from West Coast plants. This output compares with 31,892,000 lb., or 2559 planes produced in January, reflecting a steadily increasing labor utilization since February employment remained about the same as that of January.

While February production was only 10 planes over January in terms on finished units, it was 577,000 lb. over the 31-day month in terms of weight.

Based on the average weight per plane produced in 1942, which was 9288 lb., February production this year was equivalent to the output of 3496 planes of 1942 models and January production was equivalent to 3434 planes.

Average weight per unit during the past two years has increased in this manner: 1942, 9288 lb.; 1943, 11,673 lb.; January, 1944, 12,463 lb.; and February, 1944, 12,639 lb.

There is a definite switch in type of aircraft made discernible from the statistics on the increase in unit weight. The emphasis now is definitely on bigger bombers and huge transports. If an index is made up whereby the average lb. output per month during 1942 was a norm of 100 per cent, then January, 1944, production index of West Coast companies was 233.1 and February, 1944, production index was 237.3. Using the same index, production during 1943 went from 132.2 for January to 225.7 for December, with an average of 185.7 for the year.

. . . Cited for Awards . . .

• • • **The following companies have won the Army-Navy E award for outstanding war production:**

Federal Shipbuilding and Dry Dock Co., Kearny, N. J. (third star)
Bristol Co., Waterbury, Conn. (first star)
Jenkins Bros., Bridgeport, Conn. (third star)
N. A. Woodworth Co., Ferndale, Mich. (second star)
Bound Brook Oil-Less Bearing Co., Bound Brook, N. J. (second star)
D. O. James Mfg. Co., Chicago. (second star)
McGraw Electric Co., Toastmaster Products Division, Elgin, Ill. (star)
Cutter Laboratories, Berkeley, Cal.
Emsco Derrick & Equipment Co., D & B Division, Dallas, Tex.
Frost Co., Kenosha, Wis.
Goodyear Tire & Rubber Co., Kelly Springfield Tire Co., Cumberland, Md.
E. F. Johnson Co., Waseca, Minn.
Langley Corp., Langley Plant, San Diego, Cal.
New York Quinine & Chemical Works, Inc., Brooklyn.
Optical Research, Inc., Long Island City, N. Y.
Poray, Inc., Chicago.
Reliance Mfg. Co., Triumph Factory—Parachute Division, Columbia, Miss.
Shellmar Products Co., Mount Vernon, Ohio.
Simplex Products Corp., Cleveland.
Standard Screw Co., Western Automatic Machine Screw Co., Elyria, Ohio.
Union Forging Co., Endicott, N. Y.
U. S. Motors Corp., Main Plant and High Street Plant, Oshkosh, Wis.
U. S. Rubber Co., Naugatuck Chemical Division, Naugatuck, Conn.
Wilcox-Gay Corp., Charlotte, Michigan Plant, Charlotte, Mich.
Yoder Company, Cleveland.
Weirton Steel Co., Weirton, W. Va.

Maritime M

Jenkins Bros., Bridgeport, Conn. (third star)

ACCURATE? IT'S A MICROMETER with a 300,000 POUND SQUEEZE

Another DENISON HydrOILic Press!

With this HydrOILic straightening press the operator can handle one-of-a-kind jobs as fast as they come along, and control the pressure "as he goes" with inch-by-inch, pound-by-pound accuracy! On the other hand pressure limits may be pre-set at any point from 15 to 150 tons, and ram stroke can be pre-set anywhere up to 20 inches. Speed of stroke can also be varied.

Such flexibility and fluid power control makes this DLSC2-150 Press as highly efficient on small-lot or single-job operations as it is on volume production work. Tools and fixtures can be changed easily too, adapting the press for bending, assembling and other jobs. No wonder enthusiastic users call it a "micrometer with a 300,000 pound squeeze!"

The DLSC2's compact, fully-enclosed, round-cornered design, extra toe space and other features—typical of all Denison Presses—give the operator safe, easy access to the work area. Available with either foot-pedal or hand-lever controls—or both. Other DLSC2 straightening presses have capacities of 25, 50 and 100 tons. Let us send you information on the complete line. The Denison Engineering Co., 1158 Dublin Rd., Columbus 16, Ohio.

INDUSTRY'S NEW RIGHT HAND FOR PRESSING

DENISON EQUIPMENT in APPLIED HydrOILics

PERSONALS

• **Peter V. Martin** has been appointed chief of safety of Carnegie-Illinois Steel Corp., Pittsburgh. He was superintendent of blast furnaces at their Gary Works since 1941, and has a 29-year service record with the company.

• **Mary Groff** after many years of service as assistant to the advertising manager of THE IRON AGE is resigning to make her home in New England. She joined the organization after she graduated from Barnard College and served in many important positions in the business department.

• **Daniel C. Green** has been elected board chairman of the Cleveland Pneumatic Tool Co. and its subsidiary, Cleveland Pneumatic Aerol, Inc., and **George P. Torrence** has been elected president.

• **S. L. Feduska**, research metallurgist of Indiana Steel Products Co., Chicago, since September, 1943, has been appointed plant metallurgist in charge of foundry, heat treating and forging department. Before joining this company he was connected with the Continental Roll & Steel Foundry Co., and the United Engineering & Foundry Co., Pittsburgh, Pa.

S. L. FEDUSKA, plant metallurgist of Indiana Steel Products Co.

• **Gerald A. Lux** has been added to the technical staff of Oakite Products, Inc. He will make his headquarters in New York.

• **Frederick P. Culbert**, recently resigned American Vice-Consul at Casablanca and long-time French representative for the United Aircraft Corp., has been appointed general manager of the Al-Fin Corp., a wholly owned subsidiary of the Fairchild Engine & Airplane Corp.

• **J. O. Wible** has been elected president of Union Electric Steel Corp., Pittsburgh. Mr. Wible previously filled the unexpired term of Earle G. Winner, who resigned the presidency due to ill health. **Robert C. Good** has been appointed sales manager. **R. S. Gorman**, works manager, will continue to direct plant operation and certain marketing.

E. W. POTRATZ, manager of the hoist sales division, Harnischfeger Corp.

• **John K. Colgate** has been elected president of Tyson Bearing Corp., Massillon, Ohio, succeeding **Ralph Maxson**, who resigned recently. Mr. Colgate has been vice-president and treasurer of Tyson for three years.

• **E. W. Potratz** has been appointed manager of the hoist sales division, Harnischfeger Corp., Milwaukee. He joined the Harnischfeger hoist division as an estimator in 1935, and in 1939 was named assistant sales manager. Since 1942, he has been acting sales manager.

JOHN P. BERNARD, vice-president and general manager of The Sheffield Corp.

• **John P. Bernard** has been appointed vice-president and general manager of the Sheffield Corp., Dayton. He joined the Sheffield organization in 1942 after spending 17 years with the Dyer Co., Inc., Cleveland. At the time he left this company to join Sheffield, Mr. Bernard was executive vice-president in charge of operations.

• **Harry M. Heckathorn** has been elected vice-president in charge of production of Mullins Mfg. Corp.'s Salem and Warren plants. The appointment was made following the resignation of **Howard F. Kulas**, vice-president in charge of operations at Salem, who is leaving because of ill health. Mr. Heckathorn has been vice-president in charge of operations of the Youngstown Pressed Steel division plant in Warren since 1938 and will now be responsible for the operation of the three Salem plants as well.

• **James Cope** formerly head of the Washington bureau of the Automobile Manufacturers Association, has been appointed assistant to K. T. Keller, president of Chrysler Corp., New York.

• **E. Q. Smith**, formerly vice-president of Bundy Tubing Co., Detroit, has been made president of Agaloy Tubing Co., Springfield, Ohio; **W. W. McMinn** has been made vice-president; **John J. Judge**, factory superintendent; **W. H. Lohman**, purchasing agent; **Albert Katz**, development engineer; **William Spears**, project engineer; **L. M. Clark**, personnel director and **Lester M. Elliott**, assistant secretary and treasurer.

J. N. YORKE, controller of Superior Steel Corp.

• **J. N. Yorke** has recently been elected controller of Superior Steel Corp., Carnegie, Pa. He joined Superor in 1941, coming from Haskins & Sells, certified public accountants, and was promoted to auditor in 1943.

• **Joseph Duffy** has been made sales manager of the Irving Subway Grating Co., Long Island City, N. Y. He has been associated with the firm in a sales capacity for the past two years. In his new position he will direct a large sales force with representatives in every state.

• **Charles Schwarzler** has been appointed manager of the export department of the Foxboro Co., Foxboro, Mass., succeeding **Henry B. Moelter.**

• **H. J. Carroll** has been appointed secretary of the Southern Pacific Co., with headquarters at San Francisco.

• **Charles W. Sprenger** has been made district manager for the metropolitan New York district of the Carborundum Co., Niagara Falls, N. Y. Mr. Sprenger succeeds the late **John Storm. Joseph C. Steele** has been made district sales office manager at New York.

• **Neil C. Hurley** has been made chairman of the directors of the Independent Pneumatic Tool Co., Chicago, and **Neil C. Hurley, Jr.,** has been elected president. **Edward G. Gustafson,** treasurer of the company, and **John McGuire,** secretary, were elected to the board of directors.

• **Bruno R. Neumann** until recently senior economist with the planning division of the WPB, has joined the National Foremen's Institute, Inc., Deep River, Conn., as labor economist and editorial director.

•**Henry E. Hermann,** has been appointed works manager of the Bear Mfg. Co., Rock Island, Ill., in charge of all production.

• **J. F. Woessner** was appointed assistant comptroller in charge of staff activities and general duties for Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Woessner was formerly general works auditor in the company's Pittsburgh district, and had previously served as treasurer, assistant secretary and comptroller for Pittsburgh Coke & Iron Co. **M. W. Krueger,** supervisor of the Pittsburgh district organization planning department since 1942, was made assistant comptroller in charge of works accounting. He was formerly associated with the Kimberly Clark Corp., Neenah, Wis. **A. B. Cook,** assistant comptroller in charge of general office accounting, will continue in that capacity.

• **L. P. Jackson,** vice-president in charge of engineering, Mid-West Abrasive Co., Detroit, was elected a director of the firm. **Carlton M. Higbie** also was named a member of the board.

W. LYLE RICHESON, assistant vice-president of American Car & Foundry Co.

• **W. Lyle Richeson** has been appointed assistant vice-president of American Car & Foundry Co., New York. Mr. Richeson has been associated with the company for a period of 19 years. **William R. Kottsieper** has been appointed manager of the valve department. He has been associated with the company over a period of 38 years. **W. A. Gormley** and **L. A. Ward** has been made sales manager and assistant sales manager of valves, respectively.

OBITUARY...

• **Richard H. Scott,** president and general manager of Atlas Drop Forge Co., Lansing, Mich., died Mar. 11. Previously he had risen from the superintendency of the then-small Reo Motor Car Co. to become its president.

• **Maurice Pollak,** widely known steel manufacturer and president of the Pollak Steel Co., Cincinnati, died recently after a long illness. He was 67 years old. Mr. Pollak, a native of Cincinnati, entered the steel business at the bottom of the ladder in his father's plant and filled many offices before becoming president.

• **Edward R. Estberg,** treasurer and director of the Waukesha Motor Co., and of the Hein-Werner Parts Co., both of Waukesha, Wis., died in Milwaukee, March 3, after several weeks illness.

• **George M. Bower,** president of Ross Operating Valve Co., died in Detroit, March 8 at the age of 51. He was a member of the American Society of Tool Engineers.

• **Calvin L. Day** died at Montclair, N. J., on March 13. He was with the Robins Conveyor, Inc.

• **Eugene E. Hinkle,** retired president of the Hinkle Iron Works, senior partner in the E. E. & Terry Hinkle Co., and director of the Peabody Engineering Co., died March 7 at Westport, Conn. He was 78 years old.

• **Arthur W. Batcheldor,** mechanical engineer with the Ford Co., Somerville, Mass., for 15 years, died at Lynn, March 3. Before going to Ford he was associated with the Baldwin Locomotive Works and Pennsylvania Railroad.

• **William Bibbey,** 50, former owner of the Mystic Wire & Iron Co., Boston, died March 7. At the time of his death he was associated with the Quincy Ornamental Iron Co., South Boston.

Fatigue Cracks

BY A. H. DIX

War Plant Scoop

• • • Among the additional burdens the war has placed on our back is that of keeping in the good graces of the censors. This is one of the loads that does not bear too heavily on us, owing to the censorship authorities' highly intelligent application of the regulations. *(Our admiration for the censors has been boundless ever since one of them wrote us, "Your editorial material contains information that is much newer and up to date than other journals.")*

Our burden is further lightened by the cheerful cooperation of war plant press agents. Here, for example, is a photograph of a highly specialized piece of production equipment in the huge Dodge Chicago plant, where 18-cyl. airplane engines will be made.

This machine, the release informs us, makes doughnuts. We are relieved of any fear of censorial repercussions by the press agent's thoughtfulness in informing us that the photo has been cleared by the A.A.F. Materiel Command.

They look like crullers to us.

Reactionary

• • • In the "Letters to the Editor" page of the English aircraft journal, *The Aeroplane*, a reader asked if President Roosevelt said "aeroplanes" instead of "airplanes" in a recent broadcast. The editor answered:

> Possibly the rolled "r" of American speech may have made the word airplane as spoken by Mr. Roosevelt sound to a conservative ear like the good British "aeroplane." We hope not.

Even though "aeroplane" flows more smoothly over the tonsils, the editor's hope is in vain, for the streamlined term has not only established complete supremacy here but is making substantial inroads in England. We will give three to one odds that by 1950 *The Aeroplane* will have changed its name.

Left Hand Twist Drill

• • • The final chapter in the left hand twist drill controversy, whose genesis was the southpaw drill shown in "The Bull of the Woods" Dec. 9 cartoon, is written by Ernest L. Lynn, Editor, Comic Art Department, NEA Service, which distributes J. R. Williams' cartoons:

> Since Mr. Williams resides in California and letter writing is one of the things he is distinctly not fond of, I thought it better to answer your inquiry myself.
>
> Although it is true that left hand drills are made and used, nonetheless this was a little slip-up on the part of the artist. These, as you know, are rare, since I believe he could draw every tool in a machine shop blindfolded and do it correctly . . .

Advertising Striptease

• • • We have just seen an astonishing document prepared by your favorite family journal's Department of Research. The head of this department is Oliver Lewis Johnson, an individual in whom is combined a scientist's passion for the whole truth and nothing but, and a constitutional inability to abandon a trail.

He took upon himself the staggering job of analyzing the 7,921 pages of advertising (some 12,000 separate advertisements) in our last year's issues. He analyzed the ads by products, by groups of related products, and by companies, and has presented his findings in a 20-page report, which is as frankly revealing as the art lovers' books advertised in the pulps.

In it are listed the 1,016 advertisers (classified excluded) who wooed you through our pages last year, and opposite each name is the extent of their wooing, in number of pages. Biggest wooer was Westinghouse Electric, with 70.83 pages. Runner-ups were Bethlehem Steel and G.-E. Schenectady, with 64 each.

As a group, the machine tool builders were first, with 1,081 pages, about one-seventh of the total. At the low end of the scale was layout blue industry with one-third of a page.

Not only are the advertisers listed from A to Z, with aggregate space each used, but in addition the space each used for each individual product is specified.

This strip tease, with satisfying finale, is possible only because this journal, with an advertising body beautiful, has nothing to conceal. Being first in volume, it can show all — and does in an unabashed, unadorned way — thanks to Oliver L.

Pen Points in Nine Figures

> You say on page 97, Mar. 9 issue, that among the lend-lease material available for sale by the Treasury Department Procurement Division is 400 tons of pen point steel.
>
> You add that this is capable of producing "quite a few pen points." Can't any of your people weigh up a pen point and figure out how many could be made from the 400 tons?
>
> —*Deac*

The pointer on the scale in our mailing department hardly wiggled when we dropped a pen point into the pan. So we took it (an Esterbrook No. 788) over to Liggett's drugstore across the street. It weighs 1/44th of an ounce, the druggist told us.

Allowing 50 per cent for waste, you get 22 points out of an ounce of steel. The 400 tons of steel would be enough for 281,600,000 pen points.

The other day we heard of an abandoned midwestern defense plant that had several thousand snow shovels. The margin of safety in Government buying is breath taking.

Felicitous Phrasing

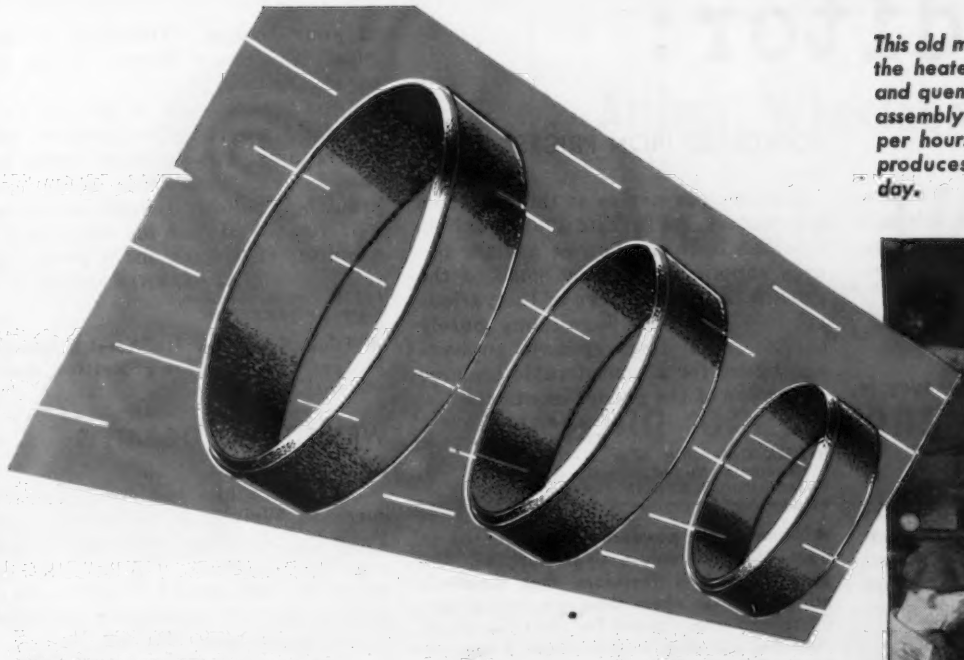
> Indications are that if the (Boykin "Steel Shortage") committee were given its way, OPA couldn't furnish enough brown ration stamps to purchase the political pork with which the South and the West would be flooded . . .
>
> —*From a Washington dispatch, page 100, March 9* IRON AGE

Puzzles

You can cheat last week's troublemaker out of a turkey by starting the counting with the third person to the left of him, and counting clockwise.

You can establish your own par for this dandruff agitator sent in by C. R. (Braeburn Alloy Steel Corp.) Cline:

> *The sum of three values equals one; the sum of their squares equals two, and the sum of their cubes equals one. Determine any three values that will satisfy all three equations.*



This old method of putting the heated ring on a jig and quenching the whole assembly produced 8 rings per hour. Super-Cyclone produces 432 rings per day.

The Lindberg Super-Cyclone Keeps Work Straighter

saves time . . . cuts costs

REDUCING the need for difficult straightening, or eliminating costly preventive measures, can speed up heat-treating production and save in many ways. The Lindberg Super-Cyclone Furnace is doing just this for users because of the heating principle on which it operates. Fan-driven hot air developed in an isolated chamber builds up temperature with rapid uniformity *throughout the charge* to as much as 1750°F. There is no direct radiant heat to cause distortion.

A bearing manufacturer placed each "race" on a special jig to hold an acceptable "round" after quenching. Produced 64 per 8 hour day. With the Super-Cyclone an operator working only 1½ hours a day, loading 63 rings at a time on a fixture, quenching all at once without jigs, yet holding to within .006" to .010" of round, finished 432 per day—*7 times more production.*

Besides keeping work straighter, saving time and saving space, the Super-Cyclone can be used for normalizing, hardening and tempering, because temperature can be accurately controlled between 300° and 1750°F.

Write for complete information to: Lindberg Engineering Company, 2452 W. Hubbard St., Chicago 12.

LINDBERG FURNACES

ARMY NAVY

SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

Dear Editor:

CONTINUOUS CASTING

Sir:

May I congratulate your Mr. Lippert most sincerely upon his splendid article in your Feb. 24 issue on continuous casting. Is there any intention of reprinting it?

GEORGE D. HARTLEY
372 May Street,
Worcester, Mass.

● It has been reprinted and a copy is being sent you.—Ed.

TRICLORETHYLENE SOLVENTS

Sir:

Your Mar. 9 issue contains an article, "How to Use Triclorethylene Solvents," by Herbert H. Hines, Springfield, Vt. Kindly advise me from whom this material can be purchased.

W. WALLACE McKAIG
Cumberland Steel Co.,
Cumberland, Md.

● There are a number of makers and distributors, among them the E. I. du Pont de Nemours & Co., Wilmington, Del., and Detrex Corp., 13005 Hillview Ave., Detroit.—Ed.

BONDERIZING

Sir:

Can you tell me the name of the company responsible for the metal finish called Bonderizing?

JAMES DUNCAN,
Heat Treat Department
Standard Products Co.,
Port Clinton, Ohio

● Parker Rustproof Co., 2177 E. Milwaukee Ave., Detroit, Mich.—Ed.

TOOL FORECAST

Sir:

Our Chief Tool Engineer would very much like to secure a reprint of the article, "Forecasting Tool and Gage Requirements," by Sergius D. Brootskoos, in your issues of Mar. 9 and 16. Are reprints available?

MARGARET M. FLEMING,
Librarian
Republic Aviation Corp.,
Evansville, Ind.

● No reprints have been made, but clippings have been sent you.—Ed.

BRAZILIAN IRON ORE

Sir:

A friend of mine asked me to find out the conditions under which he could export iron ore from Rio de Janeiro, Brazil, to this country. I would be glad if you could inform me about buyers, conditions of payment, duty, and shipping conditions for about 3,000 tons of ore per month.

ARLINDO DE BARROS VALENCIA
235 W. 108th Street,
New York 25

● Few companies here are interested in importing iron ore as most here have their own domestic ore reserves. Some of the new Texas steel plants might eventually show some interest but currently are developing their own Texas ore bodies—Ed.

POWDERED IRON PRICES

Sir:

How do you arrive at the powdered iron quotations in THE IRON AGE? Is there an open market, or are the figures supplied to you by some of the producers or consumers of the various grades? Are the quotations purely nominal, or do they represent an average figure for a considerable tonnage of powder of the grades mentioned?

F. A. FORWARD,
Technical Director
British Columbia War Metals Research Board,
University of British Columbia,
Vancouver, Canada

● Some of the powdered metals quoted on page 160 have only a single supplier. The price quoted is therefore that supplier's price. In cases where there are several suppliers, and where prices for the same grade vary, the quotation is an average. Prices are for ton lots. Some producers add a differential for smaller quantities. Some do not.—Ed.

EDITORIAL INDEX

Sir:

We shall appreciate it if you will send us two copies of the index for 1943.

E. F. BURTON,
Chief Engineer
Douglas Aircraft Co., Inc.,
Santa Monica, Cal.

● Editorial indexes are issued semi-annually. Copies are supplied gratis upon request.—Ed.

COPPER ALLOY CASTINGS

Sir:

Will you please send us six tear sheets of the article, "Better Copper Alloy Castings," by H. E. McGowan, in your Mar. 2 issue.

W. M. ELSTUN,
Secretary
Hammond Brass Works,
Summer Blvd.,
Hammond, Ind.

Sir:

We have read with interest the article, "Better Copper Alloy Castings," by H. E. McGowan in your Mar. 2 issue. Could we get two copies of it?

WALTER M. MITCHELL
York Safe and Lock Co.,
Special Ordnance Plant,
York, Pa.

BLAST FURNACE REFRACTORIES

Sir:

We read with great interest Dr. Joseph M. Robitschek's article, "Carbon Refractories for Blast Furnaces," in your Feb. 3 issue. We are very anxious to obtain several reprints.

R. M. MAXWELL
Koppers Company,
Tar & Chemical Div.,
Pittsburgh, Pa.

● Clippings have been sent you.—Ed.

TOOL STEEL DIRECTORY

Sir:

I am enclosing 25c to pay for a copy of your booklet, "Directory of Tool Steels and Other Metal Cutting Materials."

I am very anxious to get a copy of this for I am a steel bookkeeper. This job requires you to know steels and that is why your book would be a great help to me. I would appreciate it if you would rush my order as it is a matter of helping me a great deal.

MISS WINNIE ROBERTS
14779 Lydia Avenue,
East Detroit, Mich.

● Price of the new Tool Steel Directory is $1. For more than five copies the price is 50c each.—Ed.

WRIGHT PHOTOGRAPHS

Sir:

Some time ago you took some pictures at Wright Aeronautical Corp., Paterson, N. J., and published them in your Jan. 13 issue. I've looked everywhere for this issue but can't seem to find a copy. I'd appreciate it so much if you would send me one.

MISS ETHEL CASTAKOS
108 Madison Street,
New York 2

● It seems that everyone who appeared in any one of the 15 photographs that illustrated H. E. Linsley's article, "Machining the Wright Cyclone Forge Cylinder Head," has written us for a copy of it, with the result that we have none left. If any reader is willing to part with his Jan. 13 issue and will send it to Miss Castakos direct or to us, both she and we will be grateful.—Ed.

ANNEALING

Sir:

We did not receive our July 15 issue and find that none of the other Sheffield firms has a copy. We are desirous of seeing the continuation of the series on "The Annealing of Steel," by Peter Payson. Will you send us a copy or tear sheets?

GEORGE H. DAVISON
United Steel Companies, Ltd.,
Central Research Dept.,
Stocksbridge, Nr. Sheffield,
England

● The entire series has been reprinted by the Crucible Steel Co., of America, 405 Lexington Ave., New York 17.—Ed.

PASSIVATION

Sir:

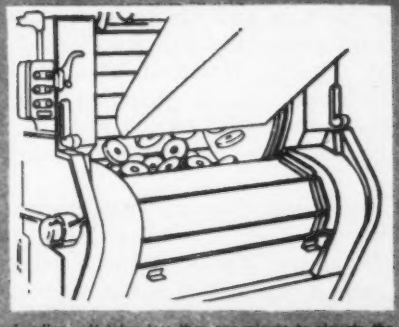
In answer to an inquiry on passivation of stainless steel, you insinuate that accomplishment can be had only by use of nitric acid. Is this necessarily so?

We have recently been using ferric sulfate with apparent success but would appreciate your comment as to its true worth in this respect.

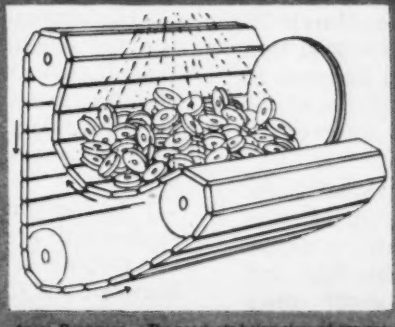
E. A. HILL,
Mech. Engineer
Palnut Co., Inc.,
Irvington 11, N. J.

● Practically all stainless steel passivation is carried out in about 15 or 20 per cent nitric acid by volume, at a temperature of 130 to 150 degrees F. The steel is usually immersed for 20 to 30 min. As to ferric sulfate, the Monsanto Chemical Co. has recommended this as a passivating agent. This technique is new, and we do not know whether enough data have accumulated to permit of a definite answer.—Ed.

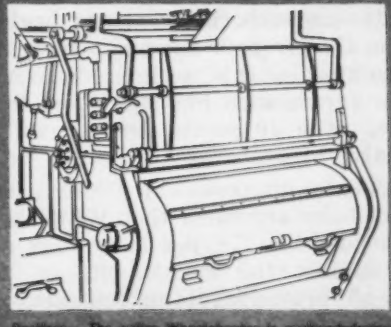
Airless Wheelabrator Tumblast Principle *CUTS TIME* and *COSTS* on metal cleaning operations in our plant



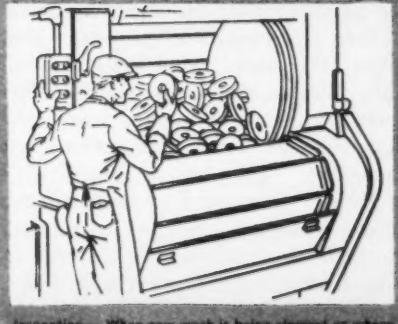
Loading — It takes less than one minute to elevate the loader and charge the machine. While the Wheelabrator is cleaning one load the next charge is dumped into the loading bucket ready for charging. The loader is operated by an individual motor which is controlled by a push button limit switch. Eliminates waste motion, and permits almost continuous operation.



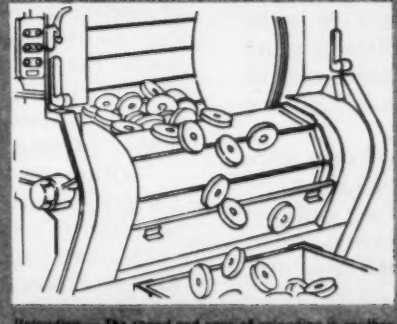
Apron Conveyor — The products being cleaned are cascaded one over the other and completely exposed to the full abrasive blast. Each piece is cushioned in its slide by the one next to it. Breakage of fragile pieces is practically eliminated. The endless apron type conveyor is one of the exclusive features of the Tumblast, which permits quick and easy loading, unloading and inspection.



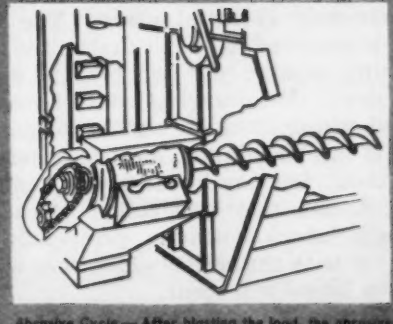
Dustless — The entire Wheelabrator is enclosed during operation, making it a safe, dust-tight unit. The door and the conveyor apron seal the front. The back is completely enclosed. All hand holes, providing access to the mechanism, are covered. A special exhaust directly above the cleaning chamber permits dust removal without the loss of good abrasive.



Inspection — When new work is being cleaned or where the cleaning time is not yet established, it is unnecessary to overclean the work. The load can be inspected at any time during the cleaning process. Only a few seconds are required to stop the machine, open the door and make an inspection. If desired, the conveyor can be operated during inspection to keep the work tumbling.



Unloading — The speed and ease of unloading is another important feature. Unloading is accomplished by reversing the travel of the apron conveyor, which carries the work up and out of the cleaning chamber, spilling it into a receptacle. This method of unloading eliminates all manual handling. Complete unloading is accomplished in from thirty to sixty seconds.



Abrasive Cycle — After blasting the load, the abrasive falls through holes in the conveyor plates and drops into a hopper directly below. A screw conveyor carries the abrasive to a screen where all refuse is removed. The cleaned abrasive is elevated to a sand separator and overhead storage hopper, from which it feeds by gravity into the Airless Wheelabrator blast unit.

American
FOUNDRY EQUIPMENT CO.
510 SOUTH BYRKIT STREET — MISHAWAKA, INDIANA

World's Largest Builders of Airless Blast Equipment

This Industrial Week . . .

- ***Telescoping of Delivery Schedules Noted in Steel Industry***
- ***Production Losses Expected Due to Tighter Draft Rulings***
- ***Improvements in Product Mix of Steel Mills Reported***

HIGHLIGHTS this week include the telescoping of delivery schedules on additional invasion equipment, the tighter manpower picture resulting from stricter draft rules expected to be a brake against production, and an improvement in the steel mill product mix due to stronger buying of bars, alloy steel and other items.

Meanwhile, the industry's attention centered upon the deliberations of the National War Labor Board over the steel wage issue. The WLB was expected on Tuesday to authorize hearings beginning March 22 on the 17c per hour demand. It was understood that at the start of this week the USWA had dropped 10 of its 24 demands but still stood firm on its major points. The 10 points dropped will be referred to collective bargaining.

Counter proposals by United States Steel Corp. included the argument that WLB has no jurisdiction to consider the 17c. per hour wage demand, a provision against the maintenance of membership and check-off provisions of a contract, and eight other points.

The rush to complete invasion equipment may result in a large share of this material being completed before the tightened draft rules bite deepest, but the steel industry expects from 5 to 10 per cent of its younger workers probably will be lost through the government's decision to draft men under 26 except in extremely essential cases. The impact in some mills is expected to be felt first in the conditioning and finishing departments and then to work back toward raw steel. Metallurgical control may be hit by the loss of young chemists and metallurgists.

At the Washington meeting where steel men were told about the new draft policy, industry executives pointed out that production already has suffered through labor shortages, principally common labor, and that with the arrival of warmer weather more production losses will occur.

SHORTAGES of labor already have resulted in loss of tonnage through inability to accomplish such routine tasks as roll changes and furnace repairs in normal time. One company estimates its loss because of repair lags at 7000 tons per month, and another smaller mill places its loss at about 5000 tons per month. Departments specializing in scheduling, inspection, carloading, etc., will be effected also.

The problem facing all war goods makers is emphasized by the statement of a Moline, Ill., company that it is giving up its sizable shell forging contract because of inability to get labor.

Deferments for all tool and die makers having one and one-half years apprenticeship were asked at Washington Monday by the National Tool & Die Manufacturers Association. L. A. Sommer, Cleveland, president of the group, said 50,000 men in the 2500 tool shops of the nation are on the verge of being drafted.

In addition to steel losses from reduced efficiency, strikes still are taking their toll of tonnage. An outlaw dispute at the Duquesne Works of the Carnegie-Illinois Steel Corp. caused the loss of about 4000 tons of ingots, while a six-day wildcat strike at the American Works of American Steel & Wire Co. cost about 2400 tons of production. Another strike occurred at Andrews Steel Co.

Perhaps occasioned by the WLB steel wage case, which will have an important bearing on costs and prices, there has been delay in OPA's announcement of carbon steel price adjustments. Several weeks more may be required before the results come out. Meanwhile, the complicated alloy steel price study is going ahead, with cost data questionnaires being circulated. OPA last week received the Lake Superior iron ore industry's formal price proposal, with quick action urged.

Other developments: The sharp warning by Undersecretary of War Patterson against undue timidity by contracting officers in making termination settlements; interpretations of five sections of the new Renegotiation Act involving war contractors and relating to exemptions under the act; WPB's reductions in magnesium production at five plants; the Warner & Swasey suit to obtain a ruling on whether an amendment to the renegotiation act is retroactive.

TIGHTER than ever is the flat rolled steel production situation, by reason of the shell container program and the enlarged landing mat requirements of the armed forces. The concrete bar business has received a shot in the arm for the second quarter through a step-up in lend-lease and FEA business. Producers total orders in February at 45,000 tons were about 30,000 tons higher than in the same month last year. A Chicago contractor has received an order for 100 concrete barges for inland waterways usage, each requiring about eight tons of reinforcing steel.

Tin mill product orders up to the full extent of

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Steel Market Briefs

• PRODUCTION—May have reached its peak, due to manpower situation. Repairs taking longer. If this gets worse, percentage of idle equipment will increase.

• BACKLOGS—Despite cancellations, cutbacks, etc., incoming orders have been ahead of shipments. Total backlogs have not been whittled down. Backlogs on some products are lower, others are higher. Plate carryovers are increasing, which tends to expand backlogs. Same situation present in sheets.

• CANCELLATIONS—Heavy with some companies, light with others. Not too significant, because of reorders later. Battlefield lessons will determine the cancelling out of some items, reorders of others. Considerable instability on cancellation trends expected.

• FLAT ROLLED—Relaxation on plates still expected by first of third quarter. Before that time, production pressure will be terrific, and magnified by manpower shortage. By the end of second quarter, plates, tin plate, and sheets expected to compete heavily for available rolling space. Sheet demands for shell containers and landing mats being telescoped into the first three quarters. Plate decline will be offset in third quarter because of this.

• ALLOY—Orders including NE grades more active, because of relaxation for use in road machines, hand tools, etc.

• PIPE—Demand strong for military needs, oil industry, and pipe lines.

• DELIVERIES—July and August on cold rolled sheets, October and later on hot rolled, September on strip mill plates, with October and November on wide plates. The foregoing are average deliveries, all subject to future developments.

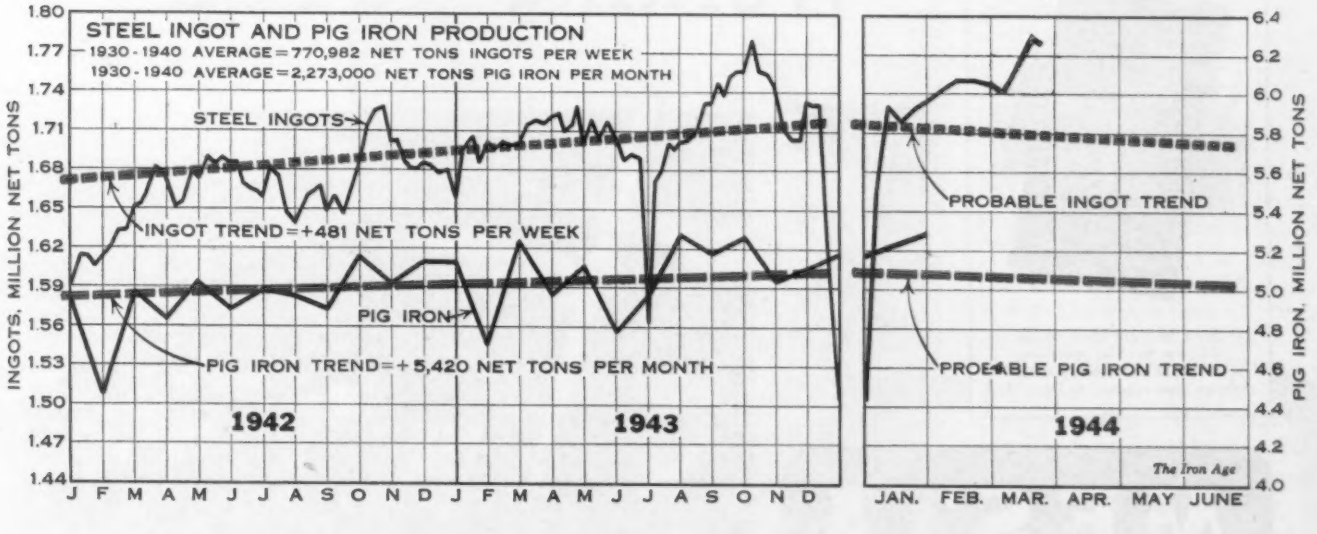
the 825,000 ton directives, are expected to materialize completely for second quarter. Electrolytic mill schedules are rapidly filling for second quarter and some companies are receiving good tonnage for their bonderizing or chemically treated lines. As pointed out previously, electrolytic output this year is expected to be 20 to 25 per cent of total tin mill production, which also includes production of black plate.

One large tin mill product maker's production of electrolytic plate during the first three months of this year was about half as much as the output of coke tin plate, and accounted for around one quarter of total production of all tin mill products.

Production of beer cans will be heavy in second and third quarters, with about 95,000 tons of materials ordered for that purpose.

In order to distribute surplus aircraft materials more efficiently, a proposal has been formulated by officers at Wright Field, Dayton, that calls for the establishing of centralized depots where the goods can be inspected, classified, packaged, and otherwise put in first class shape for prompt sale. It is believed that such a plan can be worked out within the framework of the new Surplus War Property Administration.

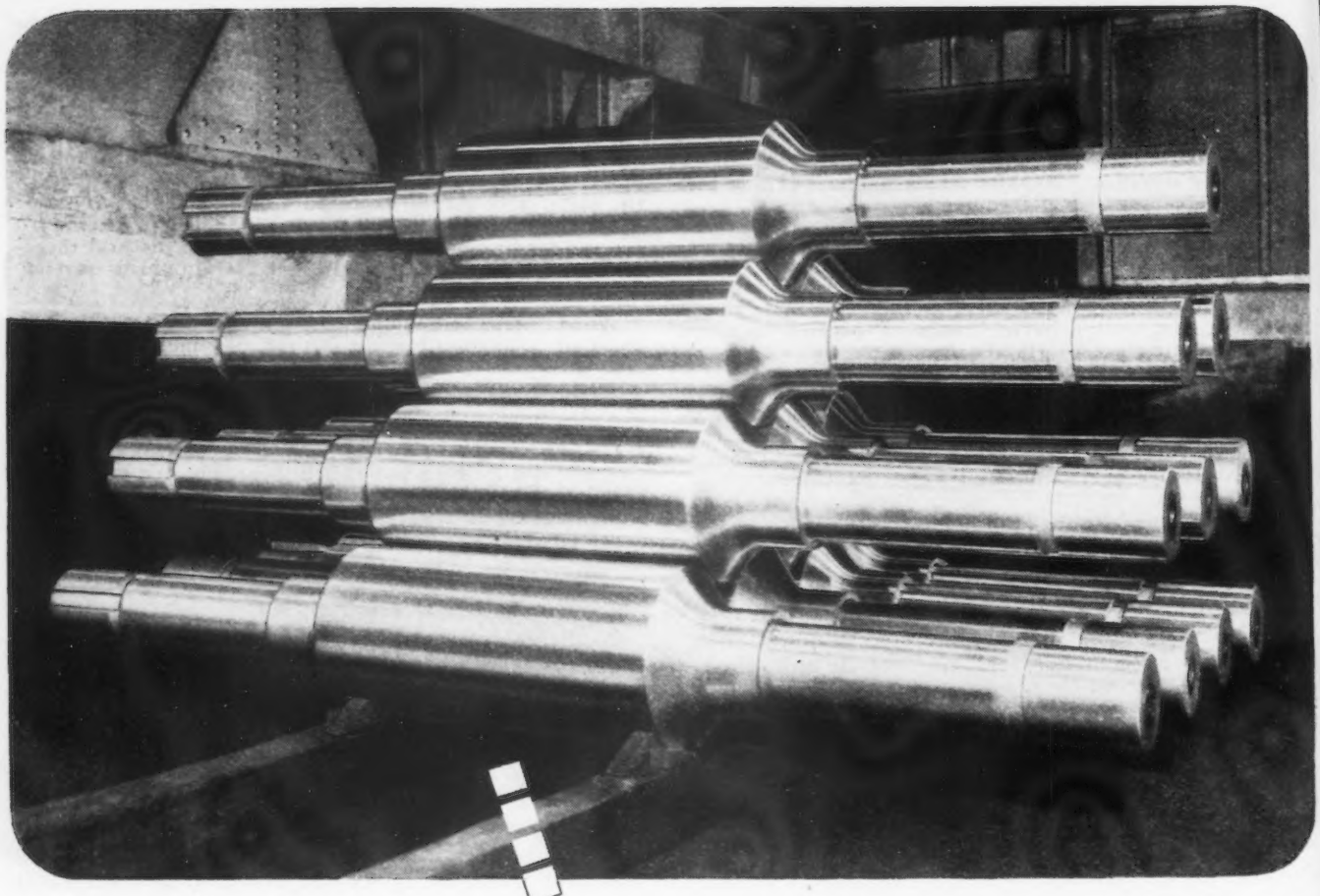
THIS week's ingot rate continues unchanged at 97 per cent of capacity. District gains occurred at Detroit, up four and a half points to 101 per cent; in the Western area, up six and a half to 90.5 per cent; and at St. Louis, up three and a half to 96 per cent. Offsetting these are the losses at Pittsburgh, down half a point to 95.5 per cent; Wheeling, down two to 97; Cincinnati, down 15 to 81 per cent; and the Eastern District, down 16 to 90.5 per cent. All other steel producing centers continue operations at last week's levels. These include: Chicago, 101; Youngstown, 98; Cleveland, 99.5; Buffalo, 104.5; and Birmingham, 99 per cent.



Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 16.....	96.0	101.0	98.0	91.5	99.5	104.5	99.0	99.0	96.5*	84.0	96.0	92.5	106.5	97.0
March 23.....	95.5	101.0	98.0	91.5	99.5	104.5	97.0	99.0	101.0	90.5	81.0	96.0	90.5	97.0

* Revision

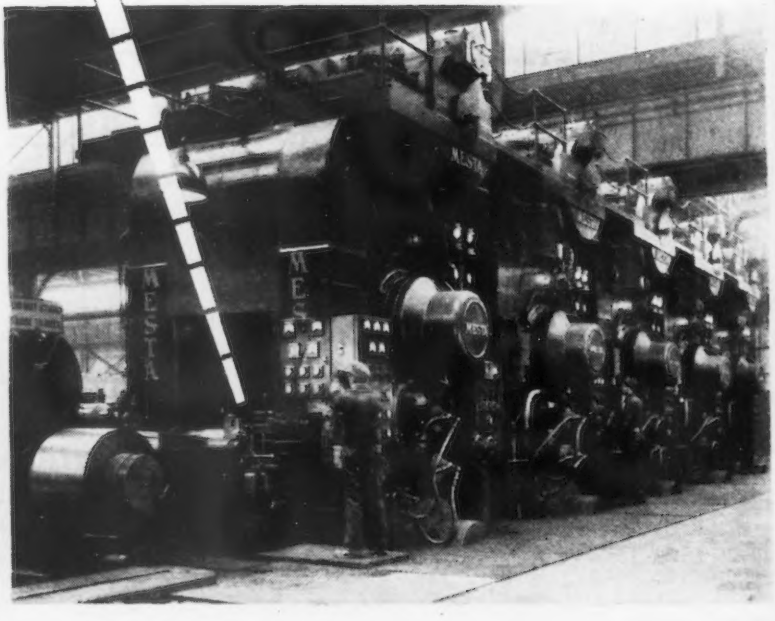


MESTA Forged Hardened Steel Working ROLLS

Send for your copy of this 64 page booklet containing valuable engineering data. Address your requests to Dept. A-3.

The Army-Navy "E" Flag with four stars, flies over the Mesta plant

BUY WAR BONDS



MESTA
MACHINE COMPANY
PITTSBURGH, PA.

Steel Industry Warned That 5 to 10 Per Cent Loss in Manpower Is Near Due to Draft

• • • **Unless he** is an "Einstein or an Edison" no steelworker or other steel company employee under 26 years old stands a chance of having his deferment renewed under the new draft policy recently established by the high command.

Steel industry leaders were told this on March 16 at a meeting of the Steel Industry Advisory Committee by Maj. Gen. Louis B. Hershey, WPB Chairman Donald M. Nelson and Executive Vice-Chairman Charles E. Wilson.

At the same time, the industry was told that older men in key jobs would be spared so far as is possible. It is estimated that the steel industry will lose 5 to 10 per cent of its working force under the decision.

Chairman Nelson told the group that the Army has decided that young deferred workers in industry must be drafted to maintain fighting-age-level of combat troops and has made the decision knowing that production losses may result. Mr. Nelson declared that he wouldn't say that a production loss would result from the decision and hoped that since industry has so far succeeded in conquering every production hurdle it would be able to jump this one too, and maintain high production rates.

According to Selective Service statistics, 465,000 men in industry and agriculture will be drafted and only 40,000 to 50,000 out of twice this number deferred will have their deferments continued.

Men in critical jobs in such programs as the B-29 and B-17 bomber programs can be retained, as well as men in the bearing, engine and other critical component industries.

Opinion is divided at WPB on the likelihood of a decrease of the operating rate in the steel industry and a production slump in steel-consuming industries.

While nothing authoritative is available, the most logical view is that military production cuts already planned (the Army has $1,500,000,000 in cancellations monthly scheduled for the first six months of the year) will balance the manpower loss.

Another result of the decision is the probability that orders relaxing metal controls will be held up for awhile and the date of Reconversion Day is more uncertain than ever.

Mr. Wilson announced to the committee the resignation of Steel Division Director J. T. Whiting, who will resume his duties as president of the Alan Wood Steel Co. The company has urgently requested Mr. Whiting's return, Mr. Wilson said.

Mr. Wilson pointed out that when Mr. Whiting came to WPB it was for a stated period. He has patriotically overstayed the limit.

Norman W. Foy, deputy director to Mr. Whiting, and Republic Steel Corp. executive, will become director. Mr. Foy has been with the Steel Division for more than two years.

Assistant Director Jesse Honeycutt, who has been in charge of the production branch of the Steel Division is also resigning to resume his post as vice-president in charge of sales of the Bethlehem Steel Co.

Many steel company executives expressed concern over the consequences of losing additional men. Reports were submitted which revealed that production is already falling off because of labor shortages, and with the arrival of warm weather, more production loss would occur.

One firm said that it anticipated a shortage of 11,000 workers, although already employing 15,000 women. In this plant thousands of men are working 16 hr. shifts, obviously a condition which can't keep up much longer.

Industry members indicated that there are now 42,000 fewer men working in steel plants than two months ago, and that the decline is accelerating. To conserve manpower after the heavy inductions of the next few months, committees may be set up on local levels to work with industry toward surveying the needs of each plant and making recommendations to local draft boards for those deferments that are absolutely essential to the continued operation. Membership on the committees would include representatives from the Army, Navy, Maritime Commission, WMC and WPB.

•

Cleveland

• • • **The concensus** of industrialists here seems to indicate that war production might suffer a reduction of from 10 to 60 per cent, based upon present war order volume, if current selective service withdrawals continue. Industry is pressing for a clear-cut policy covering draft withdrawals. A military source states that a new national draft policy is in the making.

The wide variance in the

NEWS OF INDUSTRY

From U. S. Steel's Annual Report, Page 142

estimates of production drop which may result from draft inroads is due to the widely varying conditions, within individual organizations and differing draft board tactics. According to some authorities, the figure of 60 per cent is an overstatement, but some reduction is certain.

One major steel producer reports that it has already lost 30 per cent of its force through the draft and that another four per cent are in the 18-26 year age bracket. The company reports that the present depletion has "already resulted in a large reduction in potential steel output" and "by midsummer this loss will run in excess of 113,000 tons per month."

A machine tool builder now mainly engaged in sub-contract work stated that about 15 per cent of his force would go under the present draft regulations within the next 90 days and that production could not be sustained above 85 or 90 per cent of present.

Another sub-contractor here reports a drop from 5500 men to 3200 to date and expects production to drop 15 per cent on an overall basis with individual departments being cut from 30 to 60 per cent within the next 90 days.

The aircraft industry is expected to be hit hard, according to a military source here, who reported that approximately 40 per cent of the aircraft industry's engineers are 26 and under.

Bill Jack, president of Jack & Heintz, said that 20 per cent of his forces were 26 or under and that production could drop 25 per cent or more depending upon which men were taken.

Chicago Mills Expect to Suffer

Chicago

• • • **Steel production** in the Chicago district, already reduced by labor shortages, will reflect immediately the draft of able bodied men under 26, a canvass of mills showed. In terms of steel deliveries, this means that delivery of such critical items as sheets and plates, now scheduled for Fall, will be delayed until well into 1945.

Steel has been named as one of the industries responsible for Chicago's recent classification as a Group I labor shortage area. The effect of increased draft calls in the "under 26" group will be particularly severe in skilled classifications heretofore shielded by Manning tables. The skilled classifications will be placed in the same category as unskilled is now —severe shortage and no available replacements. One major district mill frankly states that, not taking into account the probability of increased withdrawals by the draft, if its current rate of quits continues certain departments will have to be shut down by July for lack of crews. This same mill now is operating two 12-hour turns daily on some operations, and the industry generally has resorted to 10-hour work periods on critical jobs. The six-day week also is usual.

Past experience indicates that warm summer weather makes lengthened work periods physically impossible. Increased absenteeism throughout the plants may be expected to materially decrease the man-hours worked in proportion to the number of employees on the payroll.

Shortages of labor already has resulted in loss of substantial tonnage through inability to accomplish such routine tasks as roll changes and furnace repairs in the time normally required. Open hearth repairs formerly performed in about 10 days now are being made in 21 or 22 days.

One company estimates its ingot tonnage loss in this district because of repair lags at 7000 tons per month. Another smaller mill places its loss on this account at 5000 tons per month.

Attempts to recruit labor in cooperation with the War Manpower Commission have been fruitless. Because of the degree of physical fitness required for most mill jobs, draft of all physically fit men in the younger age bracket will tend to be out of proportion in comparison with industry and commerce as a whole. Carnegie-Illinois, now about 1800 employees below its optimum, has about 1500 men vulnerable in the "under 26" draft out of a total employment approximating 40,000. The Gary mill alone numbers about 1100 men in the "under 26" group.

The immediacy with which further withdrawals will hit production is indicated by the statement last week of a Moline firm that it was giving up its sizable shell forging contract because of inability to get labor.

Three Point Veteran Employment Plan

Chicago

• • • **Re-employment and** training of International Harvester Co. employees discharged from the armed services will take place under a comprehensive program affecting the company's 21 manufacturing and raw materials operations and its 187 sales branches and sub-branches in the United States. More than 15,000 employees now are in the armed forces.

Every company operation will have its own employment, placement, and training program for veterans, under the broad control of personnel and training departments at the main offices here. At each plant, the industrial relations manager under the supervision of the plant superintendent will direct the plan; at each branch house, the branch manager will take charge.

After an initial interview and a physical examination the veterans will be divided into three groups, with the following recommendations: 1—That the employee be returned to work without restrictions; 2—That the employee be placed according to job groupings developed by an occupational survey; and 3—That the employee requires special consideration for plant training or outside vocational training. Thus, each employee will find waiting for him some available position, or be offered special training or other preparation designed to prepare him for eventual employment.

Salvagers Select Officers

• • • **At the annual** meeting of the Salvagers and Re-Distributors Association, Inc., held on March 10, the following officers were elected: Abraham M. Hernowitz, Eastern Metal Co., Newark, N. J., president; Maury Cohen, Harry Harris, Inc., Kearny, N. J., vice president; Joseph B. Brown, Erie Steel Co., Philadelphia, secretary; and William Fabrikant, Julian Steel Products, New York, treasurer. M. Rosoff is counsel to the association.

WLB Decides to Hear 17c. Per Hour Testimony in Steel Wage Controversy

Washington

• • • **Split by internal** fights between CIO and AFL members, the War Labor Board on Tuesday was expected to authorize hearings beginning March 22 on the 17c. an hour wage issue despite the fact that a week previously public and industry members of the board had refused to permit AFL to attack the Little Steel Formula.

Already 94 companies, most in the steel producing industry and others in the casting industry, had been designated by WLB as properly in USWA's case before the board. This decision was made on March 18.

The steel companies had insisted that WLB has no jurisdiction over this issue and are far from satisfied with the decision that the board has the power to hear a case involving abrogation of the National Stabilization Program.

While the board and panel will hear the union's demand, the final decision in the last analysis rests with the President instead of the board. The whole country recognizes CIO's attempt to expand and increase the pay-off of the Little Steel Formula as a political issue. The country is waiting to see whether CIO President Philip Murray will be as successful as his rival, John L. Lewis, in further smashing war economic controls.

Through parts of last Thursday, Friday, Monday, and Tuesday the National War Labor Board debated over whether its Steel Panel should hear arguments of the USWA on the 17c. per hour demand.

Observers believed the difficulty arose because the American Federation of Labor's and Congress of Industrial Organizations members of the board's labor groups could not agree. Only a few days ago the board voted down a Federation request to ask President Roosevelt to modify the Little Steel Formula in a "realistic" way so that higher wages would be permitted. This, it is said, left the AFL smarting under the rebuff and in no mood to grant concessions to the CIO.

William H. Davis, WLB chairman, was present Monday and there was at least one other new face among the "public" members. Three of the industry group took the places of others who sat on Friday, and one of the CIO members of the labor group was a new figure.

The USWA-CIO has chopped 10 issues off its 24 demands. As the USWA case against the steel industry now stands, the following points are before the War Labor Board's Steel Panel:

1—General wage adjustment of 17c. per hr. for all employees.

2—Rehabilitation fund for steel workers in the armed services: $20 to be contributed by each steel-worker in the industry from wage increase directed by WLB and this amount to be matched by each steel company for each employee.

3—Guaranteed minimum weekly wage computed on employees' straight time average hourly rate for a year preceding the contract, plus the new wage adjustments, multiplied by 40.

4—Vacation with pay, one to two weeks depending upon length of service of employee.

5—Severance pay upon permanent closure of plant, to be based on four weeks' pay for more than one and less than three years' service, eight weeks' pay for employees with more than three years' continuous service.

6—Sick leave with pay, based on length of service.

7—Shift differentials amounting to 5c. per hr. for afternoon shift and 10c. for night shift.

8—Six holidays specified, with provisions that employees working on those days be paid time and one-half without reference to the present national emergency.

9—Elimination of geographical wage differentials.

10—Any wage inequality to be made subject of a grievance barring settlement of which may be submitted to the War Labor Board.

11—Classification of mechanical occupations, with fixed rates established for each classification up to three.

12—Provision for deduction of increased dues.

13—Common labor rate for learners.

14—Institution and maintenance by the company of a group insurance plan to provide life and accident insurance in a face amount equal to 75 per cent of the employees' average annual earnings with minimum coverage of $1,500, together with disability, hospital, and surgical benefits.

The other 10 points are being referred to collective bargaining, and the foregoing issues are opposed by the companies.

Meanwhile, the United States Steel Corp. has made the following counter-proposals:

1—WLB has no jurisdiction to consider a 17c. per hr. wage increase because the award of increases would be in violation to the national stabilization policy.

2—That the corporation will not voluntarily include the maintenance of membership and check-off provisions in a new contract.

3—Inclusion of wage scale in labor agreement, setting forth hourly and incentive wage rates.

4—No elimination of geographical wage differentials.

5—Elimination of inequalities of wage rates within geographical areas shall neither increase nor decrease total payroll for the plant. This means that some inequalities may be caused by too high an hourly rate for particular jobs and others by too low an hourly rate. Pay boosts for one class of workers would be reflected in pay decreases to others.

6—The new agreement should contain a procedure for adjusting alleged inequalities in both hourly and incentive rates and a procedure for establishing new and changed rates arising out of changed conditions.

7—No requirement shall be imposed on the companies for the payment of overtime rates beyond that required by law or applicable executive orders.

8—A mutually satisfactory permanent impartial umpire shall be appointed to serve for the life of the new labor agreement. The umpire's powers and functions shall be specifically defined in the agreement and his compensation and expenses shared by the parties.

9—Provision for penalties in the form of sanction and indemnities to be paid by unions in case of work stoppages, slow-downs, of interference appearing in violation of the agreement to discipline employees.

10—Agreed interpretations of the agreement should be arrived at by the corporation and the union to prevent so far as possible future misunderstandings.

Centralized Depots for Surplus Aircraft Materials Sought by Air Force

By S. H. BRAMS
Detroit Editor

• • • **An expanded program** for disposal of surplus aircraft material is taking definitive shape at Wright Field, Dayton, industry sources report. Indications from Washington are that the establishment of the new Surplus War Property Administration may shape its policies to utilize this framework for actual distribution of aircraft surpluses.

This Wright Field program is described as a down-to-earth method of procedure, rather than development of policies and principles which is being undertaken by the SWPA. Equally important is the fact that it is designed to make full use of long established and specialized industrial distribution systems in preference to superimposing on those systems a new Army-created program. For this logical and desired approach, industry can thank the chief of the Materials Distribution Branch at Wright Field, Lt. Col. A. E. R. Peterka, who, before going into service in mid-1942, was an executive of the Lamson & Sessions Co., Cleveland.

In brief, the program contemplates distribution of surplus materials by gathering them at centralized depots from which they will be filtered out through industry-operated warehouses, or, if possible, directly from contractors' plants to the warehouse distributors. Different channels would be established for steel, aluminum, copper, aircraft hardware, certain aircraft components and whatever else may be assigned to the Materials Branch for handling.

Efforts are being made by Col. Peterka to put this program into high gear while aircraft production is increasing. "If we can dispose of our surpluses by redistribution as they accumulate," he has said, "our problems later will be reduced." Accordingly, he has been in close contact in recent weeks with not only top executives of the steel and aluminum industries, but also with representative warehouse people and with the various Aircraft Councils.

Reaction of these groups has been good, but in some instances the implementation of oral arrangements by written commitments is not yet forthcoming. This is puzzling to some of the participants in these conferences. One asks, "Doesn't industry understand that this is largely their problem? Every day that goes by builds the surpluses a little larger."

Generally, however, industry agrees on the soundness of the ideas. From the viewpoint of company people, the prime obstacle to their adoption is the existence of various limitation orders which must be relaxed before the general program can be consummated.

The size of the surpluses, meanwhile, is as much a mystery as Mussolini's whereabouts. Estimates have been made, but they are only shots in the dark. Col. Peterka points out that companies which themselves hold surpluses often do not know the size of them, and hence efforts to set aggregate figures in any category are purely guesswork. The reasons for this are obvious and simple—mainly they stem from the fact that aircraft companies have been concerned with production, not in keeping records, and their inventories are not up-to-date, largely because of shortages of help. Ample proof of this is seen in Air Forces experiences in the past in obtaining lists of supposedly surplus stocks. In one case, for example, one of the largest plane producers reported approximately a million pounds of aluminum sheet and tubing as surplus, available for sale. When this was ordered picked up, only a third of that amount proved to be on hand.

This much is known, however: materials transferred thus far indicate a very substantial store of surpluses. Further, the transferral of surpluses, while relatively small today, is steadily increasing. Since last September, when this program began, approximately 6,000,000 ft. of steel tubing have been shunted from one contractor to another. About 9,500,000 ft. of aluminum tubing have been so shifted. Redistributed aluminum in other shapes aggregates more than 27,000,000 lb. More than 400,000,000 pieces of aircraft hardware, excluding rivets—"hardware" including fastening materials such as bolts, screws and nuts—have been transferred from one contractor to another.

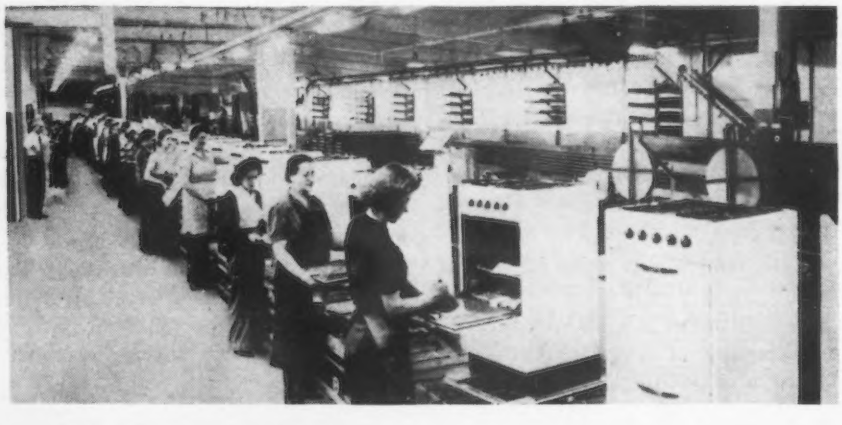
Getting down to cases, the detailed methods of disposal of surpluses differ with each material, following in general the accepted procedure of the industry involved. Distribution of aircraft hardware is through official aircraft hardware warehouses, selected by an aircraft industry vote and including the Aircraft Hardware Mfg. Co., Bronx, N. Y., and Supply Division, Inc., St. Louis, Mo. The third was in Los Angeles, but this contract has been cancelled by mutual consent and a successor is now being chosen.

Originally these warehouses were set up to supply small quantities of critical requirements, and their inventories were guaranteed against loss. Sales were at current market prices, and a customary handling profit was allowed. Gradually they have been working also into the redistribution of surpluses, but this has brought new problems which are now in process of solution.

One such problem has been the enlarged inventories which grow out of surplus material handling. The Procurement Division has recommended that the present guarantee for each of these warehouses be increased. Further, some method must be worked out to guarantee these warehouses against losses due to drops in market prices.

To illustrate, quotations on aircraft

KITCHEN RANGES: *Steel and rockwool insulated gas ranges are beginning to pour off the production line of a Borg Warner Corp., Norge division, plant at Muskegon Heights, Mich. These are not the Victory models, but first quality, pre-war types.*



hardware have declined an estimated 20 per cent in the past six months. With surplus materials coming into warehouses at going prices less commission, and moving out at the going prices, these outlets are definitely feeling a pinch today as market quotations crumble under them.

Some feel that the logical solution of this problem would be the consigning of goods by the Army to these warehouses, to be listed as sold only when they are moved out of the warehouse. However, service regulations call for the setting of a specific price at the time of transfer, and thus far the Army legal departments have been unable to work around this simple, but evidently quite formidable, stumbling block.

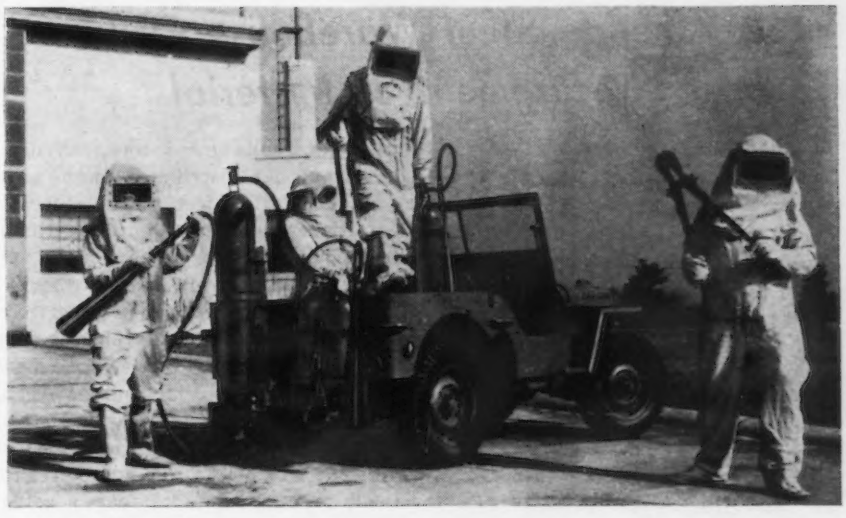
Another problem in connection with surplus disposal is that of inspection. Wright Field hopes to solve this by putting a resident Army or Navy officer at each warehouse.

Any materials coming to these warehouses under the expanded program would be checked periodically. Hardware in stock for a stated period, longer than normal under poorer-than-average conditions, would be ordered scrapped and would go to a melter. This would eliminate clogging of the warehouses.

Aluminum redistribution involves somewhat different procedure. Discussions have been held with Aluminum Co. of America and Reynolds on a cooperative program for moving surplus sheet, tubing, wire, rod and bar. This program, not yet finalized, would have Alcoa and Reynolds filing copies of their orders received with the Aircraft Scheduling Unit at Wright Field, which would in turn check them against inventories of surpluses. Should this screening establish that shipments can be made from surplus, the supplier company and the ordering firm would be so notified, and movement of goods from surplus would follow.

Commercial warehouse distributors would handle the actual redistribution. They would obtain the stock from government storage reservoirs or directly from contractors. Customary jobber discounts would be paid the commercial warehousers.

Aircraft steel redistribution is now being discussed by a committee including Col. Peterka for Wright Field and industry representatives as follows: Lester Brion of Peter A. Frasse & Co., Inc., New York; A. O. Fulton of Wheelock, Lovejoy & Co., Cambridge, Mass.; A. Y. Sawyer of Joseph T. Ryerson & Son, Inc., Chicago; G. L. Stewart of Edgar T. Ward's Sons Co., Pittsburgh; G. L. Tillson of Edgcomb Steel Corp., Hillside, N. J.; Walter S. Tower of the A. I. S. I.; and Walter S. Doxsey, president, American Steel Warehouse Assn., who is acting as committee chairman.



JEEP FIRETRUCK: *Equipped with three 15 lb. and one 75 lb. Kidde units with long hose, big nozzle and auxiliary tools, the Coast Guard jeep is converted into a highly mobile and well equipped firetruck for combating airport, dock, or other localized inflagrations. Asbestos suits protect firefighters from intense heat.*

The line of arrangements being made calls for setting up in specific detail the kinds and quantities of steel which will and will not be redistributed, together with minimum weights and sizes. Working from this pattern, the Army Air Forces would separate material to be scrapped, this to be undertaken in contractor plants or government reservoirs, and the remainder would move into warehousing channels where standard industrial procedure and standard fees would be paid. All pricing would be on a basis permitting selling of steel at published levels for warehouse or mill quantities.

At present 26 official aircraft steel warehouses are designated as handlers of critical aircraft quality steels in warehouse quantities, and these are being thought of as a nucleus for the proposed redistribution enlargement.

Copper and brass distribution presents hardly any problem at all in aircraft. Through the industry itself, the WPB Copper Division and the Copper Unit of the Materials Distribution Branch at Wright Field, surplus brass and copper products are being handled about as rapidly as they are unearthed.

Steel Warehouses' Aid Is Sought

Cleveland

• • • **The prime steel** warehouses of the nation are reported being asked by the Army Air Corps to assist in the redistribution of from 50,000 to 200,000 tons of idle and excess aircraft quality steels. This comparatively large estimated tonnage is piled up in inventories of the major aircraft producers as a result of changeovers and completion of contracts. Redistribution of the material represents a problem as it can only return to the aircraft industry from which it originated. Also the warehouse industry is not entirely suited to handling the material in the lots in which it is offered.

Greatest problem presented to the warehouses by this request is the stocking of individual lots of from several hundred tons to 1000 tons which are being offered and which the Air Corps is reluctant to break down in smaller lots. Also the prime warehouses are not well equipped to sort out the various items of a lot and do the reconditioning required as they have never been set up for such operations.

Although the warehouses may have some difficulty in handling the stocks, their use as a clearing house to keep the records straight and get the steel back into usuable condition is believed the ideal solution. No monetary risk in involved for the warehouses as the steel is expected to remain the property of the Air Corps.

WPB Amends Steel Warehouse Orders To Ease Procurement of Material

Washington

• • • **Amendments to orders** M-21-b-1 and M-21-b-2 dealing with restrictions placed upon business handled by steel warehouses and merchants of steel products have been made. These orders were planned to replace controlled materials allotments which had been ordered from the warehouses, but made it difficult for steel fabricators or other new firms to get into the business.

Under the amendments, warehouses will be authorized to place orders with producers to replace stocks. Also, they may obtain idle, excess, or salvage steel. Mills may accept additional orders from warehouses but can fill them only if the mills have excess capacity for so doing. A warehouse order placed with a producer or a holder of excess stocks will be considered an authorized controlled material order. Provisions are made in the amendments for establishing initial stocks of a warehouse for concerns not previously authorized to act as distributors of general steel products; for distributors wishing to purchase for stock a product group that was not previously handled; and for distributors who have not previously purchased general steel products from producers but now wish to do so.

As to merchant stocks, a distributor may purchase from a producer only for replacement, and may order from another distributor in the same manner and subject to the same restrictions as when he purchases from a producer. Also, a distributor may order for stock from another distributor any merchant trade product items which the latter has purchased from idle or excess inventories or has salvaged from material purchased as scrap. Such material doesn't have to be to support such an order. Lastly, a distributor may order any merchant trade product for stock from a holder of idle or excess inventories on a "special sale" as provided in Priorities Regulation No. 13.

A merchant steel distributor may place orders with any producer, which will be filled after the producer has filled all tonnages reserved for controlled material allotments. To take advantage of any reserved tonnage, a distributor must submit his orders to the producer then holding his base tonnage not later than the expiration date stated in the warehouse load directive. A producer may fill a distributor's order for that quarter received after the expiration date but may not reserve any space for such orders.

A. S. & W. Concentrates Rod Output

Chicago

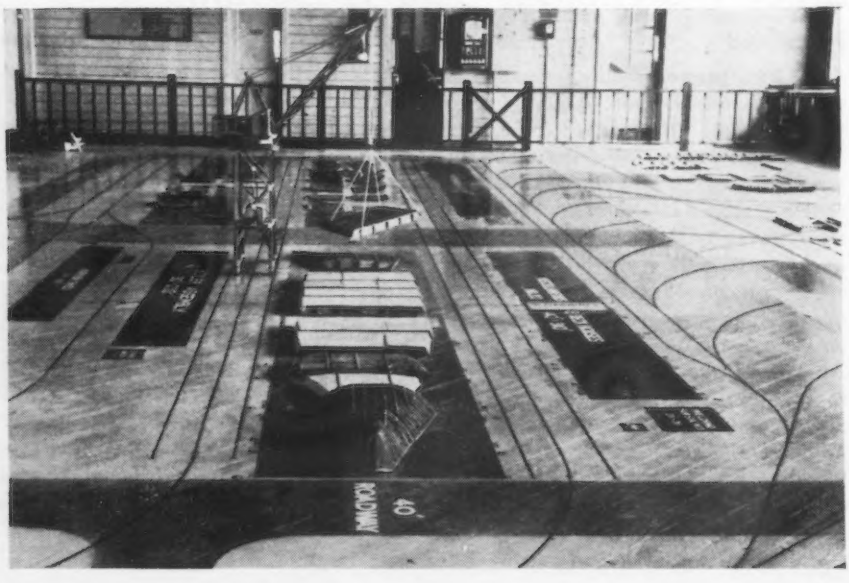
• • • **Wire rod** production facilities at the Waukegan works of the American Steel & Wire Co., Waukegan, Ill., are being dismantled, and the company's wire rod production in the district henceforth will be concentrated at its new Collins Street plant, Joliet.

One rod mill at Joliet was dismantled in 1937, and two mills are being junked in the present program. Wire rod capacity at Waukegan, which now will be eliminated, amounts to 155,000 gross tons annually, according to latest available listings.

The company recently completed a modernization program at Waukegan with view to devoting that plant entirely to production of finished manufacturers' wire in peace time. Rod patenting equipment has been replaced and relocated, heat treating equipment replaced, straightening and cutting and tinning equipment replaced and relocated, additional continuous wire drawing and finishing equipment installed, the spring mill improved, with several equipment replacements, cleaning house and iron sulphate facilities replaced, rod storage and warehouse space extended, and office facilities modernized.

Fragmentation bombs currently are being produced. Wire products which will continue to be made at the Waukegan plant include bolts, nuts, spring wire, bale ties, manufacturers' wire, valve springs, music wire, oil-tempered wire, specialty wire, etc.

SCALE MODEL SHIPYARD: *This ½-in. scale model of the Bethlehem-Fairfield shipyard is used for the rehearsal of Victory Ship production. By studying the minature, efficient flow of materials and assembly on the ways can be worked out in advance of actual production.*

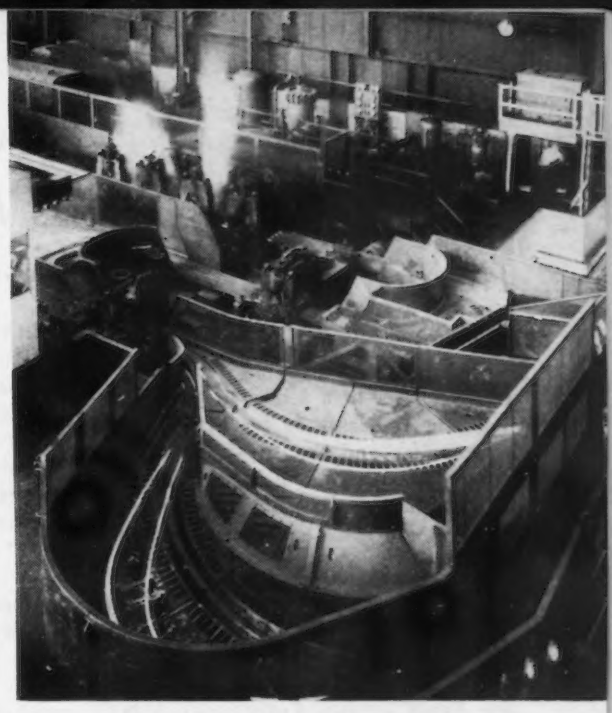


Two Divisions Created

Cleveland

• • • **American Steel & Wire Co.** is creating two separate divisions to handle the sale of electrical products and wire rope and construction materials. P. T. Coons, formerly head of the electrical, wire rope and construction materials department, which is being discontinued, will assume the responsibilities as manager of the wire rope and construction materials division. T. F. Peterson has been appointed manager of the newly created electrical division.

Merchant Wire Product Pattern Expected to Remain Liberal



Looping stands at a Bethlehem continuous rod mill

Pittsburgh

• • • **With the** exception of woven wire fence, which took a terrific dip in 1942, the general production pattern of merchant wire products changed very little in the period from 1939 to 1943. Despite this little change, in actual statistics, the possibly dry figures do indicate an excellent job on fulfilling agricultural requirements during 1942 and, especially, 1943. Credit for this achievement goes to the combined cooperation of the steel, farm, and WPB groups.

Production of nails and staples, as well as twisted and barbed wire, was exceptionally heavy in 1942, due, apparently, to military construction and some bulding up of stocks for military purposes. This was superimposed upon a WPB controlled demand from agricultural interests. Also significant, from the standpoint of reflecting the importance of certain farm products, was the exceptionally high level of bale tie production in 1942 and in 1943. The emphasis on this product, and the tying in of directives consistent with the demand, made it possible for the agricultural industry to utilize to the fullest extent baled hay, etc.

Indications are that 1944 will see just as liberal a merchant wire product pattern as last year, especially in view of the continued importance of the food and feed program during the course of the war. It is expected that any bad effects, which resulted from the virtual cessation of woven wire fence production during at least six months in 1942, will be overcome this year. Governmental officials, as well as others, apparently learned last year that such items as woven wire fence, bale ties, etc., have a direct bearing upon the amount of feed, meat, and other food, which may become available for general consumption. The lack of some of these items, at one time, threatened many farmers with a conglomeration of pigs, cattle, chickens, etc., meeting and eating upon common ground. A much better separation appears to have taken place during the past six months.

On the industrial wire front, as expected, drawn wire production advanced quite rapidly in tonnage from 1939 to 1943. In the latter year, production was about 44 per cent ahead of 1939. There is every indication that the same pattern will probably prevail this year for this product. While military demands may not have completely made up for the tonnage which originally went to the automobile industry before the conversion, the statistics for 1943 indicate that drawn wire output was not far from the unprecedented production in the year 1941.

The production of wire rods in 1943 was about 77 per cent greater than in 1939. This represents wire rods which were sold as such, and were not shipped within the steel industry for further processing into wire. This increase in wire rod output compares favorably with the 78 per cent increase in all finished steel products, from 1939 to 1943. This expansion was to be expected, in view of the varied and miscellaneous uses for wire rods in the war effort.

In considering total production of wire rods, drawn wire, and merchant wire products, the increase of this total production in 1943, compared to 1939, amounted to about 39 per cent. Summarizing, on an individual basis, wire rods were up 77 per cent, drawn wire 44 per cent, and merchant wire products 32 per cent in 1943, as compared with 1939. During that period, it is also probably significant that much standardization, with elimination of a great number of specific types or sizes of merchant wire products, was effected, and the benefits of these simplifications, it is hoped by many in the industry, will hold in the postwar period.

TRENDS IN WIRE MILL PRODUCTION FOR SALE

1939-1943. Net Tons. 000 Omitted.

Source—American Iron & Steel Institute. Compilation—The Iron Age.

		Merchant Wire Products						
Year	Wire Rods	Drawn Wire	Nails & Staples	Barbed & Twisted Wire	Woven Wire Fence	Bale Ties	Other Products	Fence Posts
1939	550	1355	679	231	274	60	6	60
1940	1042	1540	641	214	230	68	5	54
1941	1248	2285	782	280	297	82	39	68
1942	927	1951	845	301	114	106	52	28
1943	978	1949	801	243	264	105	58	50

TRENDS IN MERCHANT WIRE PRODUCT OUTPUT

In Per Cent of Total

1939-1943. Net Tons. 000 Omitted.

Source—American Iron & Steel Institute. Compilation—The Iron Age.

Year	Nails & Staples	Barbed & Twisted	Woven Wire Fence	Bale Ties	All Other Wire Products
1939	54.5	18.5	21.9	4.7	.4
1940	55.3	18.5	19.8	5.9	.5
1941	52.8	18.8	20.3	5.5	2.6
1942	59.5	21.2	8.1	7.5	3.7
1943	54.5	16.5	18.0	7.1	3.9

Patterson Flays Officers for Timidity on Contract Termination

Washington

• • • **Undersecretary** of War Robert P. Patterson in a letter to the Commanding Generals of the Army Service Forces and the Air Forces blistered the delaying policies of War Department contracting officers in making contract termination settlements.

The letter, dated Feb. 10, but made public March 15, said:

"Termination procedures established in the contracting offices of the Army Service Forces and Army Air Forces have not produced expected results. The reluctance of contracting officers to execute courageously their responsibilities as outlined in Procurement Regulation 15 continues to delay unnecessarily contract termination settlements. This reluctance is evidenced by the number of settlements awaiting contracting officer's approval as to disposition of contractor-owned property or as to contractor's statements of charges.

"* * * It is the policy of the War Department definitely stated in Procurement Regulation 15, that the contractor receive fair and reasonable compensation for work performed and for the supplies and articles furnished under the terminated contract.

"In this respect the work of the contracting officers will be evaluated not by the extent to which they succeed in reducing the settlements proposed, but by the extent to which prompt settlements are fair to both the contractor and to the government, are made.

"The delay in approving contractor's statements of charges results not only from improper preparation of statements but also from the unreasonable utilization of detailed auditing. Reluctance to make use of the office review procedure and an insistence on field audits have delayed settlements for extended periods.

"It is important that office reviews of the scope outlined in Procurement Regulation 15 be utilized to the fullest extent and that field audits be the exception rather than the rule.

"Contracting officers should bear in mind that in submitting statements to the Government, the contractor represents the facts stated are true and he is subject to penalty for any false certificate. * * *"

Warner & Swasey Asks Ruling on Renegotiation Law Amendment

Washington

• • • **The Warner & Swasey** Co., Cleveland, filed suit in the District Court of the United States for the District of Columbia March 18 under the Federal Declaratory Judgment Act to obtain a judicial ruling as to the proper construction of an amendment to the renegotiation law.

"The original renegotiation law, which went into effect as of April 28, 1942," L. B. McDonald, vice president of the company, said in commenting on the suit, "did not include sales to the DPC as subject to renegotiation.

"Over a year later—effective as of July 1, 1943—Congress amended the renegotiation law so as to include for the first time DPC business; and this provision has been interpreted by the services as being retroactive to April 28, 1942. The question we want the Court to decide is whether or not Congress intended to make this provision retroactive, and if so, whether or not the retroactive feature is constitutional.

"At the time of our original renegotiation it was our assumption that this concluded renegotiation on our 1942 business. Then in July, 1943, Congress passed the amendment making sales to DPC renegotiable, and we have been told that retroactive renegotiation of our 1942 DPC business is necessary.

"It should be borne in mind that we are not seeking to enjoin the government in this action, nor are we questioning in this suit the constitutionality of the renegotiation statute as a whole. We have simply asked the Court, by means of a declaratory judgment, to define our rights in the matter."

Producers and Fabricators Form Magnesium Association

Chicago

• • • **To assure the** future of magnesium alloys and to foster the development of fabrication techniques, producers and fabricators have formed *The Magnesium Association.* One of the purposes will be to give members and the public authentic information as to the properties and advantages of magnesium alloys, as well as to the suitable type of applications.

Edward S. Christiansen, vice-president of Apex Smelting Co., was elected president of the association at an organizational meeting held in Chicago. C. C. Loomis, president of the New England Lime Co. was elected vice-president, and C. E. Larson, operations manager of the White Metal Rolling & Stamping Co., was elected treasurer. Temporary offices are at 2537 W. Taylor Street, Chicago 12.

The membership of the association is representative of the magnesium industry in all of its phases. Four major groups are represented: producers and smelters of ingot; sand, permanent mold and die casters; wrought products; and magnesium powder manufacturers.

C.E.D. Issues Handbook On Planning for Postwar

New York

• • • **Concrete steps** that may be taken by industrial employers in planning for high postwar levels of production and employment are set forth in a handbook, "Planning the Future of Your Business," prepared for the Committee for Economic Development by a special committee of the Association of Consulting Management Engineers.

The six steps in postwar planning by individual businesses as formulated in the C.E.D. handbook for industrial employers are: 1—Define and place responsibility for postwar planning; 2—Plan product programs; 3—Plan market and sales programs; 4—Determine the manufacturing facilities required; 5—Estimate employment requirements, define jobs, and plan employee training; and 6—Estimate the operating funds needed and plan their sources.

The detailed suggestions made under these six headings emphasize the need of making postwar plans, concrete and realistic to those "down the line." Business executives are urged to subject their pricing policies to harsh scrutiny, since "postwar competition will demand it."

WPB Eases Orders on Civilian Goods But Manpower May Prove Obstacle

Washington

• • • **Easing of the** supply situation in metals has been reflected for some time in WPB orders which relax or remove restrictions on the use of such materials. These orders are growing in number and are being issued almost daily either singly or in groups. Whether or not the Army and Navy policy of tightening up on draft requirements will so affect production as to cut down the number of these orders remains to be seen. The general impression is that the military policy will not greatly affect the trend toward wider uses of metals for civilian and war purposes. One reason for this view is that it has been found that use of substitutes for metals often requires more manpower than is required in producing the metals.

Among recent WPB orders easing the metals supply situation are the following:

Casket manufacturers were permitted to use a total of 10 lb. of iron and steel per casket and 7 lb. per shipping case. The previous maximum for caskets was 3½ lb. for shipping cases and 5½ lb. for caskets.

Restrictions were removed on the use of metals in industrial type incandescent lighting fixtures and restrictions were relaxed on residential types of incandescent lighting fixtures.

Permission was given to produce extra heavy cast iron soil pipe. Production of this type of soil pipe had been prohibited since June 1, 1942. In the meantime only a single weight, "Victory weight" of cast iron pipe could be manufactured.

Restrictions were removed on the manufacture of barbed wire and woven wire fence.

Restrictions were lifted on the use of lead for counterweights and steel plates for battery boxes in industrial power trucks.

Restrictions were removed on the use of alloy steel in hand-operated wood and special purpose saws, and on the use of alloy steel in scrapers, angledozers, or trailers and bulldozers.

Permission was granted to increase production of bedsprings and box springs by 25 per cent and to improve their quality by using more steel per unit.

Standardization restrictions on the production of general purpose thermometers were removed. The complete restriction on the use of copper base alloy for industrial thermometer cases and case fronts was removed and permission given for use of a composition alloy up to 74 per cent copper and 1½ per cent tin.

Restrictions on the production of barbed wire and woven wire fence were removed because the necessity of these restrictions has passed and these products are in less demand for the direct war program. The revocation will permit the manufacture of heavier gages and a return to standards weights of zinc coating. WPB said that the heavier gages are needed to properly confine hogs and cattle and that the standard zinc coatings will result in lengthening the life of the product.

The permitted use of alloy steel in place of carbon steel in the manufacture of special purpose saws, WPB pointed out, is in line with its general policy to re-substitute materials formerly used when such a switch is indicated by the supply situation and involves no increase in the labor force. Alloy steel was customarily used for better grade saws before the restrictions were put into effect in September, 1942. It was this same policy that prompted the removal of restrictions on the use of alloy steel in road building machinery.

WPB Urges Return Of Excess Allotments

• • • **To assure maximum** production from the available supply of steel, copper, and aluminum, WPB urged that all consumers cooperate to the fullest possible extent in returning excess or unusable allotments. CMP Regulation No. 1, paragraphs (e) and (w), require that excess or unusable allotments be returned. As of the first of each month, and again at the end of the quarter, paragraph (w) users must determine if excess allotments have been made. The following factors may be considered:

1—Whether you have received excess or duplicate allotments in any one quarter; 2—Whether you can operate on smaller inventories than in the past; 3—Whether orders actually received are less than anticipated; and 4—Whether, for any other reason you will have excess or unusable allotments. If these periodic examinations disclose any excess, the excess must be returned as set forth in paragraph (w) (2) of CMP Regulation No. 1.

Allotments may be returned by letter or on form CMP-32, preferably the latter. The return should be made to the person, Claimant Agency or Industry Division from whom it was received. In those cases where the original allotment is clearly identifiable with a CMP-4B application which has been assigned to a WPB Field Office, the return of such allotment should be made to that Field Office.

Attention was called to the amended Direction No. 26 to CMP Regulation No. 1, which explains when allotments may be returned by a secondary consumer directly to a Claimant Agency or to the WPB, rather than to the person from whom the allotment was received.

Priority Changes

L-42—Sched. IV, as amended, gives permission to produce extra heavy cast iron soil pipe. (3-15-44)

L-49—Amended order gives permission to increase production of bedsprings and box springs by 25 per cent and to improve the quality of these items by using more steel per unit. (3-16-44)

L-64—Amended order permits casket manufacturers to use a total of 10 lb. of iron and steel per casket and 7 lb. per shipping case. (3-16-44)

L-157—Sched. III, as amended, removes restrictions on the use of alloy steel in hand-operated wood and special purpose saws. (3-16-44)

L-188—Amended order permits the use of zinc for applying a protective coating or plating for metal parts of binders (blank books, loose leaf books, or covers). (3-16-44)

L-211—Sched. III has been revoked, removing restrictions on the manufacture of barbed wire and woven wire fence. (3-16-44)

L-216—Sched. VI, as amended, removes restrictions on the use of alloy steel in the manufacture of vises. (3-18-44)

L-217—Sched. I, III, and IV have been revoked, removing restrictions on the use of alloy steel in scrapers, angledozers or trail-builders, and bulldozers. (3-17-44)

L-217—Sched. VI, as amended, removes restrictions on the use of metal for specified parts of truck mixer-agitators. (3-17-44)

L-264—Amended order permits use of brass in screw bases for rectifier tubes. (3-17-44)

L-267—Amended order relaxes slightly controls over production and distribution of restricted photographic equipment, accessories, and parts for non-military orders, to permit increased production of specified items and to facilitate distribution. (3-17-44)

L-272—Sched. VII, as amended, removes standardization restrictions on the production of general purpose thermometers by deleting them from the schedule. (3-17-44)

M-21-b-1—Amended order deals with the restraints placed upon business handled by steel warehouses. (3-16-44)

Greater Civilian Output Expected

Washington

• • • **Definite quality** improvement and in some instances increased production of some minor civilian goods can be expected by consumers in the next few months, the OWI reported on the basis of the WPB's revision of a number of limitation and conservation orders during the past few months. Any forecast, the WPB says, may be upset at any time by an unexpected turn in military events.

Civilian goods whose quality is being improved or whose production is being increased are those articles most frequently mentioned by consumers as "shortages which bother them," according to a recent survey made by WPB's Office of Civilian Requirements.

The only new items of civilian goods to be brought back into production this year, according to WPB, are: 1—Articles using comparatively small quantities of manpower and materials; 2—Those not interfering with war production; 3—Those not requiring extensive conversion of facilities; and 4—Those which would contribute more time and energy to war workers for their jobs.

There are no early prospects for the production of heavy durable consumers' goods such as automobiles, washing machines, mechanical refrigerators, vacuum cleaners or radios. Plant facilities as well as certain component parts and raw materials required to make these items continue to be needed for war production.

Electronic Idle Stock Plan Of Utilization Mapped

• • • **Progress in the** utilization of idle and excess stocks of electronic components in order to meet the greatly expanded military electronics program for 1944 is being accomplished through the components recovery program of the WPB Radio and Radar Division. To implement the program, the Radio and Radar Division recently organized a Component Recovery Section which provides a clearing house for the interchange of inventories of surplus radio and electronic components between the prime contractors, the Armed Services, and the Division. The basic plan is to return surplus components to the productive stream and thus smooth the flow of production of end equipment required in the greatly increased military electronics program this year.

Advantages that may be realized by the components recovery program include:

1—Through the use of idle and surplus inventory lists, electronics prime contractors may obtain needed components from idle and excess stocks of other contractors and also from the Armed Services.

2—Through WPB distribution of these stock lists to all contractors and the Armed Services, a prime contractor may transfer excess inventory stocks to other contractors and the Services.

3—Utilization of surplus component stocks will aid prime contractors in stepping up war production and help to insure prompt delivery of end equipment to the armed forces.

4—A prime contractor can arrange for the disposal of all remaining non-military stock items through the medium of WPB form 1161 (formerly PD-470).

5—The utilizing of components of his own manufacture, which have become idle or excess stocks in the hands of prime contractors through engineering changes or by cancellation or termination of contracts, will enable a component producer to complete his orders in time to meet schedules.

The Component Recovery Section receives idle and excess inventory lists resulting from cancellations, terminations, and changes in prime contracts, and also surplus inventory lists from the Armed Services and prime contractors. These lists are distributed to Army contracting officers, Army procurement districts, the Army-Navy Electronics Production Agency, the radio material and supply officers of the Navy, and to prime contractors requiring critical components.

Auto Advisory Committee To Meet with WPB in April

• • • **A WPB Automobile** Industry Advisory Committee composed of the top-ranking official in each company that manufactured passenger cars at the time production was frozen by government order is being formed. This committee will meet with WPB officials in April to explore the basic problems that must be dealt with by industry and government as a preliminary to the eventual resumption of passenger car production. Its purpose is entirely exploratory and advisory on the part of both industry and government.

In commenting on this committee, WPB chairman Donald M. Nelson emphasized that the calling of this meeting is not prompted by any plan or prospect of achieving resumption of passenger car production at any specified time that can now be determined. This conforms to WPB's previously stated policy that there can be no major reconversion of industry until the European war is won.

The coming meeting with the Automobile group is one of the most important of a series of meetings which is being held with leaders of various consumer goods industries and WPB officials to examine the problems that will arise when the time comes for the transition back to peacetime production. It is essential to make plans now so that when the proper time does come the transition from a war economy to peacetime production can be as smooth, as rapid, and as fair as possible.

Price Briefs

• Amdt. 7 to RPS 82 limits the maximum price for sales of wire, cable, and cable accessories by wholesalers and jobbers, to industrial, commercial and governmental purchasers to 120 per cent of the manufacturer's net price to wholesalers in the same quantities. (Release No. OPA-4060)

•

• Amdt. 106 to SR 14 permits mark-up for reconditioning on ceiling prices of used airplanes. (Release No. OPA-4055)

•

• Amdt. 110 to MPR 136 adds metal stampings to the list of articles covered by the regulation establishing maximum prices for machines and parts and machinery services. (Release No. OPA-T-1825)

Restrictions Removed on Barbed Wire Manufacture

• • • **The removal** of restrictions on the manufacture of barbed wire and woven wire fence was ordered by WPB. This action was taken by the revocation of schedule 3 to limitation order L-211, which stringently restricted the gages and types of wire fencing that could be produced.

The necessity for these restrictions has passed as the types of steel required for these products are not in as heavy demand for the direct war program. There will be practically no increase in manpower demands since this revocation will result chiefly in transfers of labor from one type of operation to another. At any rate, any increase in volume would result in very few additions to labor forces.

The revocation of this schedule will permit the manufacture of heavier gages and a return to standard weights of zinc coating. The heavier gages are needed to properly confine hogs and cattle and the standard zinc coatings will result in lengthening the life of the product.

Lend-Lease to Allied Nations Totals $19,986,000,000 Since March, '41

• • • **Total lend-lease** aid in the form of materials and services from the United States to Allied nations since the beginning of the program in March, 1941, through Dec. 31, 1943, amounted to $19,986,000,000, while aid during 1943 alone totaled $11,733,000,000. Actual lend-lease exports during this period have amounted to $15,578,000,000. Munitions made up the bulk, representing 54 per cent of total aid. The ratio was 22 per cent in 1941, 47 per cent in 1942, 62 per cent in 1943, and 67 per cent in December, 1943. Total lend-lease exports to the various recipient nations are shown in the accompanying table.

Meanwhile, lend-lease also works in reverse. Under this reverse lend-lease, recent requisitions to meet plane repair and adaptation needs of U. S. Air Forces abroad have been filled by the British without payment by the United States and include items as varied as 1,357,730 sq. ft. of steel and light alloy sheets and 235,000 rubber shock absorbers. U. S. Army Engineers in the United Kingdom have received as reverse lend-lease over 44,250,000 yards of steel landing mats, hundreds of miles of electric wiring, millions of spare parts for motorized equipment, and other such equipment. Likewise, 20 per cent of the food consumed in the United Kingdom by our forces is provided as reverse lend-lease; almost all tires for American Army trucks are supplied in this manner; and Australia has turned over to American forces fleets of trawlers, launches, ketches and small coastal steamers.

The Soviet Union has received about 27 per cent of the total lend-lease shipments, with lend-lease starting to Russia in October, 1941. Significant are the heavy imports of machinery by Russia as compared with other commodities and the machinery imports of other nations. Up to Jan. 1, 1944, some 177,000 tons of explosives to be used in the manufacture of bombs and shells in Soviet factories; 1,350,000 tons of steel; 384,000 tons of aluminum, copper, and other non-ferrous metals; 740,000 tons of aviation gasoline, lubricating oils, and petroleum products; and 145,000 tons of refinery equipment were received by Russia on lend-lease. In addition, planes (see THE IRON AGE, March 9, p. 76), tanks, munitions, foodstuffs, agricultural equipment, and seeds have been sent to Russia. During 1943, 99 per cent of the ships sailing with lend-lease supplies reached Russia safely, whereas in 1942, some 12 per cent of the ships were lost.

Shipments to the United Kingdom in 1943 were three times the 1942 total, but shipments of industrial materials and products and of food were up only 50 per cent. This indicates that fighting equipment made up the bulk of the increase. Thousands of planes, tanks, trucks, and other military motor vehicles were shipped to the United Kingdom. Some $460,000,000 worth of aircraft engines and parts; 4,800,000 tons of steel; 460,000 tons of non-ferrous metals; and large quantities of other raw materials and machine tools were lend-leased to the United Kingdom. Also, there were 125,000,000 barrels of petroleum products shipped, as well as 10 per cent of the British food supply. Fertilizer and farm machinery shipments have assisted the British in increasing domestic food production by 70 per cent over pre-war levels.

Of the 1943 lend-lease exports to the Africa, Middle East, and Mediterranean areas, 75 per cent were in the form of finished munitions, 17 per cent as industrial materials and products, and 7 per cent of agricultural products. The British and the French have been the major recipients of lend-lease aid in Africa, but it has also aided the Australians, Poles, Greeks, and other fighting units of United Nations forces in these areas. Many French army divisions have been equipped through lend-lease, as have French air squadrons and French Naval units. Vital civilian supplies to the people of French North and West Africa have been forthcoming through lend-lease. These supplies are now being paid for by the French authorities at full landed cost, and the United States has already received $62,250,000 under this plan.

Transportation, the greatest obstacle in aid to China, has been helped by the development of the air transport route into China. This system

LEND-LEASE EXPORTS
March, 1941, through Dec. 31, 1943
(Millions of Dollars)

	United Kingdom	U.S.S.R.	Africa, Middle East and Mediterranean Area	China, India, Australia, and New Zealand	Other Countries	Total	Per Cent of Total
MUNITIONS							
Ordnance	280	213	234	142	59	928	6.0
Ammunition	630	370	306	195	61	1,562	10.0
Aircraft and Parts	895	805	407	345	273	2,725	17.5
Tanks and Parts	521	251	446	153	34	1,405	9.0
Motor Vehicles and Parts	262	555	324	279	54	1,474	9.5
Watercraft	157	103	35	26	19	340	2.2
Total	2,745	2,297	1,752	1,140	500	8,434	54.2
INDUSTRIAL MATERIALS AND PRODUCTS							
Machinery	355	436	104	142	22	1,059	6.8
Metals	569	441	144	187	19	1,360	8.7
Petroleum Products	464	31	62	110	.....	667	4.3
Other	317	259	171	128	29	904	5.8
Total	1,705	1,167	481	567	70	3,990	19.6
AGRICULTURAL PRODUCTS							
Foods	1,695	700	134	46	15	2,590	16.6
Other Agricultural Products	450	77	7	27	3	564	3.6
Total	2,145	777	141	73	18	3,154	20.2
TOTAL EXPORTS	6,595	4,241	2,374	1,780	588	15,578	100.0
Per Cent of Total	42.3	27.2	15.2	11.5	3.8	100.0	

has grown by leaps and bounds until in December, 1943, twice as much was shipped into China by air than during the entire year of 1942. In January, 1944, the tonnage of goods flown into China was 15 times that of January, 1943. However, the total aid to Dec. 31, 1943, amounted to only $200,995,000. In addition, goods valued at $191,731,000 have been consigned to the United States commanding general in the India-China theater for transfer to China.

Lend-lease to India to Dec. 31, 1943, totaled $849,452,000, the policy on which has been determined by the importance of India's strategic and geographic position in the Far Eastern war theater. India is the major supply center for the war against Japan, with the best network of railroads in Asia and the terminal for the China air supply route. India is the chief base for action against the Japanese in Burma, but is also a major source of strategic materials essential to the American war effort. India is becoming a great arsenal as well as a military base. It not only produces small arms and small arms ammunition, bombs, torpedoes, armored cars, ordnance carriers, machine guns, artillery ammunition, and other military items, but is rapidly developing its industrial possibilities. Lend-lease has provided some of India's requirements for machine tools and raw materials. Machine tools under lend-lease have been valued at $10,000,000, but currently India is buying all of its machine tools in the United States for cash.

Lend-lease is also supplying munitions aid, war production aid, and agricultural aid to other allied nations, including Australia, New Zealand, and the South and Central American countries. All of these nations have rendered valuable direct military aid. (Lend-lease aviation statistics were printed in this magazine March 9, page 76.)

Truman Manpower Report Examines Over-Hiring of Workers, Other Phases

• • • **Phases of** the voluminous third annual Truman Committee report, issued early this month, have been covered in this magazine March 9, pages 78-80 and 103; and March 16, pages 82-84. The problem of manpower shortages was one of the specific subjects examined in detail by the committee. Here are some of the committee's comments on labor hoarding and other aspects of the labor picture:

"The nation-wide supply and demand for manpower is roughly in balance. Total employment is expected to reach about 53,400,000 by July, 1944, including a peak force of 12,100,000 agricultural workers. The armed forces are expected to total 11,300,000. Unemployment will remain at approximately the present level of 1,000,000 and about 815,000 additional workers will be available for employment if they could be used in their particular localities. . . .

"The committee has discovered a widespread tendency on the part of employers to estimate manpower requirements on the basis of how many workers they could crowd into the plant rather than upon the basis of how many they can efficiently employ. This is on the theory that if enough workers are available at all times to do the maximum amount of work that may be required, production will be somewhat greater than could otherwise be obtained. . . .

"**A similar practice**, prevalent when material shortages were most acute, was that of ordering materials in greater quantities and at an earlier date than required. The availability of more labor and materials than can be used greatly reduces management problems and cushions the effects of mistakes of management in estimating actual requirements. . . .

"The War Manpower Commission has done some good work through the 1500 utilization studies that have been completed to date. For example, its study of the Seattle ship construction yards resulted in an order in October to reduce employment by 10 per cent. Other controls instituted in this area reduced turnover rates considerably. These reductions were achieved with no loss of production.

"However, programs of this kind are difficult to put into effect, and require more skillful and intelligent personnel than is readily available. Utilization studies also consume time.

"These programs are steps in the right direction, but at best are merely substitutes for direct and determined action by the procurement agencies and the industries themselves. They are much more familiar with their own operations and should be better able to find and eliminate inefficiency if they have the will to do so. Their search for inefficiency will be stimu-

COOLING OFF: *After some furious action against the Japs at Cape Gloucester, New Britain, this 75-mm. howitzer had to be cooled off and cleaned up by washing out the tube.*

lated if they know that they will not be given blank checks on manpower.

"**A blank check** on manpower had to be given to the military because the secrecy that necessarily enshrouds military strategy makes it undesirable to scrutinize the accuracy of the estimated requirements. There are doubtless many situations in the United States where men in the armed forces are not being efficiently utilized, but troop utilization is so closely allied to strategy that the committee believes that the estimates of the armed services as to their needs should be accepted so long as there is assurance that strategic plans have been made to utilize the men requested. The armed services have set up special procedures to check on efficiency of utilization and to reduce or eliminate military installations that are no longer fully useful. The success or failure of such policies can be evaluated only after the war, when the conclusions reached will be largely academic.

"However, a similar blank check on manpower cannot be given to the procurement agencies any more than they could be given a blank check on materials. They must be forced to utilize efficiently what is available, despite the temptation on the part of each one to argue that its needs are so important that any contribution to them however small is more important than any loss to other programs or to the civilian economy, however serious it may be.

"This argument has even been extended by some procurement officials to the extent of saying that there is a patriotic duty to reduce the civilian economy to bare levels of subsistence to bolster the morale of the men in the armed service.

"The committee disagrees with this argument. There is a patriotic duty to maintain a sound, healthy economy capable of waging a long war and of providing jobs for the armed forces when they return. Workers requested for war production should be made available and civilian production should be cut only to the extent that such workers are actually required and can be efficiently utilized. Enforced idleness of war workers is destructive to morale and increases the cost of the war, and there has been far too much of it.

"**These principles** were frequently disregarded, and it was a common practice for manufacturers to hire more workers than they could use or even train at the time of their employment. Complaints were received by the committee from every section of the country and involved most of the key war industries. The cost of such practices was borne by the Government and not by the manufacturers. This was true both where the agreements involved were cost-plus-fixed-fee contracts and where they were fixed-price contracts, because most of the latter were so high as to require renegotiation and thereby to become in effect cost-plus-whatever-the-Government-would-allow-as-profits contracts. This was particularly true of aircraft contracts, where the fixed prices bore very little relation to the actual cost after mass production methods were evolved and put into practice. . . .

"The committee made a detailed investigation of the situation at Dallas, Texas, which had been declared by the WMC to be a critical labor area, solely because of the requests of North American Aviation Co. North American has made a major contribution to the war in the design and production of the Mustang and Mitchell planes and in the production of planes at its parent plant at Inglewood, Cal. The committee's investigation was limited to the manpower situation at North American's Dallas plant, a plant which it had undertaken to operate so far from the parent plant only at the urgent request of the War Department.

"A subcommittee of the committee proceeded to Dallas, Tex., and heard approximately 250 witnesses. The testimony established that North American was not efficiently utilizing the 36,000 workers which it then had and that it could not usefully employ the additional 13,000 workers that it was requesting. A transcript of the record of testimony was turned over to Charles E. Wilson, vice-chairman of WPB, who had been selected by the chairman of the WPB to supervise the aircraft industry because of his outstanding achievements as a production expert and as president of General Electric Co. Mr. Wilson consulted with the North American management and with representatives of the Army Air Forces and the WMC in Dallas, and informed the committee that the estimated manpower requirements of the North American plant at Dallas could safely be reduced from the previously announced peak load by approximately 10,000 workers. Mr. Wilson further informed the committee that no new employees would be required by North American until January, 1944, except for replacements, and that after that time new employees would be hired only on a gradual scale based upon new and more realistic schedules. Both Mr. Wilson and Maj. Gen. Charles E. Branshaw, commanding general, Army Air Forces, Materiel Command, Wright Field, deserve credit for the prompt and capable manner in which they handled this situation. . . .

"The investigation at Dallas had a profound effect upon the aircraft companies, particularly those on the West Coast. After re-examining their actual needs, they reported to Charles E. Wilson in the WPB that in their opinion their requests for additional workers could safely be reduced."

AMPHIBIOUS TANK: *In Kwajalein lagoon, this amphibious tank is moving from a Coast Guard-manned transport toward the beach of Namur during the recent invasion of this atoll. These powerful sea-going tanks haul fighting equipment through the surf to the beachheads.*

Egypt Examines Possibilities for a Postwar Hydro-Electric Steel Plant

• • • **An examination** of the possibilities of Egypt becoming at least self-sufficient in regard to its steel needs was made recently by Ernest Menczer, of Cairo. He pointed out that at present there are only a few foundries in the country that depend entirely upon scrap as a metal source, and no facilities are in operation for reducing metal from ore. In spite of the lack of industrial development, there are known iron ore deposits in Upper Egypt near Aswan where at least 980,000,000 tons of 40 to 60 per cent ore exists, 280,000,000 tons of which can be strip mined. In addition, there are also known deposits of manganese, molybdenite, and tungsten ores. The major deficiency and a vital factor is there is no coal available except by importation. One answer to this is electrical reduction of ores, possible by building an hydro-electric plant at Aswan.

It is felt that if at the end of the war the world returns to a system of free competition and free trade without protective tariffs, a steel industry in Egypt would have little or no chance of survival unless the cost of electrical energy and other factors reduce production costs to a level that will permit such products to compete in world markets. However, if such an industry is given governmental support by means of tariffs and other measures it is entirely feasible that the construction of such a plant would make the nation self-sufficient and have enough material left over for future subsidiary industries.

On the other hand, should the postwar world economy become one of a universal economic system to eliminate international competition and to impose restrictions on output in accordance with world demand, it is then considered quite necessary to exploit the Aswan iron deposits and develop Egyptian water power resources without regard to competition.

As to the economics of electrical reduction of ores and electrical smelting of metals, this has been proved on a small scale by electric blast furnaces in Sweden, Norway, Italy, and Switzerland, where very high grade metals have been made. The first world war saw the development of the use of electric blast furnaces and it is believed progress made in the field of metal production should permit perfection of these methods to such an extent that after the war it will be possible to economically construct and operate electrical blast furnaces.

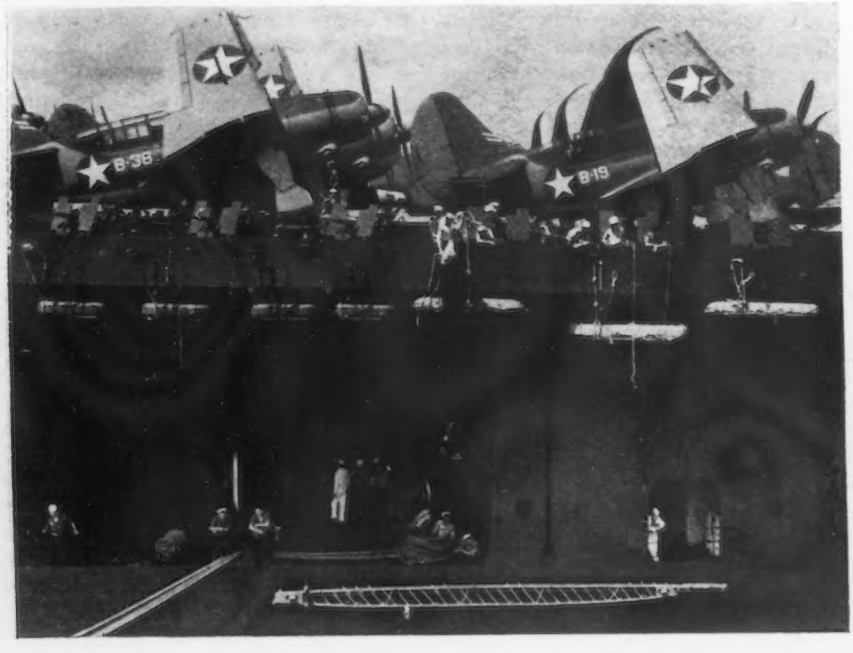
The development of an hydro-electric power system at Aswan would also permit the construction of chemical fertilizer plants, a product that Egypt imports to the extent of 2,000,000 lb. per year.

The need and plausibility of such a project is compared to some extent with the steel industry in India. However, it is acknowledged that Indian ore, running as high as 60 per cent Fe, and fine coal deposits make India a much more natural country for such industrial development. It is pointed out that all these natural resources in India have not contributed to the development of steel manufacture nearly as much as the steel requirements of India.

If the world goes back to a free trade and free competition economy, it is recommended that the Aswan project be undertaken either by the State or by a company with granted tariff protection to insure success. Egyptian needs in finished steel production total about 200,000 tons annually, consisting mainly of structurals, bars, angles, rail, and sheet. This represents about 0.1 per cent of world finished steel production, it is estimated. Even with complete electrification of ore reducing equipment, however, such a project still would be dependent upon coal or coke imports, since about 700 to 900 lb. are necessary per ton of pig iron produced.

On the development of such a project also hinges the establishment in Egypt of several allied industries, at present non-existent in the country. These would include manufacturers of machinery, boilers, tools, railroad cars, electrical apparatus, hardware products, etc. At present Egypt not only lacks a machine industry, but does not even posses a factory for the production of quite primitive agricultural implements such as ploughs.

HELLDIVERS: *These Curtiss-Wright Helldivers are stowed on board going into a theater of action. They form a "canopy" over the liferafts that can be seen secured to the side of a Navy aircraft carrier. Gun stations may be observed just over the life rafts.*



Almost Eight Billion Spent In February for War Purposes

• • • **United States** expenditures for war purposes hit a new high in February, $7,808,000,000 as compared with $7,416,000,000 in January, an increase of 5.3 per cent. The previous high was in November, 1943. The average daily rate for war expenditures in February amounted to $312,300,000.

From July 1, 1940, through February 29, 1944, the government expended $168,600,000,000 for war purposes. War expenditures for the fiscal year 1944 now amount to $58,600,000,000, as compared with $45,600,000,000 expended through February during fiscal year 1943.

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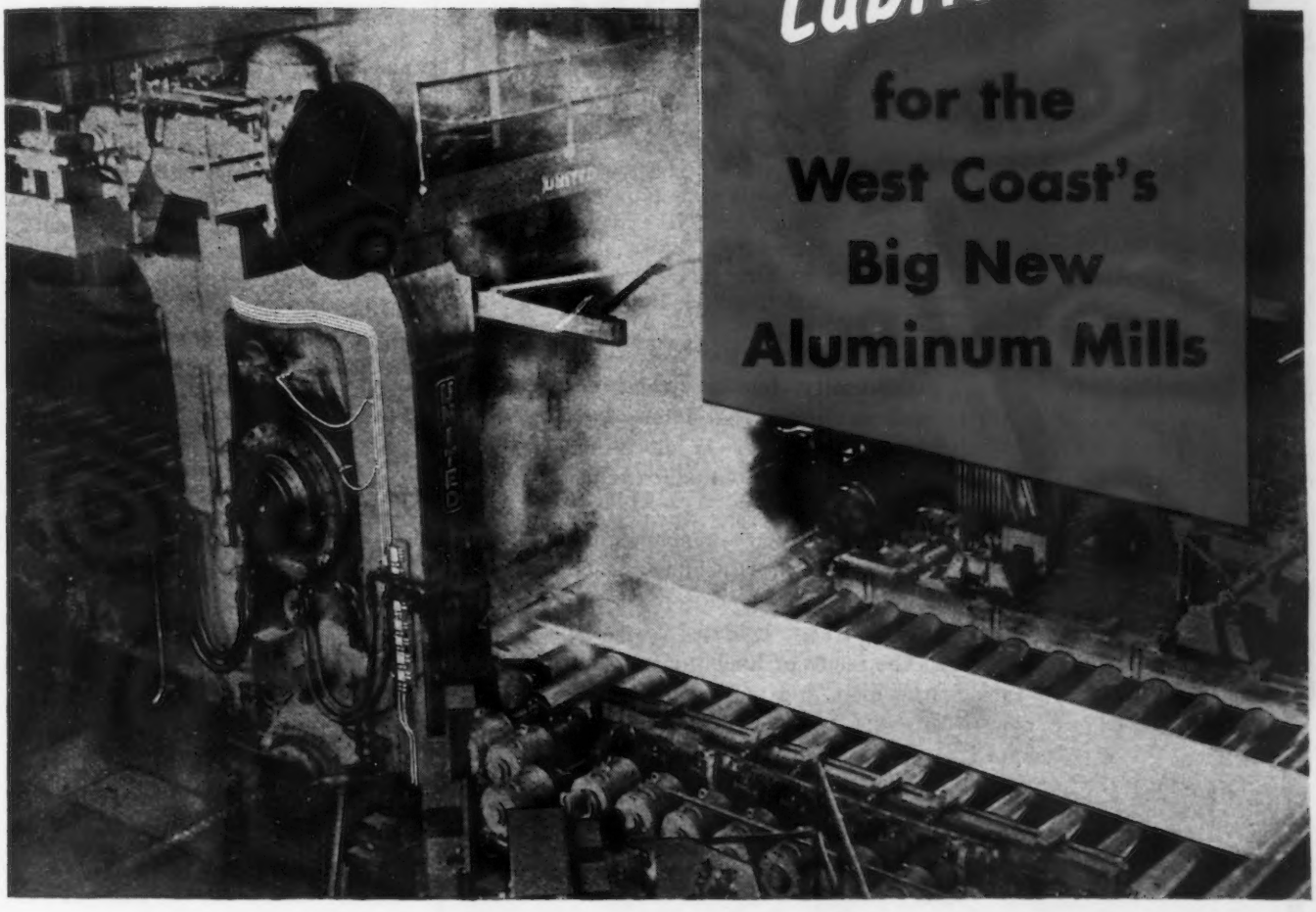

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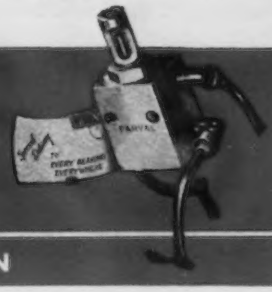
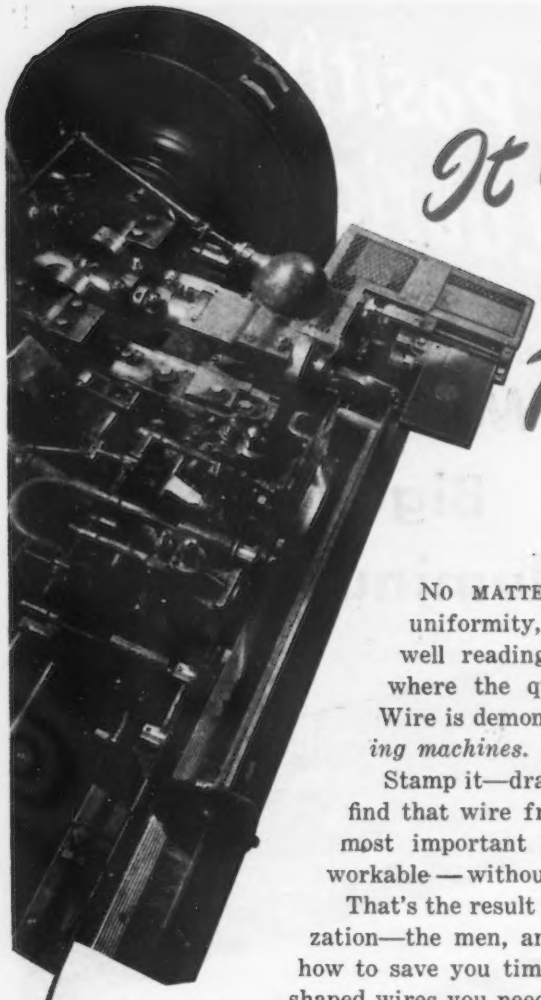


CENTRALIZED SYSTEMS OF LUBRICATION



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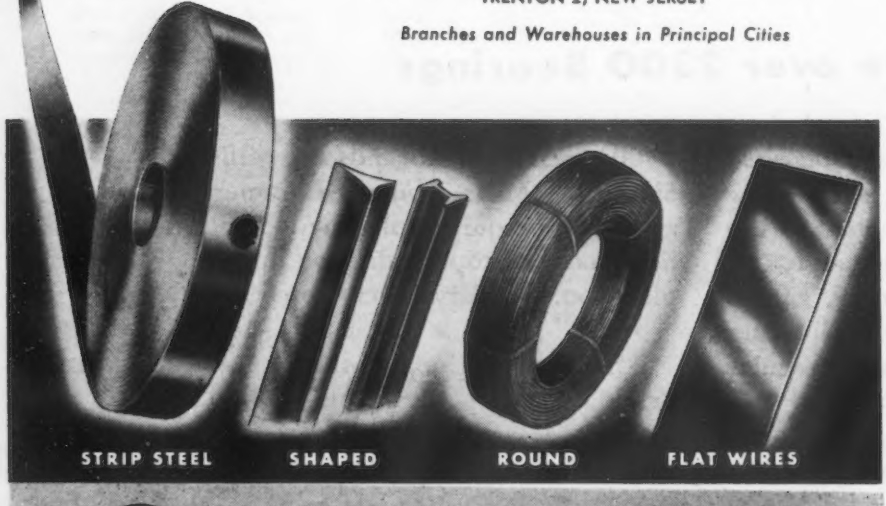

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Pilot Foundry Heads Post War Planning

Mahwah, N. J.

• • • **The American Brake** Shoe Co. opened its new Experimental Foundry at Mahwah, N. J. This pilot plant, instead of operating on a miniature basis, is a full-sized foundry capable of handling castings up to 2000 lb. gross weight. But only experimental work will be done in the foundry.

This plant had been planned as a further step in the company's extensive program of metallurgical research, but the priority situation on construction materials had postponed erection. Then it was learned that the U. S. Army Air Forces, Wright Field, were concerned with the procurement of forgings for aircraft needs and were considering the possibility of substituting centrifugal and static castings to ease the situation.

Since such castings required considerable piloting before they could be ready for production, Wright Field engineers approached Brake Shoe in the matter and arranged for the Army Air Forces to sponsor a priority application for the foundry. The construction was promptly authorized by the WPB and a Correlation Research Project was assigned the company by the War Metallurgy Committee of the National Research Council.

To save time and conserve new steel for direct war purposes, it was decided to buy an idle plant at Kansas City, Kansas, which was dismantled and 250 tons of structural steel and sash were shipped to New Jersey.

Everything in the way of modern foundry equipment and standard safety devices have been included.

This experimental foundry will be directly and indirectly in the service of the government for the remainder of the war. Its immediate work will be devoted to: 1—Development of pilot centrifugal and static castings practices for the aircraft industry. 2—Experimental work assigned by the War Metallurgy Committee. 3—Research projects that have a bearing on the war for the eight operating divisions of the company.

After the war the principal activity of the foundry will be experimental and research work for the company. Much of it will consist of investigation of new processes or products of interest to any of the company's hot metal divisions. A great deal of it will be to seek improvement of present

There are many GOOD THINGS AHEAD . . .

One proposed use for obsolete war planes is for the quick freezing of foods. Cargoes of freshly picked fruits and vegetables may be flown directly from the fields to high altitudes. There the compartments will be opened and the contents immediately frozen by the intense cold.

More than 2,000 varieties of plants have been tested for rubber during the last year.

A resin bonded panel of plywood, with a sprayed coating of steel, has eight times the strength of either material alone.

Electronic hearing devices are now so sensitive that the growing noises of a blade of grass may be heard.

One use suggested for the Helicopter is to carry girders and beams to high buildings or bridges and hold them in place while they are being fastened. This would make derricks, elevators and cranes unnecessary for this purpose.

Magnets are being used by draftsmen to hold drawings in place on steel-cored drafting boards.

Three stages of post-war development in railway locomotives are predicted. First, the high-efficiency turbine, using super-heated steam at 600 to 700 degrees. Second, the oil-burning internal combustion turbine. Third, the same type of turbine with a gas-producer using coal.

A small hand tool now "spot-welds" thermoplastic resins electronically.

So rapid are changes in technology that, for purposes of government bookkeeping, synthetic rubber plants are assumed to become obsolete in five years.

Transparent plastic, reinforced with glass fibers, is being used in aircraft construction. The material is said to have ten times the impact strength of ordinary plastics.

For twenty years people have been laughing scornfully at the "seadromes", 65,000 ton, 10 million dollar islands for transatlantic passenger planes. Now that seemingly fantastic project is being seriously considered by several large steel, shipbuilding and air transportation companies. Supported on floats 160 feet below water and extending 70 feet above the surface, the seadromes are unaffected by waves and would furnish a safe, level landing and refueling place as well as luxurious hotel accommodations.

Steel alloys, whose exact compositions are unknown, can now be quickly identified by the use of a small radio-like apparatus.

The most powerful electric motor in the world has recently been completed. It develops 7,000 horsepower at a speed of 25 r.p.m.

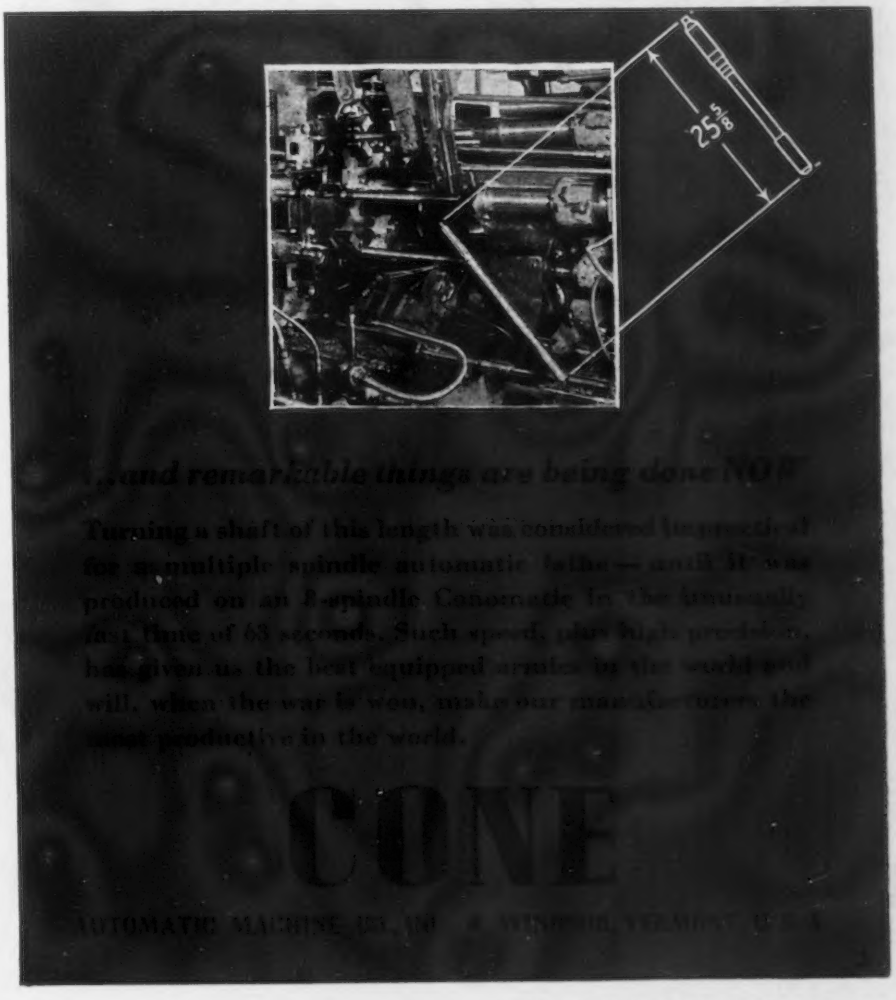
Seventy-two refineries are now making 100 octane gasoline, the production of which has increased 400% in the last year, and is expected to double again in the year ahead.

By the use of a new ultra-high frequency, resonator telephone engineers expect to send six-hundred thousand conversations or television pictures at one time through a six inch pipe.

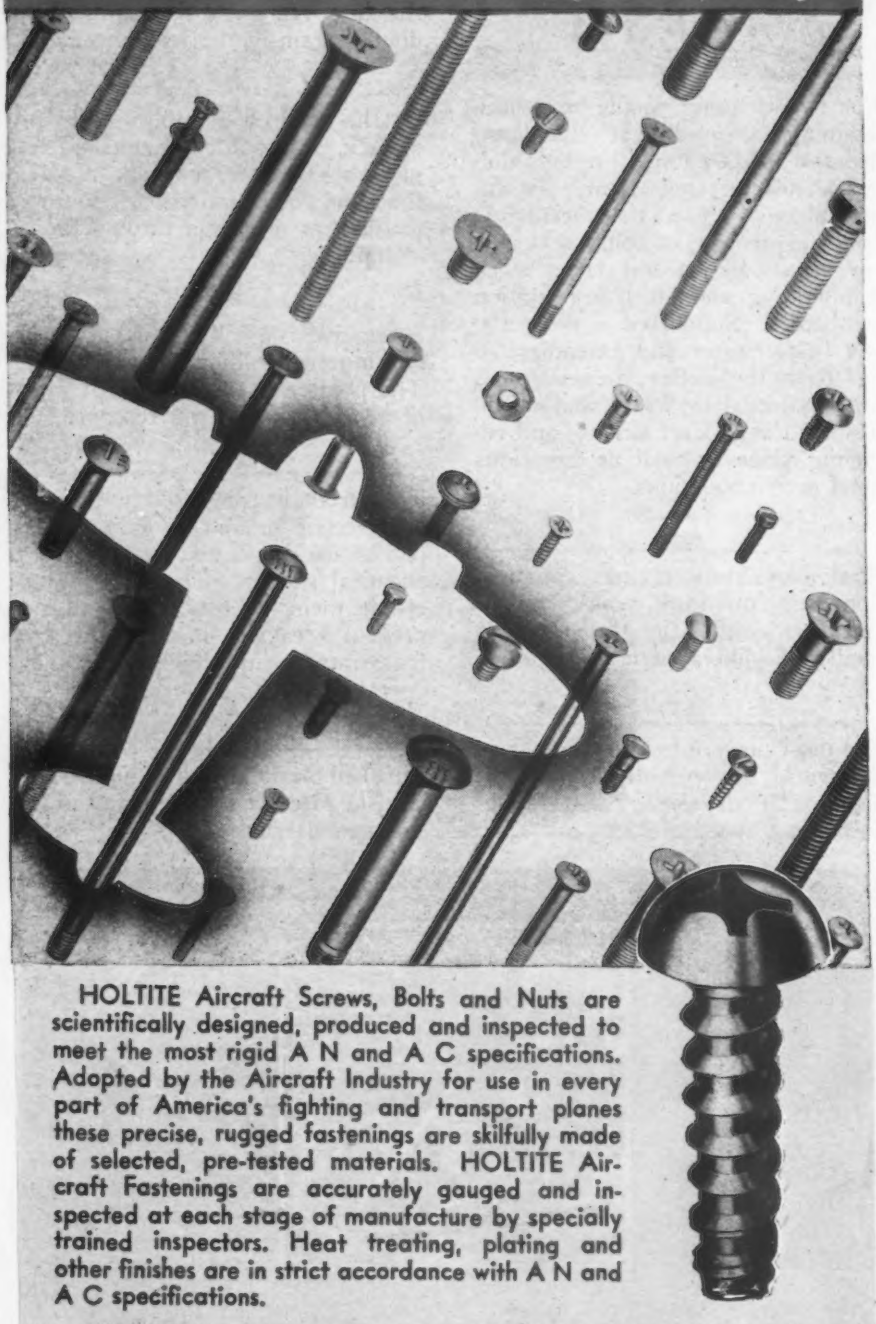
A new balance will weigh as little as two-hundred millionths of an ounce. The pointer is so tiny that it must be read through a microscope.

The carbon brushes used in the various electric motors of fighting airplanes are small, but vital. A new chemical process is reported to increase their life fifty times, and to prevent breaking down at the low temperatures in which they must operate at high altitudes.

Punched plastic sheets are now being used in place of cedar separators in storage batteries.



Precision AIRCRAFT fastenings



HOLTITE Aircraft Screws, Bolts and Nuts are scientifically designed, produced and inspected to meet the most rigid A N and A C specifications. Adopted by the Aircraft Industry for use in every part of America's fighting and transport planes these precise, rugged fastenings are skilfully made of selected, pre-tested materials. HOLTITE Aircraft Fastenings are accurately gauged and inspected at each stage of manufacture by specially trained inspectors. Heat treating, plating and other finishes are in strict accordance with A N and A C specifications.

HOLTITE "Thread-Forming" SHEET METAL SCREWS

When Speed Nuts are used with HOLTITE Sheet Metal Screws, the small, tapered point permits a quicker start and run-on of nut. The smooth threads with faster lead reduce nut-turning time and provide a much tighter lock to resist vibration.

Cutting their own threads—in metal or plastics as they are driven in, these production-boosting screws eliminate time-consuming tapping operations and effect a stronger, tighter fastening as each thread stays tight in the perfect mating thread it has cut in the material. Available with slotted head or HOLTITE Recessed Head.

CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.

BUY MORE WAR BONDS

products by changes in foundry practices, melting techniques, and rigging.

Personnel training will be a major role of the experimental foundry. It is planned to put apprentices through a short training period in the foundry and then release them as they may be needed to the operating divisions.

When it again becomes possible to employ professional engineers, a group of field metallurgists will be established to work in conjunction with the Experimental Foundry. These men will assist in developing new markets and new products for present markets, through a correlation of laboratory efforts with industrial needs. At all times the foundry is intended to be a changing, modern exhibit of good foundry practices.

Postwar Trade With China Studied by Council

• • • **Stressing** the mutual benefits to the United States and China of expanded postwar trade, Richard C. Patterson, Jr., president of the China-America Council of Commerce and Industry, recently announced in New York the development of a program based upon full cooperation and understanding.

Mr. Patterson, former assistant secretary of commerce, visualizes great possibilities for two-way and cooperative trade with China and points out that production to meet pent-up civilian needs throughout the world would greatly ease the employment problem in this country after the war.

The program, as outlined by Mr. Patterson, includes analyses of treaties, trade policies and the proposed International Monetary agreements; comparative studies of American and Chinese business laws and their effect on China-American trade; studies of commodity loans; development of Chinese natural resources and industries; postwar air and other shipping routes and the training of Chinese technicians in America. A detailed examination of China's Reconstruction Plan is also contemplated. He continued:

"With China now easing restrictions on foreign investments and evidencing a desire to build the strongest possible trade ties with the United States, the China-America Council is endeavoring to provide a solid basis for business and industry to work hand in hand with all concerned in the development of this world market.

PRECISION BOMBING

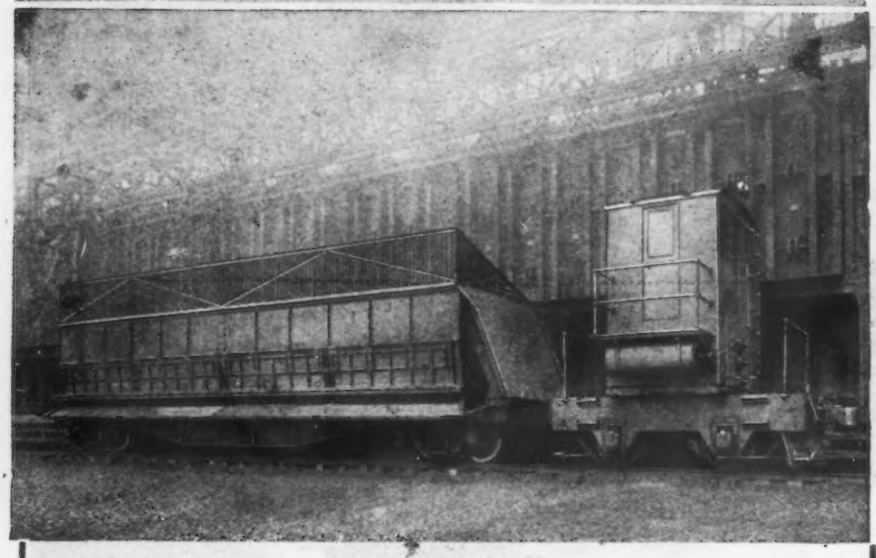
Precision must be the watchword of both the falling bombs and the sweetly purring engines to assure a successful mission. Just as the Norden bomb sight provides pin-point aiming when the bay doors swing open above a target, so Perfex gages impart that final touch of precision accuracy to the giant power plants. This kind of teamwork spells top flight performance all around. While serving war production needs, Perfex devoutly hopes soon to be filling postwar requirements.

★ Perfex manufactures thread plugs, thread rings, plain plugs, plain rings and special thread gages to blueprint. For complete information and prices wire or write our sales department today.

PERFEX GAGE & TOOL CO. 3602 Gaylord Detroit 12, Mich.

ACCURACY PERFEX OUR CREED

COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

Other ATLAS Products

Ore Transfer Cars

•

Scale Charging Cars

•

Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage

•

Turntables

The ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

Foundry Equipment and Furnace Orders Are Charted

• • • **The trend of orders for foundry equipment, which rose to $3,500,000 last October as a result, mainly, of the accelerated truck program, has continued at this higher level. Shipments have been running level with orders received so that the backlog, which is slightly in excess of two months' current production, has remained level or risen slightly during the last quarter of 1943, according to WPB.**

The level of unfilled orders for metal melting furnaces remained fairly stable throughout 1943. Due to the importance of foreign requirements in this field the trend of new orders fluctuates sharply. As of the end of December, 1943, the backlog of unfilled orders represented approximately ten months' production.

Foundry equipment includes annealing ovens (malleable castings); blast cleaning equipment, sand or metal abrasive; briquetting equipment for iron and steel borings and turnings; core-making and core-crushing machines; cupolas; dust collecting equipment; ladles, for transporting and pouring iron, steel, and nonferrous metals; molding machines; conveyors; mold, and molding sand; ovens, core and mold sand reclaiming equipment; sand handling and sand preparation equipment; shakeout equipment; steel shot and grit for blasting; tumblast and rotoblast equipment; tumbling barrels and mills for cleaning castings. These data are based on the reports of approximately 90 companies and represent approximately 95 per cent of the industry. Repairs and replacements were approximately 15 per cent of shipments in the case of electric metal melting furnaces and slightly over 24.5 per cent in the case of foundry equipment on the basis of reports for the year 1943.

Monthly Shipments and New and Unfilled Orders, 1943

ELECTRIC MELTING FURNACES

(000 Dollars)

	Shipments	Orders Received	Unfilled Orders
January	1,092	532	7,093
February	1,050	504	6,518
March	899	1,680	7,421
April	748	415	7,091
May	1,370	606	6,384
June	1,021	199	5,830
July	831	1,656	6,744
August	1,122	831	6,594
September	1,470	1,485	6,741
October	822	379	6,363
November	387	1,041	6,975
December	682	647	7,037
Total	10,345	9,975	

FOUNDRY EQUIPMENT AND SUPPLIES

	Shipments	Orders Received	Unfilled Orders
January	4,949	2,788	18,759
February	4,953	2,551	16,535
March	5,863	2,913	14,899
April	5,365	2,676	12,904
May	4,718	1,774	10,513
June	4,825	2,319	9,017
July	4,017	2,405	8,345
August	3,513	1,989	7,429
September	3,881	2,070	6,930
October	3,792	3,401	7,092
November	3,563	3,422	7,076
December	3,217	3,786	7,731
Total	53,806	32,094	

YOUR COPY OF THIS BOOK IS OFF THE PRESS . . . SEND FOR IT TODAY!

● Do you use radius forming diamond tools in your shop? If so, you'll want a copy of this new book—just off the press. It illustrates and describes the complete line of radius forming diamond tools designed and manufactured by Wheel Trueing Tool Company . . . the most complete line on the market today. And it explains why these tools that are engineered to the job produce such accurate work, give such dependable performance, speed production and provide such money-saving economy. It is a book you should read . . . and will want to keep for future reference.

We have a copy of this new book waiting for your request. Write today.

WHEEL TRUEING TOOL COMPANY

3200 W. Davison Ave. Detroit 6, Michigan

Alvey-Ferguson Conveyors Will Help This Stoker Plant Produce 20 Postwar Stokers Per Hour!

YOU KNOW that you must make your postwar products more economically.

You know that efficient conveyorized mass production lowers production costs.

Isn't it wise, then, to write us for a discussion of your indoor transportation problems *before* final plans are made to re-convert *your* plant to postwar production?

Perhaps we can help *you*—as we helped *this* well-known manufacturer of stokers.

The A-F Conveyor System shown above was designed to handle 20 units per hour. Sub-assembly work is handled on the roller conveyors. The A-F Trolley Conveyor acts not only as a carrying medium through dipping, painting and spraying operations, but conveys parts from storage, through machining, fabricating and finishing to storage and assembly. In addition, it acts as a stock bank releasing floor space for other purposes and eliminates wide trucking aisles.

Everything possible has been done in this plant—and will be done in yours—to make for more efficiency and lower costs. Write today.

ARMY NAVY E

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710 Disney St. CINCINNATI 9, OHIO
Affiliated Corporation:
The Alvey-Ferguson Co. of California
P. O. Box 396, Vernon Branch, Los Angeles 11, Cal.

CONVEYING EQUIPMENT
A-F CONVEYING MACHINERY
Alvey-Ferguson
METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

Reports of Firms' Ordnance Feats Are Sought for History

• • • **Permanent** recognition for the war role being played by individual Ordnance producing firms can be obtained if the companies will prepare a report of their achievements.

The Historical Section of the Ordnance Department is anxious to receive narrative accounts from the individual companies, to be used in connection with the writing of a complete history of industry-Ordnance efforts in this war. It is expected that the history will be published in permanent form, in a number of volumes. Thus, valuable information for future industrial preparedness will be preserved.

Ordnance producers are requested to submit to 705 Mills Building, Washington 6, a narrative account of production activities for the Ordnance Department in World War II, dating from the commencement of such activities and covering the period from that date to Dec. 31, 1943. Thereafter, supplementary accounts covering 90-day periods, the first of these for the months of January, February, and March, 1944, are desirable within 30 days after the close of each such period until the completion of the company's final U. S. Ordnance contract for the present war.

Primary factors which might well receive treatment in each of the accounts prepared include: Speed of conversion; quality and quantity of production; overcoming production obstacles; unusual contributions to development and improvement of ordnance material; avoidance of work stoppages; maintenance of fair labor standards; records on accidents, health, and sanitation; relations with the Ordnance District Office. To these, a final topic might well be added, namely, research and development.

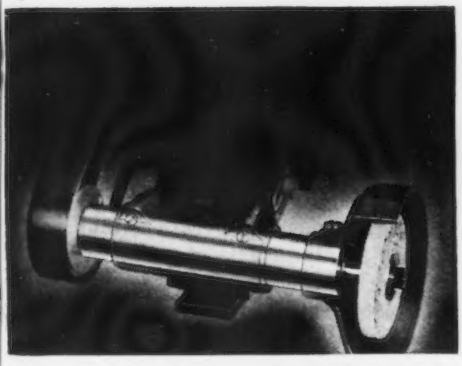
Pratt & Whitney Issues Book Depicting 1943 Events

• • • **Events of** 1943 at Pratt & Whitney, West Hartford, Conn., have been recorded by the company for its employees in a 32-page "year book" which is profusely illustrated.

After a foreword by C. W. Deeds, president and general manager, and C. R. Burt, chairman, the book depicts manufacturing activities and then covers employee activities at length. Two pages are devoted to a list of employees in the armed forces.

NOT A TIME BOMB

BUT A PACKAGE OF PRECISION



WHICH WILL EXPLODE MANY OLD NOTIONS OF PRODUCTION COSTS

Do you think high tooling costs must inevitably accompany volume production of precision parts? *This is not always true today* — as experience has proven in the numerous war plants which have discovered the "Production-with-Precision" potentialities of this sleek, shining steel cylinder. It is the quill (essential heart) of the Dumore Precision Grinder, the tool which converts existing machine tool equipment of various sorts to production grinders of high precision . . . at remarkably low cost.

As war requirements change, or conversion to peace goods takes place, the adaptability of this high-precision tool to a wide range of applications will be a major factor in keeping overhead down —quality and volume *up*.

You will find the full story of the "Dumore System" interesting, helpful and stimulating. Get the facts, today. Ask your industrial distributor, or write direct to The Dumore Company, Department TC24, Tool Division, Racine, Wisconsin.

A PRECISION TOOL FOR PRECISION RESULTS

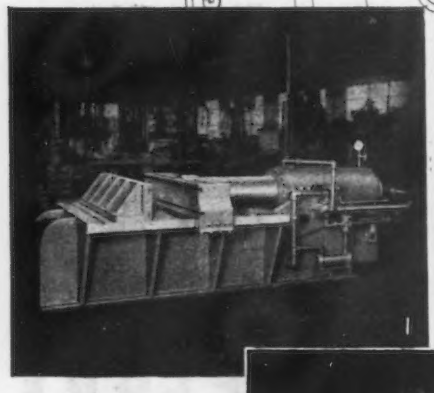
Typical of the Dumore manufacturing methods which "build-in" the engineered precision is the assembly of the quill in a special department, air-conditioned to maintain constant temperature and exclude dust. The vibrationless, high-speed operation (up to 42,500 r.p.m.) and the stamina to maintain precision through long periods of continuous operation, are achieved only by scientific design and painstaking workmanship. Details in complete Dumore catalog, full of helpful data on grinding. Yours for the asking. Send for it, NOW!

DUMORE

PRECISION AND OFF-HAND GRINDERS

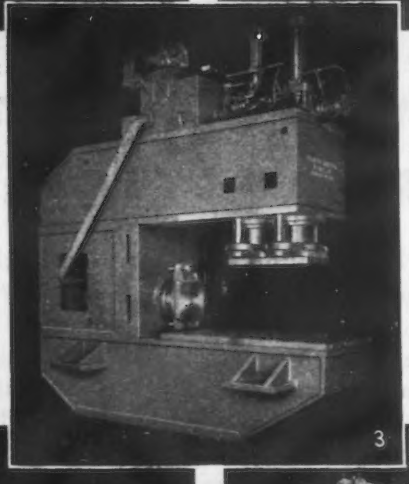
DUMORE GRINDERS ARE SOLD BY AUTHORIZED DISTRIBUTORS IN ALL PRINCIPAL CITIES

Metal Working Machines for WAR and PEACE

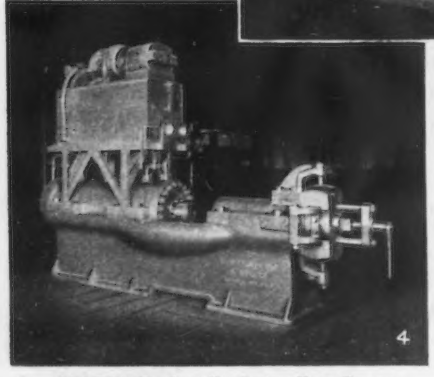


1. BEATTY Hydraulic Bulldozer. A rugged, modern design in capacities of 35-tons through 200-tons.

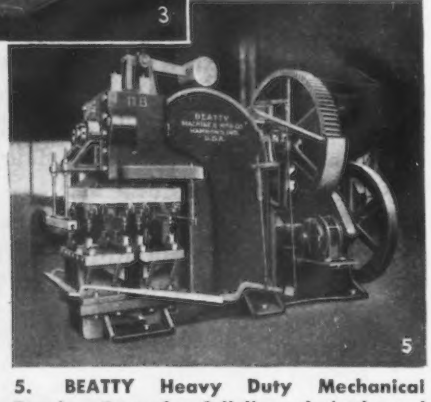
2. BEATTY Horizontal Hydraulic Bending Press. Fast, easily operated, in capacities from 35-tons through 200-tons.



3. BEATTY Hydraulic Forming & Flanging Press. Self-cooling oil circuit. Capacities of 200-tons and 400-tons.



4. BEATTY Hydraulic Extruding Press — for extruding metals or plastics. In three models, in capacities of 150-tons through 425-tons.



5. BEATTY Heavy Duty Mechanical Punch. One of a full line of single and double end punches — and spacing tables — for heavy metal working.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

Michigan Manpower Replacement Plan Mapped

Lansing, Mich.

• • • **Michigan Selective** Service headquarters announced recently a plan for calling war workers into the draft which, in effect, turns them over to the services as soon as cutbacks or contract completions cause their layoff.

The state's employers were "advised" to make immediate revision in their replacement schedules when contract cutbacks or cancellations reduce payrolls. The indication was that when no replacement schedules exist, the plant will be expected to release draft-eligible men first, regardless of any union seniority agreements that may exist.

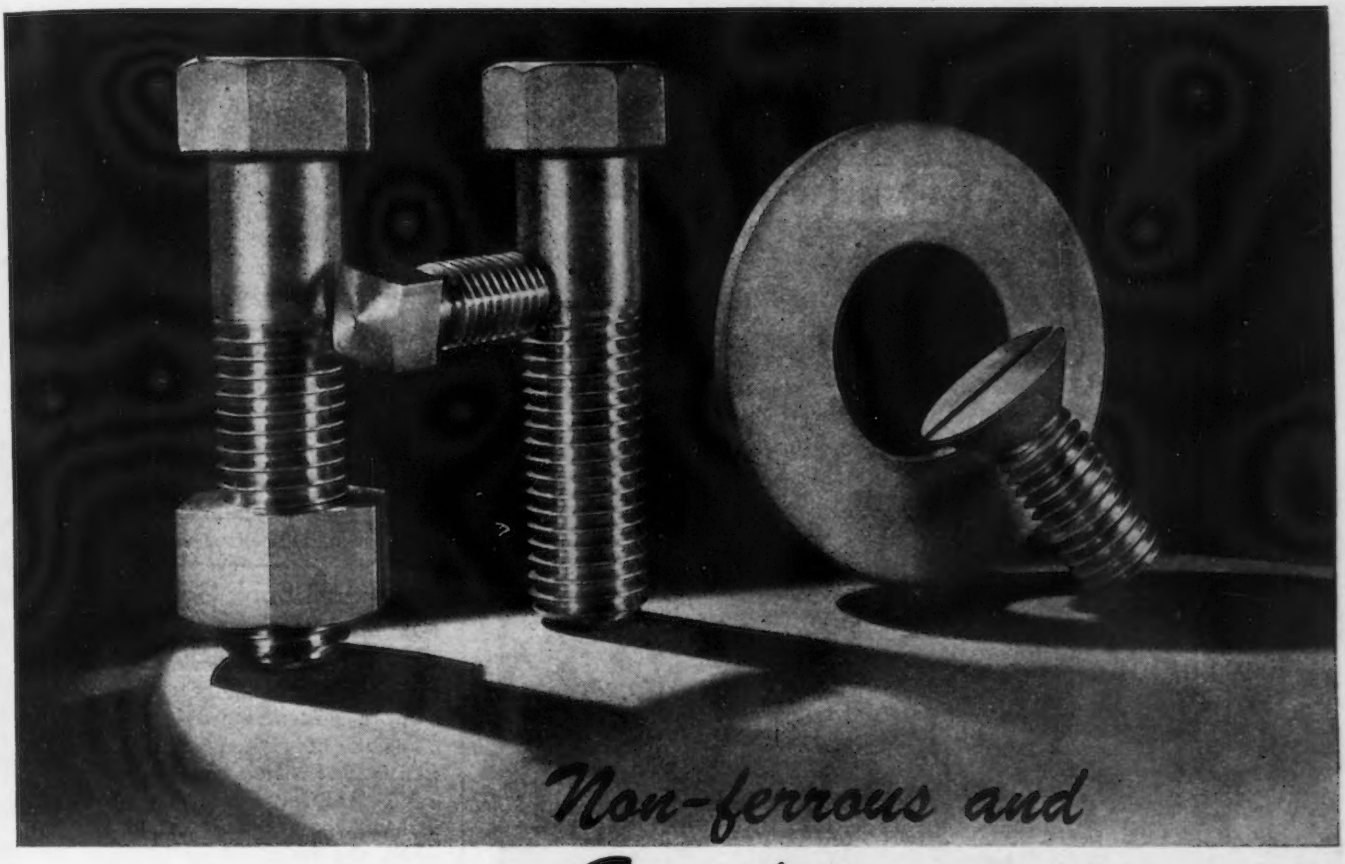
It was pointed out that where replacement schedules are filed, there is no conflict with union seniority rules. A plant could reduce its working force by several hundred men, for example, in accordance with its union seniority list, and then notify selective service of its need for that many fewer men. Draft calls would be made in deferment sequence, and as these reduced the number of men at work in the plant, the workers laid off under union seniority would be called back. In practical effect, of course, this would amount to handing the draft the most eligible men first, rather than make the plants targets of accusations that they held onto younger men and released workers above 38 during layoffs. An accusation of this sort was recently made by New York selective service officials.

100,000 Worker Recruit Plan Mapped for Railroad

Washington

• • • **A campaign to fill** 100,000 present and impending job vacancies on the railroads of the nation was announced by ODT. The manpower drive will be conducted by a newly established Railroad Manpower Mobilization Committee representing the united efforts of the government and railroad labor and management. It is composed of representatives of the WMC, ODT, Railroad Retirement Board, Association of American Railroads, the railroad labor organizations, and OWI.

Additional employes, both men and women, are needed in virtually all categories of railroad work. While no serious tie-ups have yet occurred in the transportation there has been



Stainless FASTENING

Headquarters

HEADQUARTERS is "a chief place of business." So . . . . . when you need non-ferrous and stainless fastenings, come to Harpers . . . the organization which specializes on the manufacture of bolts, nuts, screws, washers, rivets and specials made of Brass, Bronze, Copper, Everdur, Monel and Stainless . . . an organization not concerned with common steel fastenings.

To serve fastening users, Harper stocks over 4280 different items . . . employs a large staff of engineers and field service men . . . and offers a vast fund of practical non-ferrous and stainless fastening "Know how." Sample this "Know how" by writing (on your letterhead) for a 4-color, 84 page catalog.

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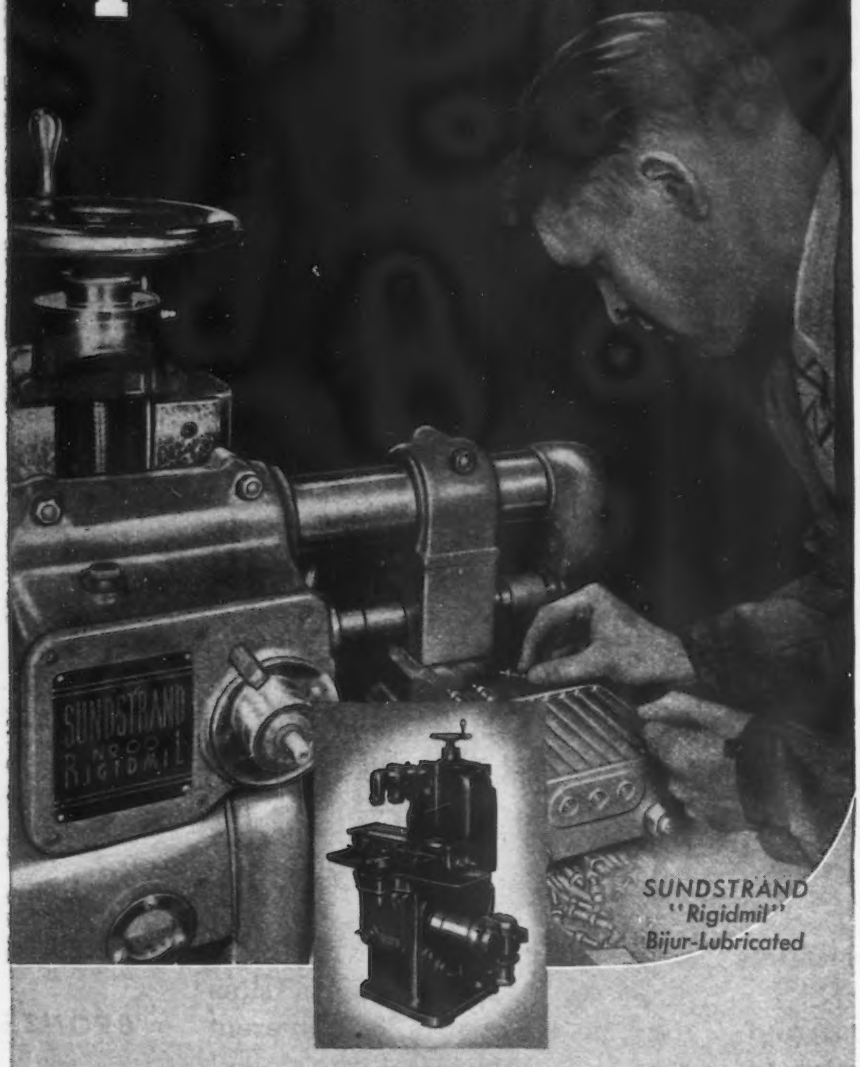
EVERLASTING FASTENINGS

ARMY E NAVY

HIGH SPEED protection . . .



■ With industry geared to a constantly increasing tempo, high production rates must be maintained over long periods of time. Long runs, multiple shifts, extended hours . . . these and other emergency conditions make efficient lubrication all the more essential. BIJUR automatic "metered" lubricating equipment is doing its part in assuring quality production at top speeds.

BIJUR LUBRICATING CORPORATION, LONG ISLAND CITY, N.Y.

BIJUR

AUTOMATIC *Metered* LUBRICATION

1728

some local congestion caused by lack of manpower, and unless offset by remedial action, such congestion is bound to become serious.

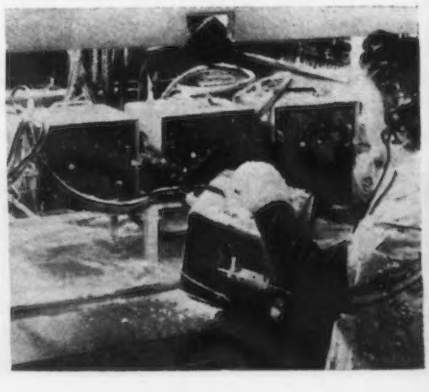
From the information assembled by the ODT, the major needs of the railroads throughout the country are for ten classifications of labor. These are: Shop workers, such as machinists and blacksmiths; track men; bridge and building mechanics; workers for freight houses, stores and roundhouses; brakemen for both yard and road services; locomotive firemen; clerks of all kinds; telegraphers, telephoners, and towermen; signal men and signal maintainers; and marine workers, licensed and unlicensed.

New Handbook Covering Mechanical Springs Out

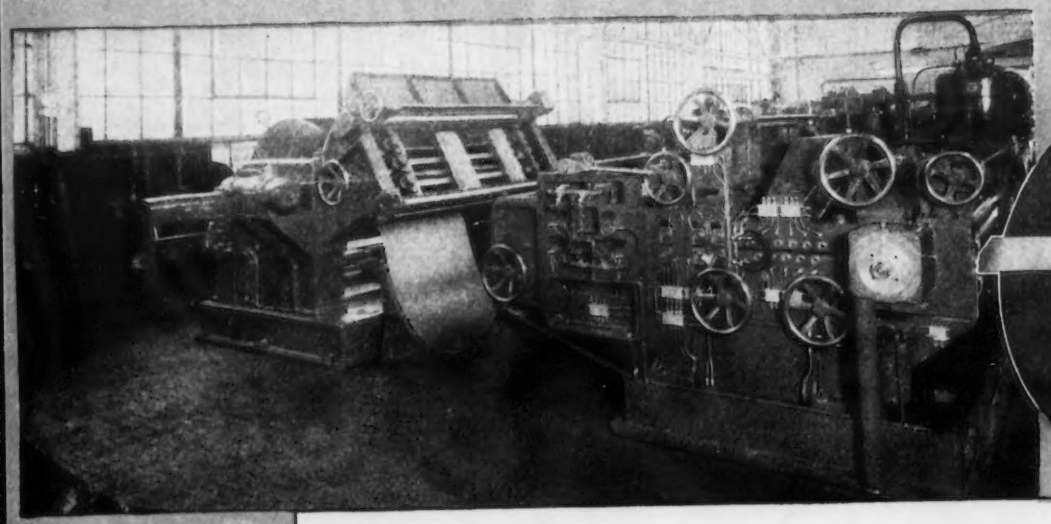
• • • **A new handbook,** "Mechanical Springs, Their Engineering and Design" has been issued jointly by the divisions of the Associated Spring Corp. It consists of around 110 pages and is profusely illustrated. Contents include charts and formulas upon which the design of all types of mechanical springs is based.

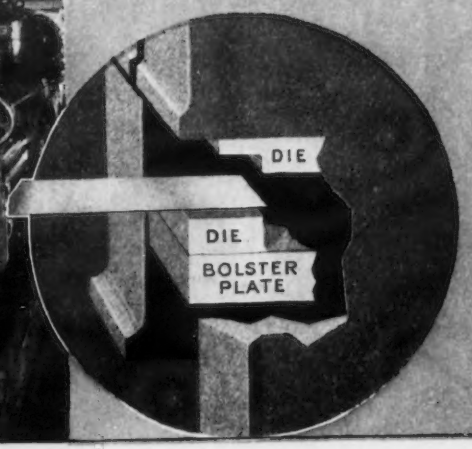
Copies may be obtained by qualified engineers and purchasing agents by writing the nearest of the divisions of the Corporation: Wallace Barnes Co., Bristol, Conn.; Barnes - Gibson - Raymond, 6400 Miller Ave., Detroit 11, and Cook plant, Ann Arbor, Mich.; F. N. Manross & Sons, Bristol, Conn.; William D. Gibson Co., 1800 Clybourn Ave., Chicago 14; Raymond Mfg. Co., Corry, Pa.; Dunbar Bros. Co., Bristol, Conn. In Canada the division is Wallace Barnes Co., Ltd., Hamilton, Ont.

SUB-ZERO TEST: *These radio instruments are being removed from a sub-zero testing chamber at the Radio Division of Bendix Aviation Corp. Such tests are incorporated in the routine inspection procedure for these aircraft radios to insure that they will function perfectly at the —65 deg. F. temperatures in which high altitude bombers operate.*



McKAY Announces a New

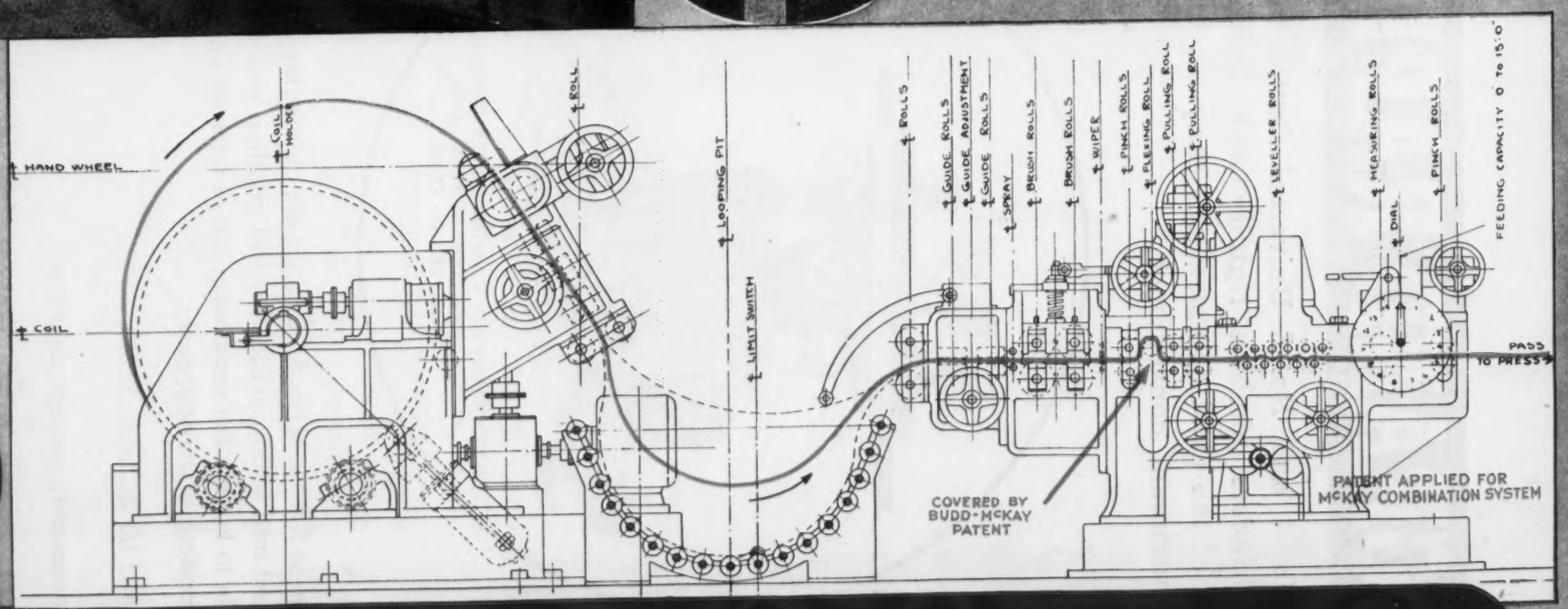




CONTINUOUS PROCESSING and PRESS FEEDING LINE FROM COILED STOCK for POST-WAR PRODUCTION

1. This Line Flattens the Strip
2. Feeds and Measures Stock to the Dies
3. Eliminates Stretcher Strain
4. Minimizes Die Drawing Difficulties

The schematic drawing illustrated below shows the flow of strip from coil to press



COMPLETE INFORMATION SENT UPON REQUEST

The McKAY MACHINE Company

ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT

ASSOCIATED COMPANY

The WEAN ENGINEERING CO., Inc. • WARREN, OHIO

GRAND RAPIDS

No. 4 and No. 5 Universal Cutter and Tool Grinders combine rigidity with flexibility so that the most complex jobs may be done with maximum convenience.

GRAND RAPIDS NO. 4 MOTOR DRIVEN UNIVERSAL CUTTER AND TOOL GRINDER WITH POWER FEED TO TABLE

These No. 4 and No. 5 machines are obtainable with power feed and with provision for wet grinding making it possible to handle the occasional job of internal or cylindrical grinding advantageously.

Send for Bulletin #1243.

Reasonably prompt delivery.

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

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Materials Handling And Presses Described In Enemy Patents

• • • **This is the nineteenth** list of seized enemy patents, available on license from the Alien Property Custodian. These patents are grouped in classes. Sub-class numbers are shown first in parentheses, followed by the patent number, description of the patent, the inventor's name and nationality, and the date of issuance.

This series began in the Nov. 4 issue of THE IRON AGE, page 95, at which time procedures for obtaining the patents for use were described with information concerning their usage and possibilities. Seized patent applications were shown in THE IRON AGE on July 8.

Class 214—Material or Article Handling

(1) 2,117,523. Automatic barrel-treating machine of the type in which barrels move through several stations where they are successively treated. W. Strohl, Germany. 5-17-38.

(1) 2,198,976. Apparatus for conveying cigars and fillers. C. Rober, Germany. 4-30-40.

(1.10) 2,222,745. Apparatus for emptying chocolate molds or the like wherein the molds are subjected to a cooling operation. M. Heidelmeyer, Germany. 11-26-40.

(2) 1,794,299. Material receptacle for automatic weighing machines. W. Kader, Germany. 2-24-31.

(8.50) 1,862,386. Apparatus for removing articles from a pile. J. Neff, Germany. 6-7-32.

(11) 1,810,442. Sheet cutting machine comprising a driving shaft and means for conducting the sheets to separate piles according to their quality. G. Spiess, Germany. 6-16-31.

(11) 1,957,260. Machine for separating maculate parts of sheet paper. A. Gayler, Germany. 5-1-34.

(12) 1,823,172. Method of and apparatus for unloading boats, barges, and like vessels. K. Schon, Germany. 9-15-31.

(15) 1,750,095. Hold for dredgers. F. Ewig, Germany. 3-11-30.

(16.10) 2,024,190. Automobile parking and storage machine. R. Sumi and N. Sasayama, Japan. 12-17-35.

(17) 1,692,610. Silo of the kind adapted for use with powdery and granulated materials. E. Barthelmess, Germany. 11-20-28.

(17) 1,866,124. Conveying apparatus, particularly for electroplating. J. Oertli, Germany. 7-5-32.

(17) 1,921,206. Apparatus for passing articles suspended from supporting devices through baths. J. Oertli, Germany. 8-8-33.

(17) 1,935,506. Loading centrifugal extractor. H. Krantz and H. Buysch, Germany. 11-14-33.

(18) 1,668,825. Discharge funnel for silos. E. Sobek, Austria. 5-8-28.

(18) 1,824,483. Apparatus for operating shaft furnaces in the thermal treatment of granular material. O. Hubmann, and F. Voerkel, Germany. 9-22-31.

(18) 1,835,225. Charging device for shaft furnaces. E. Knoringer and C. Wolski, Germany. 12-8-31.

(18) 1,943,634. Coke oven charging machine. C. Still, Germany. 1-16-34.

(18) 1,943,635. Coal charging truck. C. Still, Germany. 1-16-34.

(18) 2,015,451. Apparatus for charging furnaces. E. Gerlach, Germany. 9-24-35.

(18) 2,032,564. Device for charging gas generators and the like. T. de Fontaine, Germany. 3-3-36.

(18) 2,121,133. Furnace charging device. C. Still, Germany. 6-21-38.

(23) 1,674,007. Coke-pushing machine. E. Grasshoff, Germany. 6-19-28.

(23) 1,763,918. Apparatus for moving ingots or masses in furnaces. W. Bangert and M. Peters, Germany. 6-17-30.

(23) 1,979,419. Leveling bar for a coke oven. C. Still, Germany. 11-6-34.

(35) 1,607,623. Furnace-charging mechanism. H. Schaffert, Germany. 11-23-26.

(35) 1,670,203. Automatic charging hopper for receptacles especially for producers. R. Moller, Germany. 5-15-28.

(35) 2,148,465. Fuel-charging apparatus. J. Hein, Germany. 2-28-39.

(35) 2,151,514. Method of and apparatus for

FOOTWORK— ON THE OCEAN

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"FULL SPEED AHEAD . . . FULL SPEED ASTERN" . . . Now to port, now to starboard — a PC Boat must be able to *maneuver* faster than the submarine it's chasing.

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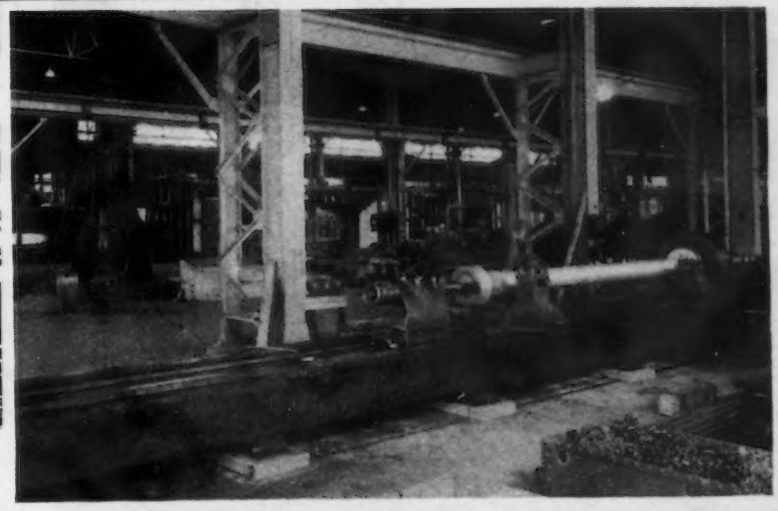

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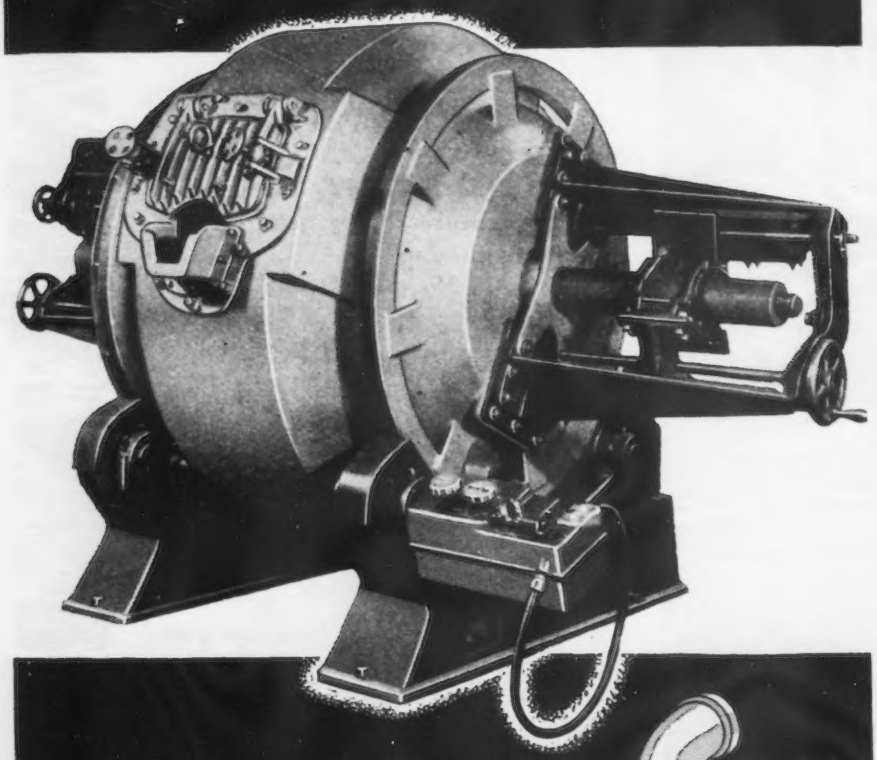

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Because of their high melting speed you can produce as many as eight ferrous heats or sixteen non-ferrous heats in one eight-hour shift. And you pour these heats with a minimum of dirt, fumes and hard work.

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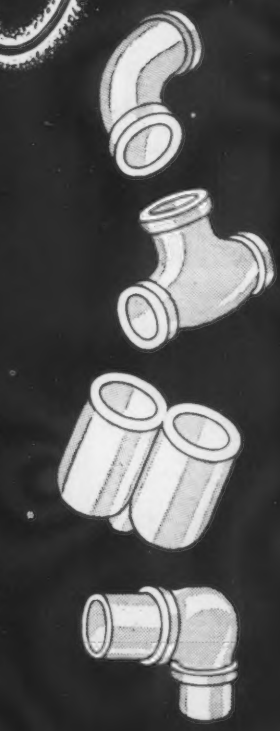

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

conveying material containing at least one expansible constituent. W. Heinen, Germany. 3-21-39.

(38) 1,741,374. Loading-plant especially designed for building-stones of any kind, such as lime stones or sand stones, bricks, clinkers and the like. W. Mortz, Germany. 12-31-29.

(65) 1,944,063. Loading device especially for trucks. F. Brauner, Austria. 1-16-34.

(67) 1,739,183. Truck for removing house refuse. P. Schuberth, Germany. 12-10-29.

(67) 1,753,135. Door for vehicles for removing house refuse. P. Schuberth, Germany. 4-1-30.

(67) 1,776,034. Dust cart adapted to prevent the escape of dust or refuse during the emptying of the dust bins or containers into it. H. Krahn, Germany. 9-16-30.

(67) 1,781,346. Dust cart for the conveyance of granular material. K. Schmidt, Germany. 11-11-30.

(67) 1,831,648. Process for the complete filling and emptying of receptacles such as dust-carts. J. Bauer and A. Umbach, Germany. 11-10-31.

(67) 1,863,964. Rubbish cart built in the form of a motor driven vehicle comprising a rubbish container with a rubbish propeller arranged in its interior. G. Brenner, Germany. 6-21-32.

(67) 1,963,288. Device for emptying refuse receptacles into refuse-collecting vehicle. O. Ballert, Germany. 6-19-34.

(67) 2,113,685. Refuse vehicle. M. Leopoldo, Italy. 4-12-38.

(67) 1,996,945. Self-loading vehicle. O. Ballert, Germany. 4-9-35.

(67) 2,252,608. Dust cart in which the refuse is dumped at the rear of the cart through a hopper and is pressed into the interior of the cart by means of a rudder-like wall member. O. Ballert, Germany. 8-12-41.

(89) 1,676,041. Unloading machine. S. Nagao, Japan. 7-3-28.

(95) 1,978,153. Cooling bank plant with several delivery channels. F. Zabel, Germany. 10-23-34.

(95) 2,187,100. Automatic control for switching cars on and off mine cages. K. Ruhl, Germany. 1-16-40.

(115) 1,722,125. Lifting machine such as a crane. J. Bernhard, Germany. 7-23-29.

(119) 1,851,074. Concrete conveying bucket. T. Wagener, Germany. 3-29-32.

(135) 1,940,616. Convertible implement for excavating. K. Wissmann, Germany. 12-19-33.

(138) 2,000,150. Instroke excavator. H. Siebert, Germany. 5-7-35.

(138) 2,191,569. Drag shovel. J. Kuhsel, Germany. 2-27-40.

(140) 2,055,111. Drag shovel excavator. H. Siebert, Germany. 9-22-36.

(146) 1,988,862. Control for excavators. K. Wissmann, Germany. 1-22-35.

(152) 1,686,167. Vehicle for receiving and transporting refuse and the like. H. Neuy, Germany. 10-2-28.

(1) 1,994,399. Device for the transportation of goods both on railways and on the road. G. Moreau, France. 3-12-35.

(3) 1,914,711. Load lifting and discharging apparatus. C. Carmillet, France. 6-20-33.

(5.5) 2,058,815. Apparatus for threading tobacco leaves upon a string for the purpose of drying said leaves. P. Muller, France. 10-27-36.

(8.5) 2,253,050. Apparatus for feeding compression molds for cigar fillers. C. Rober, Germany. 8-19-41.

(11) 1,760,058. Tar-separating apparatus. H. Hennebutte and E. Goutal, France. 5-27-30.

(11) 1,774,447. Sorting or distributing apparatus. J. Marchand and J. Andriessen, Netherlands. 8-26-30.

(11) 1,852,428. Container for distributing or sorting apparatus. J. Marchand and J. Andriessen, Netherlands. 4-5-32.

(11) 1,856,165. Apparatus for sorting and distributing mail matter. J. Marchand and J. Andriessen, Netherlands. 5-3-32.

(15) 1,868,035. Device for trimming coal and like material in ships. D. Valstar, Netherlands. 7-19-32.

(16.1) 2,028,476. Garage for automobiles and the like. J. Rome and K. Rubinstein, France. 1-21-36.

(16.1) 2,297,199. Device for receiving, conveying, or transporting bulky objects. H. Buddecke, Germany. 9-29-42.

(18) 1,668,968. Charging device for gas producers, shaft furnaces, and the like. J. Lambot, Belgium. 5-8-28.

(18) 1,788,289. Means for supplying fuel to furnaces. J. Gogelein and C. Schoonenberg, Java. 1-6-31.

(18) 1,887,292. Device for distributing the charge in an oven. A. de Saint Hubert, Belgium. 11-8-32.

(36) 2,141,506. Apparatus for charging furnaces. A. Bongarcon, France. 12-27-38.

(38) 1,879,203. Plant for loading and un-

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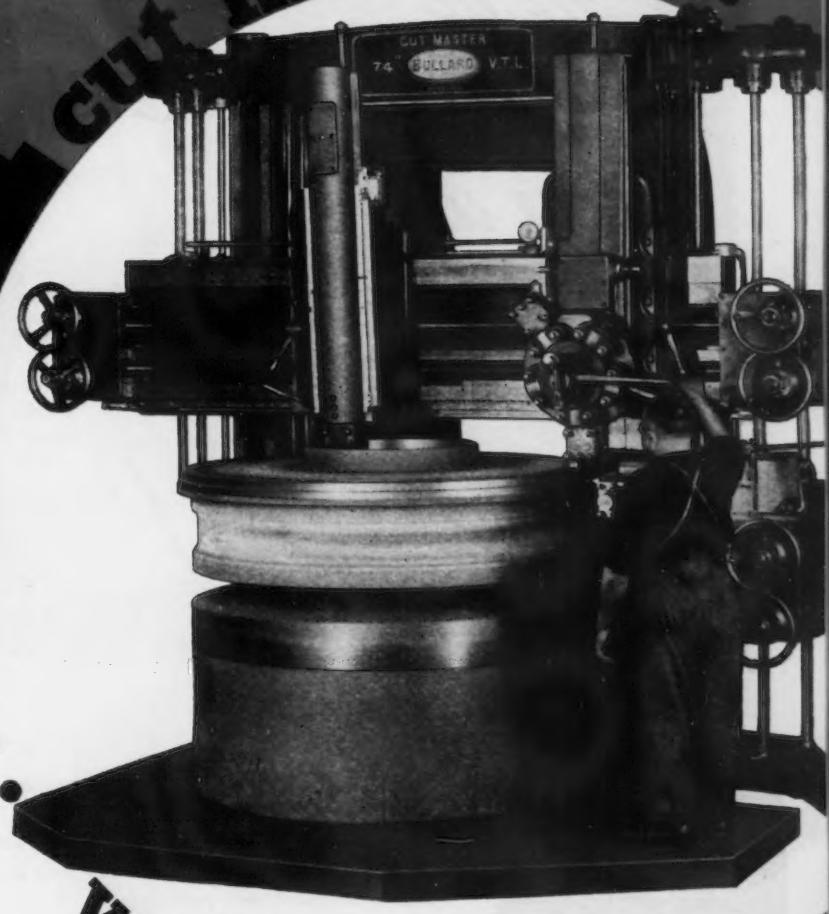

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loading wagons. P. Guilbert and J. Legrand, France. 9-27-32.

(38) **2,085,329.** Device for the loading and unloading of wheeled loads on railway cars. A. Porte, France. 6-29-37.

(41) **1,863,984.** Working and loading platform for gallery work in tunnels. C. Hoelfeldt-Lund, Norway. 6-21-32.

(41) **1,905,434.** Hopper crane of the movable and traveling type. F. Boyer, France. 4-25-33.

(44) **1,716,240.** Apparatus for the unloading of railroad cars and other vehicles. C. Postweiler, France. 6-4-29.

(47) **1,801,180.** Wagon-tipping apparatus. H. Tacvorian, France. 4-14-31.

(52) **1,763,545.** Discharging means for open railway wagons. G. Willimek and W. Kozietulski, Poland. 6-10-30.

(67) **2,050,806.** Loader for refuse vehicles. F. Rey, France. 8-11-36.

(67) **2,084,656.** Self-loading refuse vehicle. P. Rottee, France. 6-22-37.

(67) **2,091,519.** Refuse vehicle and the like. L. Noyer, France. 8-31-37.

(67) **2,130,951.** Loading apparatus for vehicles. C. Edwards, England, assignor to F. Rey, Seine et Oise, France.

(84) **1,868,568.** Movable platform for conveying goods chiefly in ship's holds. J. de Andia Yrarrazaval, France. 7-26-32.

(85) **2,305,762.** Apparatus for self-loading vehicles. U. Cristofoletti, L. Laboccetta and E. Persi, Italy. 12-22-42.

Class 100—Presses

(1) **1,669,657.** Machine for roping straw or other vegetable. R. Dunkel and A. Wilde, Germany. 5-15-28.

(41) **1,866,487.** Device for squeezing segmental fruit slices wherein the curved edge of one pressure plate is bent up to form a flange or rim which runs concentrically to the curved edge of the other pressure plate. F. Ritter, Jr., Germany. 7-5-32.

(41) **2,037,553.** Portable lemon slice squeezer for table use. S. Wagner, Germany. 4-14-36.

(44) **1,819,704.** Power press in which the advantages of mechanical and fluid operation are combined. A. Friz, Germany. 8-18-31.

(48) **1,769,658.** Press for the treatment of moist materials, for instance oil containing materials of the kind in which the material is continuously passed through a pressing chamber narrowed towards the discharge end, and the oil or other fluid expressed escapes through the walls of the pressing chamber. G. Veenhuyzen, Netherlands. 7-1-30.

(48) **1,840,263.** Press for moist material especially suitable for pressing oil-producing fruits and seeds. K. Sohler, Germany. 1-5-32.

(48) **2,165,134.** Process of preparing enamels, for instance on cast iron or wrought iron, having a high resistance to variation of temperature. K. Frank and F. Osterloh, Germany. 7-4-39.

(50) **1,637,671.** Oil press combined with a disintegrating means which has the form of a grid being inserted at the bottom in the mouth of the press space. H. Zander, Germany. 8-2-27.

(50) **1,660,160.** Means for removing compressed matter from containers. P. Hanel, Germany. 2-21-28.

(50) **1,661,614.** Apparatus for pressing out liquid matter from materials of any kind in double cage presses and is designed especially for the pressing of oleaginous materials. P. Kutschbach, Germany. 3-6-28.

(50) **1,672,659.** Straining press for extracting liquids from moist substances of various kinds and of the type having a press chamber of annular cross-section through which the material is passed. K. Sohler, Germany. 6-5-28.

(50) **1,736,262.** Hydraulic pot press for removing the oil from cocoa powder, etc. P. Hanel, Germany. 11-10-29.

(50) **2,213,815.** Horizontal press for the treatment of cellulose sheets with alkaline lye, in which in one and the same container the said sheets are soaked with the lye, the excess of lye is thereupon pressed out, and the treated sheets are discharged from the container for further treatment. F. Jaeger, Germany. 9-3-40.

(50) **2,229,900.** Combined filter and hydraulic press. H. Reitz, Germany. 1-28-41.

(50) **2,253,437.** Hydraulic pot press which serves for pressing cocoa butter from the liquid cocoa mass. K. Leimer, Germany. 8-19-41.

(54) **1,930,903.** Pressing box filter protection, especially pressing boxes of hydraulic cocoa press, in which the cocoa butter is pressed out of the cocoa mass by the application of high presses. M. Michel, Germany. 10-17-33.

(50) **2,306,477.** Filter apparatus combining an ordinary filter chamber with a hydraulic

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Women War Workers are taking their place in industrial war production in the nation's largest manufacturing plants, reducing considerably the shortage of men workers.

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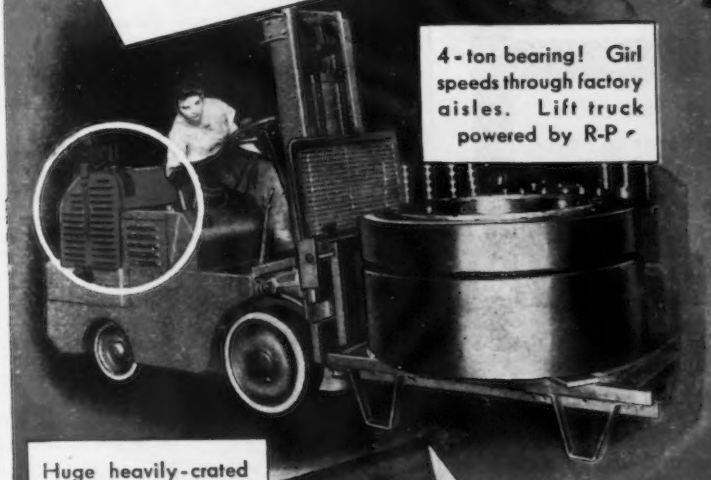

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3 Prevent rust on surfaces between operations while parts or work are being held prior to application of paint, lacquer, varnish, etc.

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press, the preliminary filtration, the subsequent hydraulic pressing and the emptying of residue from the filter chamber taking place entirely automatically. J. Hoffmann, Austria. 12-29-42.

(57) 1,987,318. Device for making up of sliced ham into rolls. F. Backenecker, Germany. 1-8-35.

(70) 2,164,245. Spindle-press or pressure exerting device of the type which includes an electric motor as a drive and wherein the driving element of the motor is preferably arranged at a permanent height with relation to the fly-wheel of the press. O. Kienzle, Germany. 6-27-39.

(71) 1,704,872. Hydaulic press for breaking metal blocks. O. Schlenstedt, Germany. 3-12-29.

(31) 2,198,440. Machine for tying a bundle of letters, books or like documents or for binding with a string one or more other objects. J. Marchand, Netherlands. 4-23-40.

(37) 2,027,657. Press for dehydrating colloid material, more particularly peat, wherein the two traveling members are pressed toward each other by one or more deformable supports subjected to the pressure of a plurality of resilient members distributed throughout their length. M. van Roggen and L. Robin, Belgium. 1-14-36.

(37) 2,052,909. Process of dehydrating colloid material. M. van Roggen and L. Robin, Belgium. 9-1-36.

(38) 2,084,229. Process for extracting juice from cut sugar beets and other gas-containing substances. D. van Maanen, Belgium. 6-15-37.

(47) 1,620,567. Apparatus for continuous extraction by pressure. P. Navarre, France. 3-8-27.

(47) 1,621,077. Three-roller sugar cane mill with a particularly arranged feed roller. A. Meesters, Dutch East Indies. 3-15-27.

(47) 2,313,996. Drum press comprising two drums which rotate in the same direction and are mounted within and eccentrically to each other. C. Hoolhorst, Netherlands. 3-16-43.

(47) 2,314,074. Turnplate for cane sugar mills consisting of a plurality of parallel ribs formed transversely of the top face of the plate, the front end of each of the said ribs

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being bevelled at the top and sides to form a tapering point terminating adjacent to the leading edge of the plate. N. Capay, P. I. 3-16-43.

(48) 1,630,430. Sieve plate for screw presses for removing water from aqueous substances, pulps, etc. K. Holter and O. Quiller, Norway. 5-31-27.

(48) 1,886,755. Screw press and the like which are used for pumping, conveying or conveying and concentrating viscous or doughy materials and the like. J. Strindlund, Norway. 11-8-32.

(48) 1,929,129. Continuous press for solid materials containing liquids comprising in combination with two rollers, usually large in diameter and rotating at a relatively slow speed, rollers in which the supporting shafts are stationary and an Archimedean screw press provided with a movable arresting disc. P. Villez, France. 10-3-33.

(48) 1,968,180. Screw press in which the material is displaced under pressure to a pressing chamber by the thread of the press screw. A. ten Bosch, Netherlands. 7-31-34.

(48) 2,104,197. Screw press adapted to press moisture and liquids out of animal and vegetable raw material and comprising an interiorily cylindrical perforate housing of uniform cross-section throughout and having an inlet or feed opening through which material may be fed into the housing. M. Johansen, Norway. 1-4-38.

(48) 2,119,162. Screw press comprising a press casing, two longitudinal screws so arranged rotatably side by side therein that their threads intermesh with each other. H. Hartner, Norway. 5-31-38.

(48) 2,246,045. Worm press adapted for the separation of viscous resinous substances from liquids of lower viscosity and consisting of a casing and a worm rotatably arranged therein, said casing being provided with feeding and discharge devices. G. Hirschberg, Germany. 6-17-41.

(48) 2,293,297. Squeezing device for plastic and semi-plastic masses and comprising a combination of rotating worms or spindles with broad threads and has elongated channels provided for the material to be squeezed. S. Kiesskalt, K. Winnacker and K. Erb, Germany. 8-18-42.

(50) 1,724,184. Automatic hydraulically operated press for the extraction of oils from seeds or fruit in which the admission and exhaust of the pressure on the different pistons, the insertion of the filtering fabric or fabrics, the ejection of the oil cake from the

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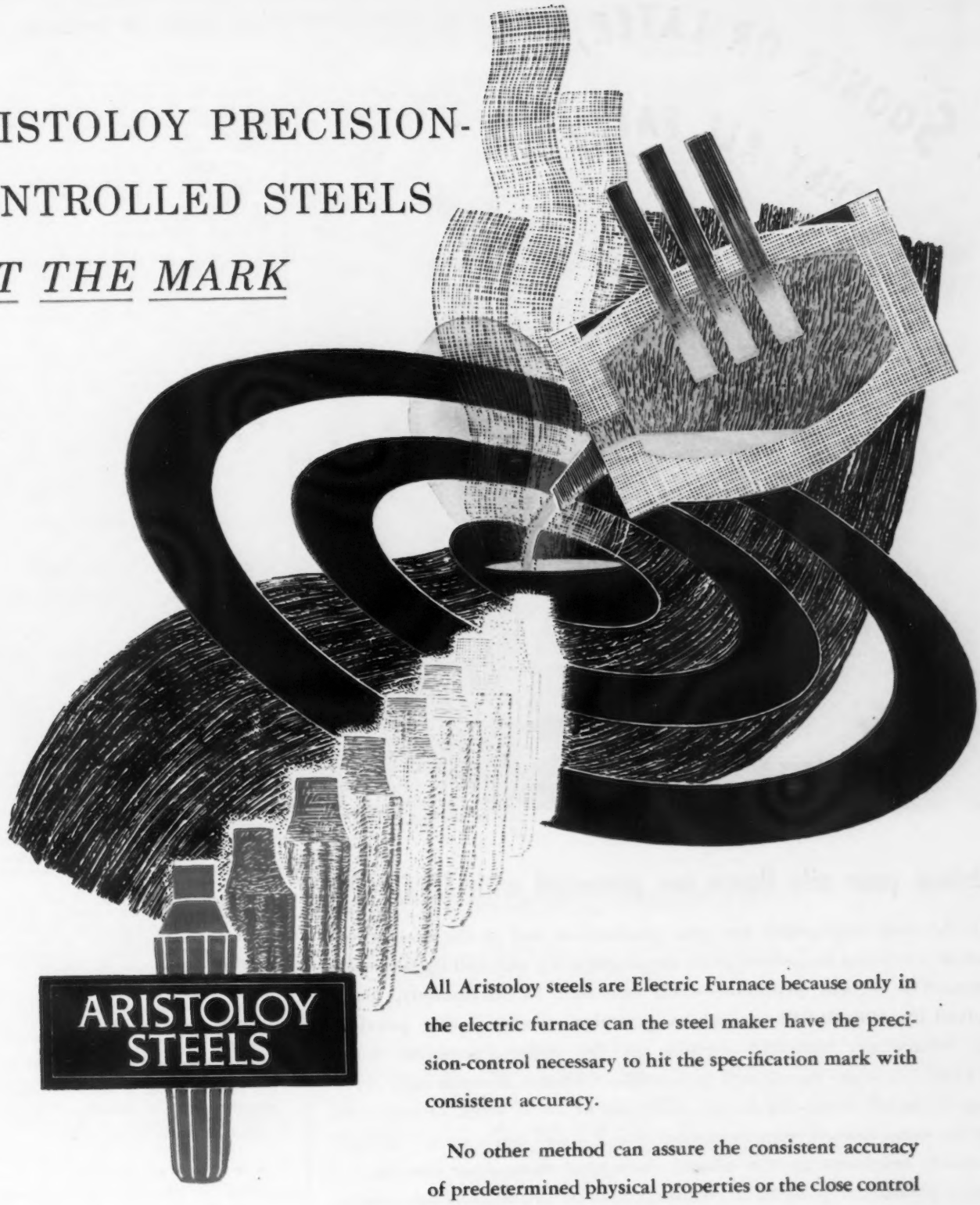

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West — Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

press and the setting of the press for a new cycle of operations are automatic. L. Deoune, France. 8-13-29.

(50) 1,926,504. Process for reducing the liquid contents of materials which have many capillary spaces. A. ten Bosch Njzn, Netherlands. 9-12-33.

(51) 1,871,575. Machine for molding pressing oil seed cakes or the like, in which the seed material is pressed, for example, by means of a pressure member, into a cake mold resting on a press table. A. Aarskog and K. Svendsen, Norway and P. Ebel, Germany. 8-16-32.

(52) 2,163,839. Conveyor device for conveying molded cakes wrapped in a cloth which is automatically stripped off during conveyance, the stripped cakes being conveyed to a device for trimming their edges. A. Honig, Netherlands. 6-27-39.

(54) 1,974,697. Filter for reducing the gas or the liquid contents or both of stances which may contain many capillary spaces, for instance, for the pressing out of water and gases from peat, brown coal, of oil from oil seeds, etc. A. ten Bosch, Njzn, Netherlands. 9-25-34.

(71) 2,197,441. Hydraulic press of great power in which the principal members are made, arranged and distributed in such a manner as to permit the maximum reduction of their dimensions. J. Perony, France. 4-16-40.

(To be continued)

Central Foundries Plant Among New DPC Awards

Washington

• • • **Defense Plant Corp.**, RFC subsidiary, has authorized the following contracts:

Publicker Commercial Alcohol Co., Philadelphia, to provide plant facilities in Philadelphia at a cost in excess of $4,000,000.

Central Foundries Co., New York, the construction and equipment of a plant in Anniston, Ala., at a cost in excess of $1,200,000.

Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., to provide plant facilities at Muskegon at a cost in excess of $1,400,000.

The S. K. Wellman Co., Cleveland, to provide equipment at a plant in Cleveland at a cost in excess of $125,000.

American Viscose Corp., Wilmington, Del., to provide equipment at a plant in Lewistown, Pa., at a cost in excess of $4,000,000; equipment at a plant in Marcus Hook, Pa., at a cost in excess of $750,000; and equipment at a plant in Parkersburg, W. Va., at a cost in excess of $2,250,000.

Revere Copper & Brass, Inc., New York, to provide additional facilities at a plant in Baltimore, at a cost in excess of $900,000, making a total commitment of more than $6,800,000.

Kinetic Chemicals, Inc., Wilmington, Del., to provide equipment for a plant in East Chicago, Ind., at a cost in excess of $900,000.

Mycalex Corp. of America, New York, to provide plant facilities in Quakertown, Pa., at a cost in excess of $600,000.

• • • **The War Department** has announced the following contract awards:

Milwaukee Ordnance Plant and Signal Battery Co., Milwaukee. For conversion and adaptation of some of the existing building and utilities of the Ordnance plant and the installation of manufacturing equipment for Signal. Estimated amount of contract is $450,000. Contract awarded to Klug & Smith Co., Milwaukee. Work will be supervised by the Milwaukee district office of the Corps of Engineers.

Copher Ordnance Works, Rosemount, Minn. Award of contract to Fegles Construction Co., Ltd., Minneapolis, for dismantling portions of the works. Estimated amount of contract is $858,000. Work will be supervised by Omaha district office of Corps of Engineers.

Victory Ordnance Plant, Decatur, Ill. Contract awarded to National Concrete Fireproofing Co., Cleveland, for construction of additional facilities, alterations, and expansion. Estimated amount of the contract is $626,491. Work will be supervised by Chicago district office of Corps of Engineers.

Grinding mills used to reduce ore to appropriate size for treatment

NICKEL AIDS THE MINING INDUSTRY

to KEEP 'EM PRODUCING!

Weapons for war get their start underground.

And it's modern mining machinery that speeds 'em on their first step to Berlin and Tokio.

Through research and development work in the pre-war years, manufacturers have pioneered many innovations that make today's mining equipment amazingly efficient.

And in this war emergency, the industry is making the most of that equipment... working it harder, longer, often beyond rated capacity... spurred on by the limitless demands of war.

One reason the equipment holds up so well... thanks to the foresight of design engineers... is that many of the critical parts are made of Nickel alloyed materials.

Nickel goes a long way to make those parts longer-lasting and more dependable... tougher, stronger, more resistant to corrosion.

Hence, the use of Nickel is now so widespread that Nickel Alloys fortify nearly all kinds of mining and milling equipment parts... from drill bits and crusher frames to skips and cages, from ball mill liners to mine car axles.

Throughout the years of research and planning behind this progress, it was our privilege to cooperate with the engineers who desired help in the selection, fabrication, and heat treatment of alloys. Whatever *your* industry may be... if you'd like to have such assistance... counsel and printed data are available on request.

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New Catalog C makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects—from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

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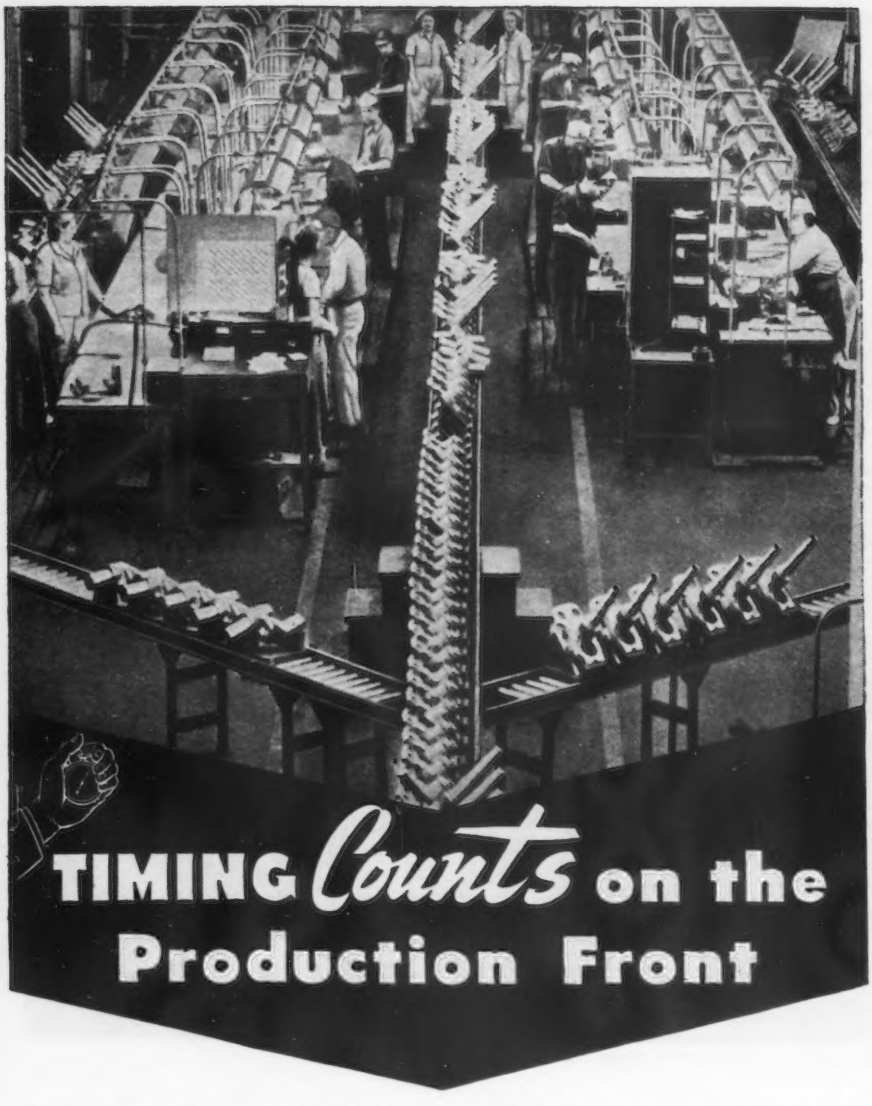

. . . controlling the flow of material saves man-hours and makes certain that delivery schedules will be met

On the playing fields of sport—and on the field of battle—success depends on *timing*, rhythm of motion. Timing is a vital element in production, too.

Having the right material at the right place at the right time—just enough of it and not too much — is a characteristic of efficient production.

Keeping production synchronized — timed — involves planning all along the line, to relieve congestion at one point, speed up movement at another, to the end that goods will be produced with precision and speed, and at an economical cost.

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★ ENGINEERED FOR FASTER PRODUCTION ★

Distress Bearing Stocks Utilized

Washington

• • • As a result of a shortage of ball bearings, distress stocks of these products have been used to meet requirements for electric motors for the naval landing craft program, members of the WPB Electric Motor Industry Advisory Committee have reported to WPB. Government officials present at the recent meeting advised the committee that a program is now under way to provide adequate supplies of these components for motor manufacturers.

Navy officials present at the meeting indicated to members of the committee that rapid changes in future programs were anticipated, and also that heavy demands would be made for spare equipment. The industry was advised to arrange production facilities so as to be able to handle these requirements without delay.

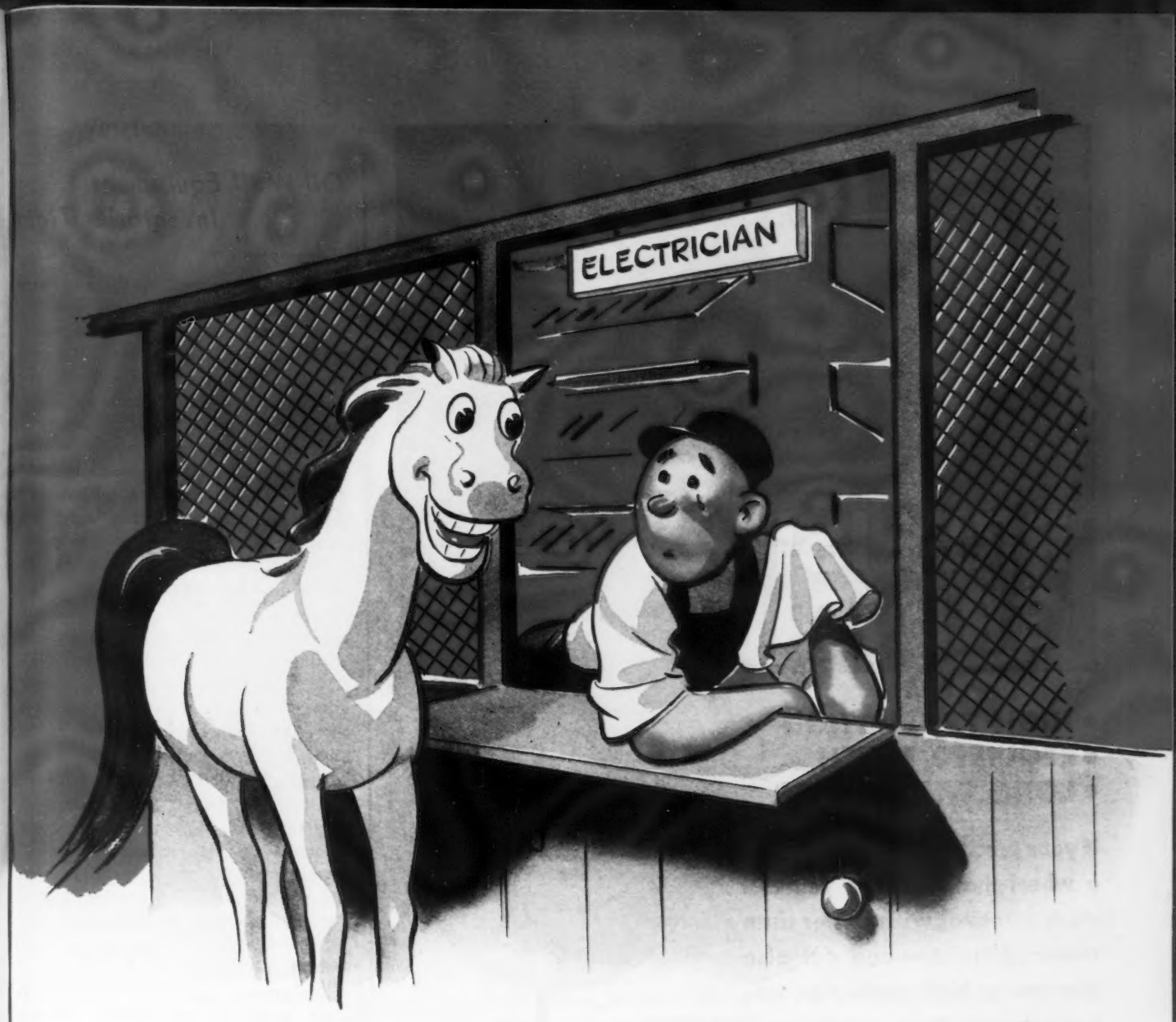
Manpower problems are becoming increasingly difficult, according to industry representatives, as key workers are absorbed by the draft. Skilled technical men, such as motor winders, electrical machinery fitters and supervisors, are being lost at a rate that threatens scheduled production of critical components such as naval DC motors, the representatives said. Industry members also reported that they are experiencing trouble in obtaining steel and malleable castings. WPB officials advised that headway is being made on easing both these problems.

OPA Puts New Price Limit On Wire Cable and Accessories

Washington

• • • OPA announced on March 13 that the maximum price for sales of wire cable, and cable accessories by wholesalers and jobbers to industrial, commercial, and governmental purchasers has been limited to 120 per cent of the manufacturer's net price to wholesalers in the same quantities. The limitation applies regardless of the number of sellers handling the product before it reaches the user.

This action, effective March 21, was taken to stop pyramiding of distributers mark-ups—a practice which, OPA said, has arisen in the industry since the war emergency. Formerly, it was possible for each seller to add to his price "average percentage margins over net invoice cost."



"Beefing" Won't Help! You need Horsepower by Howell

ELECTRICIAN: Boy, they're running me ragged. Motors coming in with no insulating varnish on 'em, and no phase insulation. Some of 'em out of balance. Doesn't take much to break those babies down.

HORSE: I know. That's why I want to tell you about Howell Motors.

ELECTRICIAN: Yeah! You better know what you're talkin' about.

HORSE: Every Howell Motor is thoroughly insulated. All our rotors are statically and dynamically balanced—they're precision-built, too.

ELECTRICIAN: Good! But do they stay that way?

HORSE: You bet they do! Good materials—copper rotors, high grade bronze or ball bearings—and careful workmanship insure long life. Ask the hundreds of Howell users in the automobile, ventilation and air conditioning industries, in dairies, grain elevators, shipyards, tank plants—they'll tell you . . . you can always depend on Howell Motors for longer, more dependable operation.

ELECTRICIAN: I know. I've used them. But we haven't got Howells here.

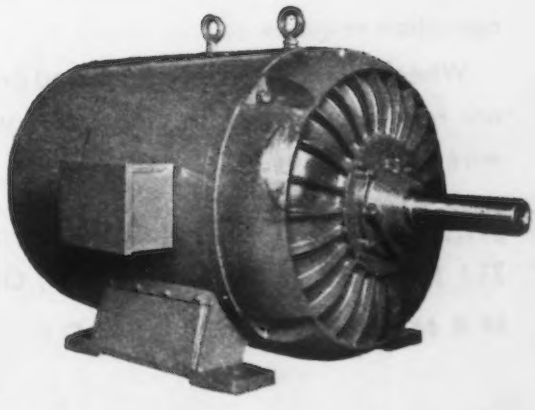
HORSE: Well, quit "beefing" and specify Horsepower by Howell for your next job.

For your specialized or standard motors, phone the nearest Howell representative today, or write the factory. Get the finest motors that money can buy at no premium in price.

HOWELL ELECTRIC MOTORS COMPANY

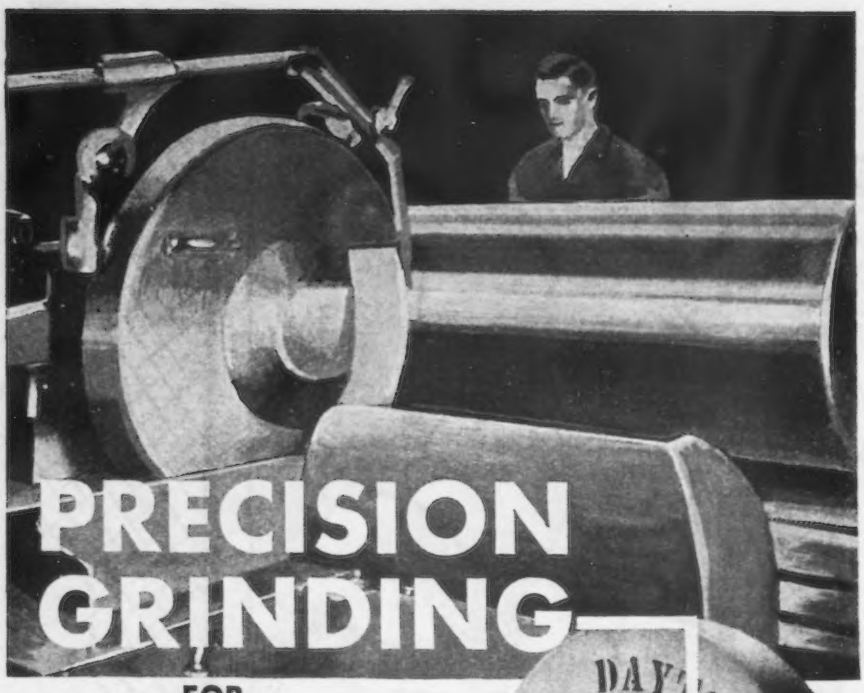
HOWELL, MICHIGAN

Manufacturers of Quality Motors Since 1915



Howell Totally Enclosed, Fan-Cooled Motor (shown above). Available through 125 H.P. . . . all working parts are protected against dust, fumes or moisture. . . . Fan cooling prevents undue temperature rise (motor overheating) . . . All steel, streamlined housing provides minimum weight and greater compactness of overall length . . . built to N.E.M.A. frame dimensions . . . special horizontal and vertical fan-cooled motors are available.

Also a wide range of other types of motors up to 150 H.P.



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- LONG WHEEL WEAR

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You'll find Dayton Grinding Wheels have what it takes—are engineered to fit your job and to do that job precisely as the operation requires.

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MANUFACTURERS OF
DAYTON GRINDING WHEELS

Oil Well Equipment Inventories Tight

Washington

• • • **Suppliers must** continue to carry heavy responsibility for the distribution of petroleum production equipment where it is most urgently needed, WPB and PAW officials emphasized at a recent Petroleum Equipment Suppliers Industry Advisory Committee meeting. Suppliers will be expected to maintain stocks to meet the needs of a greatly accelerated oil production program, they said, but items continue tight and no possibility of normal inventories can be realzied at this time.

Wire rope and internal combustion engines, both necessary for petroleum production, were described by WPB officials as being in extreme competition with direct military orders and therefore cannot be expected to be any more readily available at present.

Drill pipe and tool joints WPB said, are being produced at the limit of industry capacity and are going through a transition period from inadequate supply to a quantity large enough for actual operating needs. Ten million feet of drill pipe and 300,000 tool joints will be produced in 1944, WPB said.

Equipment suppliers were given much credit by government officials for their successful refereeing of operator demand with resulting favorable effect on petroleum production. Within the framework of wartime equipment shortages, petroleum production is well on its way to a wartime goal of 5,000,000 barrels a day, PAW officials said.

Scramble in Structural Market Seen by Ingalls

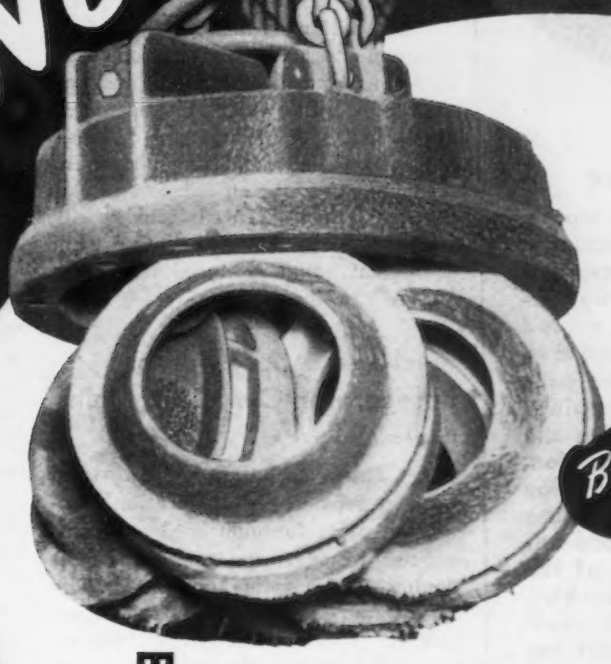
Atlanta, Ga.

• • • **A postwar** scramble for the structural steel market, bringing an era of "extremely competitive" prices in which "many of the weaker companies may fail," was forecast March 13 by R. I. Ingalls, chairman of the Ingalls Iron Works of Birmingham, Ala.

Mr. Ingalls said the structural steel industry expected a "certain amount of institutional building and a vast number of railroad and highway bridges" to be erected, but that there appeared to be no prospect of demands remotely approaching wartime schedules.

It's DINGS MAGNETS for LIFTING

YOU CAN DEPEND ON



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A complete line of High Intensity Circular and Rectangular lifting magnets, to meet every requirement, is offered to those with metal handling problems.

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FEATURES:

Coil Locked in Place — to prevent damage and short circuiting.

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Coil Waterproofed — impregnated under pressure.

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Large Structural Fins — impart added strength and radiate heat.

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Leads Fully Protected.

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Heavy Bottom Plate Stands Rough Handling.

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Special Steels and Highest Quality Construction.

Dings MAGNETIC SEPARATION HIGH INTENSITY

MAGNETIC HEADQUARTERS SINCE 1899

WORLD'S LARGEST EXCLUSIVE BUILDERS OF MAGNETIC EQUIPMENT

STRENES METAL
IN FRONT LINE OF SERVICE

BEFORE THE WAR

Strenes can be cast to shape. Most of the usual machining time is saved. Redressing is reduced. That is why before the war Strenes gained heavily as forming and drawing die metal. In one case around 2,000,000 stampings were obtained and the die is still in good condition, ready to resume operation at the end of the war. Runs of 100,000 pieces up are not uncommon. Hundreds of the largest plants in the country used it regularly in their tooling programs. Want the names of pre-war users of Strenes?

IN THE WAR

Strenes today is being used for draw pots, draw pot inserts, draw rings for draw bench operation, for progressing upsetting dies — all in shell manufacture. Glad to identify all such users and many others.

AFTER THE WAR

After the war, refrigerator, stove, metal casket, grave vault, farm implement and other manufacturers will resume with Strenes metal forming and drawing dies. Many of the automobile, truck and tractor builders are extensive users, for body, fender and hood dies. Will name them to interested inquirers.

Look into the merits of Strenes metal — Try it, at least once.

THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO

Copper Use for Fasteners Approved for AA-3 Orders

Washington

• • • **Sew-on, machine** attached or riveted snap fasteners, buckles, eyelets, staples, rivets, and burrs may be manufactured from copper if they are for military use and if they are purchased on orders bearing AA-3 preference ratings or better, WPB announced.

This action, which is taken by amendment 2 to conservation order M-9-c as amended Jan. 22, replaces a former rule which restricted the manufacture of these items to those for use on jungle clothing and equipment, and for use on leather, canvas, webbing, duck, coated fabrics and special fabrics for field clothing and equipment being produced on ratings of AA-3 or higher.

Steel Use Approved for Refrigerator Condenser Units

Washington

• • • **The WPB on March 10** revoked specifications for refrigeration condensing units for industrial and commercial refrigeration and air conditioning machinery and equipment. The most important feature of the action was the removal of the prohibition on the use of steel in the construction of bases for refrigeration condensing units having motors over 20 h.p. in size. Revocation of this restriction, WPB said, will save valuable manhours formerly required to erect concrete bases at the time of installation of the unit. The original purpose of this provision was to conserve steel, but now that the type of steel required is generally more available, it is considered more important to conserve manpower.

WPB's action which revoked schedule II to order L-126 also removed standardization restrictions which limited the number of models that each manufacturer could produce. Since a large percentage of the units now being produced are for military use and since those produced for the Army, Navy and Maritime Commission were exempted from model standardization, it was felt by WPB that these restrictions were no longer necessary.

Alloy Steel Use Permitted In Hand Tool Manufacture

Washington

• • • **WPB announced** on March 10 that alloy steel may be used in the manufacture of items covered by schedules I, II, IV and V of the hand tools simplification order, L-157. As amended, the schedules will allow manufacturers to use alloy steel instead of carbon steel if they desire. In some cases this will result in the production of a better product.

Items covered by the schedules, which establish simplified practices and limit manufacture to the types, sizes, etc., specified, follow:

Schedule I — hand shovels, spades, scoops, and telegraph spoons; *Schedule II*—forged axes, hatchets, broad axes, adzes, and light hammers; *Schedule IV* — heavy forged hand tools; and *Schedule V* — hand forks, hooks, rakes, hoes, eye hoes and cultivators.

"Sure are doing everything to discourage travel, aren't they?"

Courtesy The Crown

WE'RE SPENDING NOW-BUT WISELY!

"We're investing in better production methods for today and tomorrow. Modern overhead cranes are helping speed our war contracts. Then in post-war, and for years to come, they will give us a big edge on manufacturing costs."

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When making capital expenditures, profit from the experience of leading manufacturers. When buying cranes, come to P&H — America's *oldest*, *largest*, and *only* crane builder producing complete electrical crane equipment. Your inquiry is invited.

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Inks Since 1892

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U.S. Steel Output in 1943 Totals 30,540,000 Net Tons

New York

• • • In its annual report to stockholders, the U. S. Steel Corp. announced that steel production by the Corp. in 1943 totaled 30,540,000 net tons of ingots, a new production record, and the production for the three-year period, 1941-1943, totaled 89,500,000 tons. Finished steel shipments totaled 20,148,000 net tons. The Corp. is now operating steel mills, some of which belong to the government, which will have, when completed during 1944, an annual ingot capacity in excess of 33,800,000 tons. To develop the company-owned facilities, since 1929 the Corp. has spent or authorized for expenditure about $1,050,000,000 of its own funds.

In the renegotiation of contracts for the 14 U. S. Steel subsidiary companies, the Navy Price Adjustment Board, acting for all governmental agencies, completed renegotiation of 13 companies and found them to have realized no excessive income up to Dec. 31, 1942. The renegotiation with the remaining subsidiary, Federal Shipbuilding and Dry Dock Co., resulted in a reduction of $3,000,000 in the selling prices of deliveries under Navy Dept. contracts up to Dec. 31, 1942. This amounted to an actual refund of $570,000, reported as a reduction of income for 1942.

Federal Shipbuilding delivered from its Kearny and Port Newark, N. J., yards 80 ships, including destroyers, destroyer escorts, transports, and Naval auxiliaries.

Concerning strikes, it is reported that the U. S. Steel's production performance was made possible by effective cooperation on the part of employees, and only the action of small groups in bringing about a series of strikes and work stoppages marred this record. These strikes resulted in an estimated loss of steel production of 318,000 tons, compared with 53,000 tons in 1942; a loss of coal output of 2,600,000 tons compared with 32,000 tons lost in 1943, and a loss of 4,845,000 man-hours as against 267,000 man-hours similarly lost in 1942.

Concerning the CIO-USWA proposals for a wage increase of 17c. an hr., and other benefits, now pending before the War Labor Board, U. S. Steel estimates that if all proposals were accepted and applied to all subsidiaries having CIO contracts, manufacturing costs at present operating rates would be increased $186,000,000 a year.

The U. S. Steel Corp. income for 1943 totaled $63,448,546, as against an adjusted income for 1942 of $71,248,569. The adjustment in 1942 income resulted from renegotiation of contracts. Net sales for 1943 totaled $1,976,844,751 as against $1,862,951,692 for 1942 after adjustment. While sales during 1943 were 6.1 per cent higher than in 1942, net profit was 10.9 per cent less. The profit margin based on net sales for 1943 was 3.2 per cent, whereas for 1942 it was 3.8 per cent.

ASME to Meet at Birmingham

Birmingham

• • • An address by Maj. Gen. G. M. Barnes, chief, technical division, Office of the Chief of Ordnance, Washington, on "Keying Research to Battle Problems" will be one of the highlights of the 1944 spring meeting of the American Society of Mechanical Engineers to be held here April 3, 4, and 5.

On the convention agenda are such topics as management, aviation, fuels, industrial instruments, and metals engineering.

COMING EVENTS

March 27, 28—American Society of Tool Engineers, Philadelphia.

March 30, 31—American Gas Association War Conference, Rochester, N. Y.

April 2 to 5—The American Ceramic Society, Inc., Pittsburgh.

April 5, 6, 7—SAE National Aeronautic Meeting, New York.

April 12 to 15—The Electrochemical Society, Inc., Milwaukee.

April 17, 18—American Zinc Institute, St. Louis.

April 25 to 28—American Foundrymen's Association, Buffalo.

May 1, 2—Westinghouse Machine Tool Electrification Forum, Pittsburgh.

May 8—Association of Iron & Steel Engineers, spring conference, rolling mill committee, Pittsburgh.

May 9, 10—American Steel Warehouse Association, Inc., Chicago.

May 25—American Iron and Steel Institute, New York.

By any light . . . in any age

BRASS

IS ALWAYS MODERN

WHEN whale oil lit the evening reading tables of 1807, it glowed from burnished brass lamps . . . symbols of civilized living that lit the way forward from the smoky hearths and pine tapers of log cabin days. And fifty years later, when kerosene became plentiful, brass lamps with brass burners and fittings became more firmly ensconced than ever as modern home lighting fixtures.

Today, more than 130 years after the whale oil lamp . . . nearly 2,000 years after the first rude lamplight shed its rays over delicately wrought Chinese brass . . . this ageless alloy is still among the foremost of the modern metals for smart lamps and lighting fixtures. And why? Two reasons. One, because homeowners and decorators have never found another metal that gives the same golden-yellow richness and cheerful gleam of brass. And the other, because brassware fabricators have never found another metal that is so easy to machine and form into so many products. So it is safe to say that 100 or 1,000 years from today, brass will still be modern . . . because it will always be the classic of its kind.

Here at Bristol, brass of many different analyses has been rolled and drawn for a multitude of uses . . . industrial, functional, and decorative . . . though today it all goes to munitions makers to rid the world of Huns and Japs. When that job is done, then Bristol will turn to the job of helping modern-minded manufacturers win new peacetime victories with Brass, the modern metal. And it's not too early to talk things over, right now.

THE

BRISTOL BRASS

CORPORATION

Makers of Brass since 1850, Bristol, Conn.

Measuring Errors in Involute Spur Gears

(CONTINUED FROM PAGE 73)

the most rapid forms of complete inspection, and the second type involves the use of the least expensive equipment. The second type is often sufficient for completely inspecting gears where profile errors are not critical.

To use a pin to determine *pitch-line runout* the gear is usually mounted on centers, and the variation in the highest position of a pin of convenient size in the tooth space is measured with an indicator as the pin is moved from space to space around the gear. Two pins are sometimes used with a micrometer without mounting the gear on centers, but as this has no reference to the axis of rotation, it will indicate only the *out of round* type of distortion and local errors. Cone checking fixtures are a convenient and somewhat more rapid way of checking runout. On this type of fixture, the gear is also mounted on centers. A slide, mounting a cone attached to an indicator, is so arranged that the cone can be rapidly inserted in each tooth space and the variation in the distance to center determined from the indicator readings. This type of fixture is also adapted to the use of the ball, rack tooth, or rack space.

In using any of the double-sided inspection methods, it should be kept in mind that the larger the operating pressure angle between gear and master, the larger the diameter of the pin, the greater the included angle on the cone, rack tooth, or rack space, the less sensitive will the readings be to local distortion of the gear. However, a displaced ideal gear will show the same runouts as long as contact is maintained with the involute regardless of angles or diameters. Thus with *double-sided* methods of inspection, standards for testing conditions should be set up so that results will be comparable.

Red or blue lead is sometimes used on a hand-rolling fixture with the tightly meshed master gear method and is reliable except to the extent where center distance variation affects the depth of the tooth bearing. Operating speeds and pressure are of course not obtained. The same hand-rolling fixture may be used to check bearing on standard center distance with backlash between the gear and mate or master. This method is not double-sided, but neither is it truly functional as speed and pressure cannot be made to approach operating conditions.

Best Methods of Inspection

All the types of inspection mentioned herein have been used successfully. If a complete picture of gear quality is to be obtained, provision to check functional or double-sided methods against fundamental methods should be had. This means that involute measuring machines, spacing checkers and taper checking equipment should be available. For efficient and complete quality control, the power testing method has many advantages if both visual and audible techniques are used. All errors on all teeth manifest themselves to the operator in a very short time if he knows how to interpret the signs. The disadvantage of this method is obviously that a skilled operator is essential. The method of inspection using tightly meshed gear and master will detect most combinations of profile and spacing errors but it will not permit accurate evaluation of these. A master gear should be used rather than a mating gear as the mating gear will tend to operate on too short a center distance when tightly meshed. Runout can be determined without the expense of a master gear by using a cone checking machine or a pin and indicator. The advantage of the master gear is that it is somewhat faster. It should be remembered that the double-sided methods do not check lead, and so if high quality gears are required, some supplementary check for parallelism should be employed.

In the actual selection of checking equipment, the most important factors to bear in mind are volume of gears to be inspected and quality to be maintained. The chart, Fig. 6, shows a possible selection of equipment to meet various conditions. It does not cover equipment for measuring backlash, root radius or other factors not directly affecting action.

Among the Week's Trade Notes

Monsanto Chemical Co., St. Louis, has announced a contract by which it will acquire I. F. Laucks, Inc., of Seattle, manufacturing chemists and producer of plywood glues. Through the transaction, Monsanto will acquire the two Lauck plants in Seattle and other company interests at Vancouver, B. C., Los Angeles, Portsmouth, Va., Lockport, N. Y., Stanbridge, Que., and interests which Laucks holds in Australia and Sweden.

●

Electric Service Supplies Co., Philadelphia, will hereafter be known as Electric Service Mfg. Co. The company's personnel, ownership and manufacturing remain the same.

●

S. F. Bowser & Co., Fort Wayne, Ind., has purchased the Eagle Lock Co., Terryville, Conn., for two million dollars. The purchase is subject to stockholder approval.

●

E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has taken option to buy an 822-acre site containing the San Jacinto shipyard property of the U. S. Maritime Commission, near La Porte, Tex.

Greeman Steel Treating Co., Worcester, is using acetylene torches, with setup a most important part of the operation, in a new flame hardening process for delicate metal parts or where localized hardening is necessary.

●

Walton Industries, a subsidiary of Walton Die & Mold Co., Detroit, has purchased the six-story building at 28 Ionia Avenue, S W., and plans to begin manufacturing operations shortly with a payroll of around 40 persons.

●

Pennsylvania Transformer Co., Pittsburgh, announces the appointment of J. J. Costello Co. as sales representative in New England territory with offices in Boston, and New Haven, Conn. J. F. Joyce has been appointed district sales representative with offices in Cleveland.

●

B. F. Goodrich Co., Akron, Ohio, has awarded a construction contract to the George A. Fuller Co., Washington, for the buildings which will house a new tire manufacturing plant to be erected in Miami, Okla.

●

Auto-Ordnance Corp., maker of the Thompson submachine gun, has changed its name to Maguire Industries, Inc., because contemplated postwar activities will have little relation to ordnance.

●

Norman Bel Geddes has dissolved the partnership that he formed in 1943. The company will continue under his personal direction, keeping the name Norman Bel Geddes & Co. The entire sales department has been eliminated.

●

Lamson & Sessions Co. has moved its Chicago sales office from the plant to Room 1710, 310 South Michigan Avenue, Chicago 4.

●

Sprague Specialties Co., North Adams, Mass., is to erect a special type building for commercial process work in connection with the manufacture of condensers for the Navy.

●

Worcester Pressed Steel Co.'s munition work includes a pressure vessel or bottle designed from a 100-lb. forging that must function at a working pressure of 750 lb. per square inch and test at 3100 lb. pressure.

●

Leon J. Barrett Co. has devised a special centrifugal machine for making cases for covering condenser coils. It has stepped up production of steel cases from 50 to 5000 per hr. Condenser coverings originally were of copper or brass, but when these metals became scarce were made of steel, plated with copper or tin.

●

United States Rubber Co.'s wire and cable department has taken over plant No. 1 of the Lowell, Mass., Ordnance Works and will manufacture a long line of communications cable for the Signal Corps.

NO...IT'S REALLY pH THAT DOES THE CLEANING!

THE "CURE-ALL" is a great idea—but it won't work. Today, in your business and in ours, we know that it takes a "specific" to make a cure or get a job done right.

One Does The Work Best

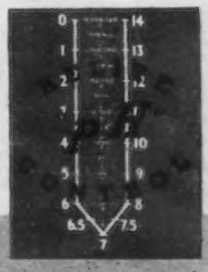
In every processing and cleaning operation there is one specific chemical combination which precisely fills the requirements of a particular situation and will do the job best. The difference between this correct material and anything else — even the closest approximation—is extreme. Kelite sees it every day in reports from Service Engineers in the field. You can see it in the unequalled speed, certainty and economy which the correct material makes possible.

pH Simplifies The Job

This matter of the right material for the job is so important that Kelite has gone to great lengths to attain it. Formerly, standardized test tubes of correct solutions were made up in the laboratory and used as models on the job. All this work was worth while, but it was slow... until we learned how to make use of pH. Now it's simple!

No Special Skill Needed

An operator does not have to be skilled to use Kelite pH Control. The pH values are lined up and compared in an easily-understandable form on the Kelite pH Chart. It's as easy to use as a yardstick! Your inquiry is invited.



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Los Angeles 1, Calif.

Manufacturing Plants in LOS ANGELES, CHICAGO, PERTH AMBOY, HOUSTON
Branches in Principal Cities.

KELITE

INDUSTRIAL CHEMICAL PROCESSES AND MATERIALS

MACHINE TOOLS

. . . News and Market Activities

Ratings Needed for Reconditioning

Cleveland

• • • **Machine tool reconditioning** and re-tooling by the original builders has recently taken on increased importance. It has also taken on certain controversial aspects which vary between individual producers.

Most recent entrant into the field has been the National Acme Co. which is actively soliciting orders to completely recondition and re-tool any of its machines within the 10 to 15 yr. age span. The re-tooling phase of the program is being emphasized because a large number of machines particularly from the munitions field are becoming available for other production and for those manufacturers who can see their way to planning future production, this is an opportunity to re-tool in advance of actual need.

While there is need to recondition a large number of machines due to the overloads and abuse sustained during war production, there are a number of arguments presented against machine tool builders engaging in such pursuit. One of the most formidable of these is the fact that a great many of the rebuilding jobs available tend to come into the builders' shops without a rating. This in effect, causes the builders to expend man-hours and material on unrated work. This is difficult to avoid as many of the firms considering having machines reconditioned do not wish to take the trouble to obtain ratings, although they are available.

Contradictory as it seems it is also true that the workings of the current Internal Revenue Act will not permit allowance for the costs of rebuilding machines unless a rating is obtained. This should influence some machine owners to obtain ratings so that the charge may become a capital goods investment.

There is also some criticism of the policy behind reconditioning older machines which will only serve to glut the post-war market for machine tools worse than now appears likely by removing most rebuilt tools from the strictly obsolete class.

It is reported that there is a currently confidential report of idle machine tools soon to be issued by the WPB which will reveal the vast number of relatively new machine tools available. While no estimates of this survey's total can be made yet, it is known that several hundred thousand such machines are actually idle at this time. Some of the most far thinking members of the machine tool industry point to the fact that this pool of available tools represents the newest products of the industry for the most part and seem to represent the best outlet for any builder's ambitions to do reconditioning. A definite move to remove the old "hookers" from the scene and supplant with these newer machines seems sure to come a little later.

The position, however, of each individual builder with regard to rebuilding its own models differs greatly in that some have not made drastic revisions in models over the past 10 years and little could be gained by restricting rebuilding to only latest models.

CASTING DWARFS MACHINE: *Machining of this 45-ton warship propeller strut poses a difficult problem, with one 15-ft. arm sticking up in the air. Surfacing of one attachment pad is being performed on this big planer at a Kearney, N. J., shipyard by the use of an extended tool holder pedestal mounted on the standard clapper box.*

•

Order Volume Compares With 1936-38 Level

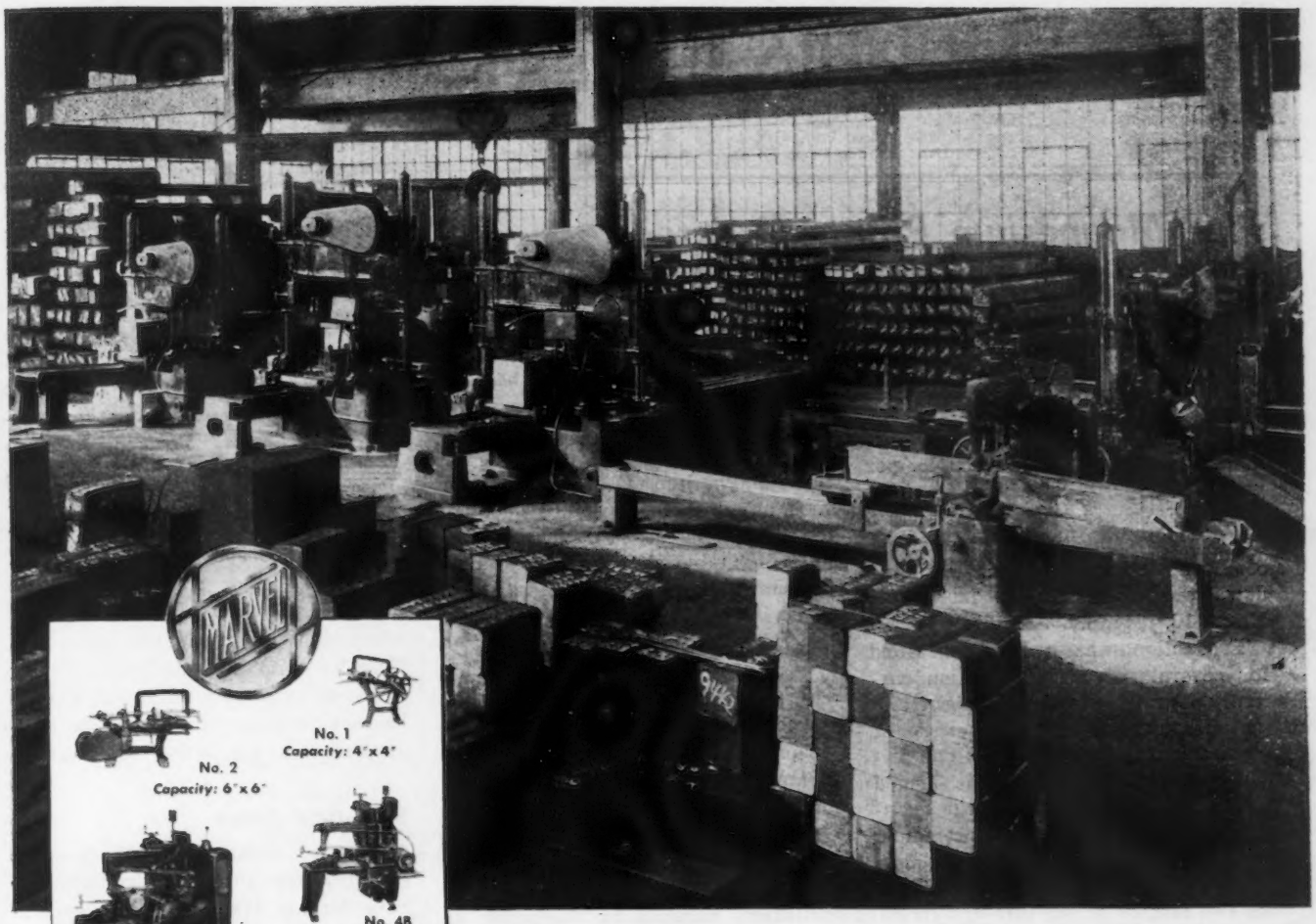
Chicago

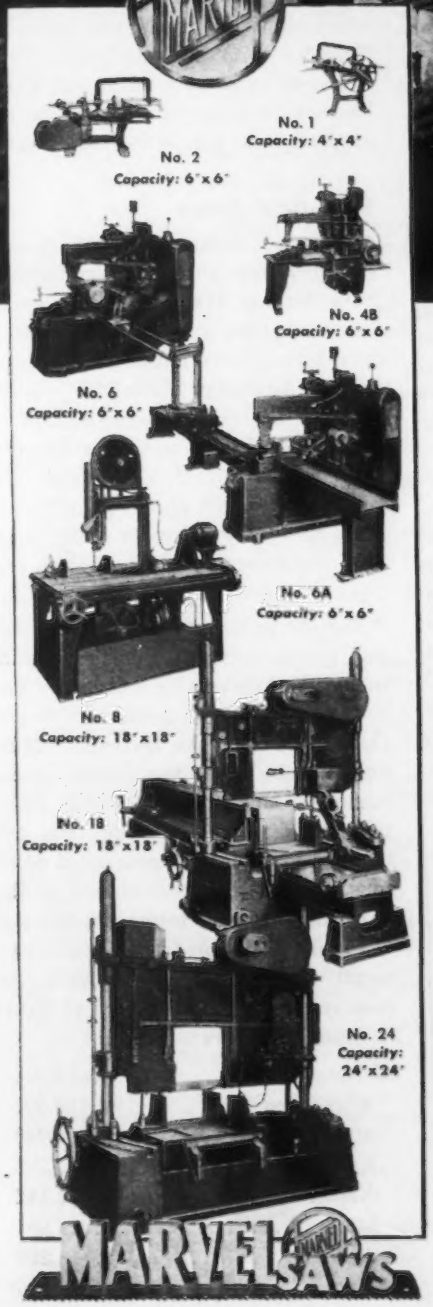
• • • **Current machine tool** volume is compared by local dealers to 1936 and 1938. Tailend orders from war plant tooling up continue to dribble in and these, combined with sustained normal buying from such civilian industry as the railroads, provide a comfortable business level for dealers in new tools. For future months, it is anticipated that buying for railroad shops indicated by current inquiries will provide a comparatively large number of orders from that industry. One huge aircraft engine plant, apparently neither fully tooled nor fully manned, still is in the market.

Design modifications in war equipment have not been of such a nature as to require much buying of new basic tools.

Among machine tool builders, a far greater degree of conversion to production of direct war products is noticeable than six months ago. At that time, conversion was chiefly noticeable among the smaller manufacturers, but some of the industry's biggest firms now are turning out a substantial volume of war goods.

With random exceptions for certain specialized machines, manufacturers' backlogs on larger tools cluster in the four to six months range, and on smaller tools, from 45 to 90 days.





2 men now do the work of 4 and save forging steel too

The Ajax Steel & Forge Company, Detroit, has solved its cutting-off problems with a battery of MARVEL Saws. Before, billets were cut-off with a hammer—an operation which not only required at least four men and tied up hammers and furnaces, but also resulted in the waste of a great deal of forging steel.

Now two operators with seven Marvel Saws supply the entire plant with billets cut to exact size from bars up to 18" x 18" square. In addition to their present Marvel Saws, five of which are illustrated above, this company is adding a super-giant MARVEL No. 24 Hydraulic Hack Saw—the new mammoth saw that quickly cuts off the toughest steels in sizes up to 24" x 26" cross section.

Our local MARVEL Sawing Engineer will gladly call at your plant, study your metal cutting problems and make recommendations as to methods and equipment. Write for new Catalog.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. **Chicago 39, U. S. A.**

Eastern Sales Offices: 225 Lafayette St., New York, N. Y.

NON-FERROUS METALS

. . . News and Market Activities

Five Magnesium Plants Ordered To Curtail or Stop Production

Washington

• • • **WPB ordered reductions** in magnesium production at five plants. With total rated capacity of all plants in the country at 586,000,000 lb. per year, reduction will amount to about 33,750,000 lb. per year or less than 6 per cent of capacity. Announcement of Ford magnesium plant shutting down was made in THE IRON AGE, March 16, 1944, p. 80.

Production was ordered curtailed for several reasons. Production currently is running between eight and ten million lb. per month in excess of requirements. This surplus is due primarily to the fact that the armed services have not consumed the quantity stated in their requirements. Surplus stocks of magnesium now total more than the amount required for two months at the rate of current consumption. Furthermore, this action will result in savings of coal, gas, transportation, and labor in areas where one or all of them are scarce.

Only one of these plants, Permanente Metals Corp., has been operating at capacity. Therefore, curtailments will be less drastic than appears from the rated-capacity figures. In the case of Electro Met, for example, the order will merely freeze production at 50 per cent of rated capacity or slightly more than the present rate. Practically the same thing will be true of Amco.

Magnesium is being released by WPB for all possible military requirements and for essential civilian needs. Greater utilization of magnesium products by the military has been encouraged by WPB for some time. Restrictions for all civilian purposes cannot be removed at this time because magnesium fabricating facilities such as foundries, are not adequate for other than essential demands. The following table shows January, 1944, production, cutback effected, and labor saved in the five plants affected.

•

Zinc Limitations Eased

The WPB has announced its provision for the restoration of the use of zinc in the manufacture of many finished products. The restoration was effected by amending Conservation Order M-11-b to add a number of items to the list of exceptions to the limitations imposed by the order, as follows: Coal stokers, domestic electric ranges, dry cell batteries and portable electric lights, electric fans, mechanical pencils, motorized fire apparatus, protective coating or plating of zinc on loose leaf metal parts and units.

There will be no general increase in the output of the finished products involved, nor will there be any relaxation in the restrictions on the manufacture of the products, WPB said. End product volume and other restrictions on manufacture still remain under the controls set up by the many "L" orders under which they are produced.

REDUCTIONS IN MAGNESIUM OUTPUT ORDERED BY WPB

COMPANY	Process Used	Annual Capacity, Lb.	Reduction Ordered, Per Cent of Capacity	January Production, Lb.	Monthly Reduction, Lb.
Electro Metallurgical Co., Spokane, Wash.	Ferrosilicon	48,000,000	50	1,500,000	0
Permanente Metals Corp., Manteca, Cal.	Carbothermic	20,000,000	50	1,880,000	940,000
Ford Motor Co., Dearborn, Mich.	Ferrocilicon	40,000,000	100	919,000	919,000
Mathieson Alkali Works, Inc., Lake Charles, La.	Mathieson	54,000,000	100	955,000	955,000
Amco Magnesium Corp., Wingdale, N. Y.	Ferrosilicon	10,000,000	35	424,000	0
TOTAL		172,000,000	22	5,722,000	2,814,000

Canadian Aluminum Price Down

Toronto

• • • **C. D. Howe, Minister** of Munitions and Supplies, announced that Aluminum Co. of Canada has reduced the price of aluminum "by agreement between the company and the Canadian Government." The reduction also applies to purchases from the company by the United States and the United Kingdom. The Minister, however, did not specify the amount of the reduction nor give information as to the new price. Local officials of Aluminum Co. of Canada state that they have no information regarding the new price and point out that it has not been passed along to the ordinary trade as far as they are aware.

•

Statistical Notes

• **The net consumption** of silver in industry for 1943 was reported to have totaled 118 million oz., according to figures submitted at a recent Silver Producers and Distributers Industry Advisory Committee meeting. Imports of ore and base bullion and refined silver amounted to about 63 million oz. and United States mine production added about 40 million oz. The deficiency between new supply and requirements was supplied from Treasury free silver.

• **For the first month** of the year, copper production from domestic mines including Alaska was 89,506 net tons, a decrease of 1288 tons from that in December, 1943, the Bureau of Mines announced. For the same period, domestic zinc mines yielded 64,894 tons, an increase of 1020 tons over the previous month's output of 63,874 tons. Mine production of lead in January increased 409 tons to 38,325 tons.

• **Figures on non-ferrous** secondary metal recovered in 1942 have just been released by the Bureau of Mines. In brief these are:

Secondary Metal	Net Tons
Aluminum	198,492
Magnesium	6,238
Copper	927,755
Nickel	4,142
Lead	323,001
Antimony	18,200
Zinc	330,526

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$7.50
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercal bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	.

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	**8.75**
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	**8.50**
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	**7.50**
Old rolled brass	7.00
Admiralty condenser tubes	**7.50**
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	**6.50**
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.375
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over.	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz., lots	40.32–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

WPB Tries to Bolster Up Weak Scrap Market by Warning of Shortages

New York

• • • **Considerable criticism** has been forthcoming from WPB circles of reports that various grades of scrap are going at lower than ceiling prices and that some grades are not moving at all. The shortage of carbon grades, as emphasized by the WPB Industry Advisory Committee, may, on the whole, be true for a long range picture, but actual current shortages are difficult to locate. Furthermore, there seem to be no mills particularly anxious about any possibility of a coming severe scrap shortage.

Many mills have been reported from time to time as being completely out of the scrap market for periods varying from a couple of days to several weeks. This would indicate that no particular anxiety was felt by mills for scrap supplies.

Why WPB should continually try to bolster up a weakening scrap market seems pretty obvious. To let down on efforts to get out the scrap might result in a scrap shortage, and any wholesale breakdown of the scrap price structure would tend toward this end. To prevent such an occurrence, WPB's efforts have not lagged.

There have been charges from time to time that mills are trying to break scrap prices. There's a belief in some quarters that one of the large eastern consumers is very energetic along this line at present. On the surface, any current concerted effort by the mills to break the scrap market doesn't seem to make sense, because of the industry's efforts to obtain higher steel prices. The fact that mills are at present curtailing buying doesn't necessarily indicate they are trying to break the market, but more likely seems to point to the fact that a semblance of normal economics is beginning again to function in this inflated war period and mills are endeavoring to bring stocks more in line with consumption.

There was a definite trend this week toward sales closer to ceiling prices rather than toward more widespread under-ceiling sales. Most districts reported that in-district sales were holding to ceilings, while some out-of-district sales were being made sufficiently lower than the ceiling so as to absorb the freight from the point of sale to the point of consumption.

Some grades of scrap are just not selling. For example, blast furnace scrap at Cleveland doesn't have a market, but observers believe that when this grade begins to move again it will be at a price at least $1 below the ceiling. However, out-of-district sales from Cleveland of blast furnace scrap at lower than ceiling have been reported, indicating the weakened market at that center. This is true of several other specific grades, and, while sales in Cleveland under the ceiling are not being made, these low out-of-district sales will affect the local market when buying resumes in that area.

•

PITTSBURGH — Supply and demand still in balance. Most of the weakness, price-wise, on turnings from outside this district, has disappeared, temporarily at least. Other grades firm at ceiling.

•

CHICAGO—Sales are reported to mills of short shoveling turnings at $13.75; of cast iron borings at $12.75; and of mixed borings and turnings at $12.75. Sales of machine shop turnings also are reported at $1.75 below ceiling. Other open hearth grades appear to be firm with some West Coast shipyard scrap still to be delivered here under commitments made several weeks ago. In the matter of alloy residuals, one mill complains of difficulty with tin, but this is not believed to have been due to tin cans. Much difficulty with chromium, nickel, and molybdenum as residuals in material sold as carbon steel scrap continues, and the situation promises to become worse unless some real solution is found for disposal of triple alloy scrap.

•

PHILADELPHIA — Several mills that have been holding up shipments have lifted restrictions either in whole or in part. However, it is the opinion of some suppliers here that should all restrictions be lifted, the quantity of heavy open hearth grades could not be increased to meet greater demand. Low phos which had been selling at below ceiling prices is now practically impossible to move even at cut-rate. Both open hearth and foundry grades of cast scrap continues to be difficult to find.

BOSTON—With shipyard scrap allocated, little battlefield coming into New England, and natural local sources of scrap picked to the bone, coupled with a labor shortage, most yards are "existing," while brokers are able to get only an occasional car of material.

•

CINCINNATI — The situation here seems to be fairly well balanced as dealers indicate there is a reasonably ample supply of open hearth scrap and turnings. Some pressure to stop diversion of open hearth scrap to electric furnaces is reported. Cupulo cast continues to be tight, although no stringency has yet been reported. Sale of scrap for consumption within the district continues at ceiling, but some out of the district material, particularly on turnings is running $1 to $2 under the ceiling prices in Cincinnati for shipment into other districts. Consumers there refuse to pay a price which will cause them to absorb the additional freight.

•

BIRMINGHAM—Demand is practically non-existent here for any grades of material except open hearth grades. Despite lack of demand, prices are holding steady.

•

LOS ANGELES—In addition to allocations of shipyard scrap to Chicago district buyers which still continue, quite a volume of scrap is moving to Utah for the Geneva mill's priming charges. In southern California No. 1 and No. 2 heavy melting and No. 2 bales are reported at $1.00 off dealers' price and mills may reduce their offers another dollar this month. Prices are reported a little firmer in the Pacific northwest though ceilings in that area are lowest in the United States. Cast scrap continues at ceiling with scant supply.

•

BUFFALO—Mills appear to be amply supplied, with the largest consumer continuing to receive outside scrap under allocations. Very little dealer scrap is reported. Consumers apparently are shying from increasing inventories; in fact, are whittling down stockpiles. Conflicting reports of shortages and surpluses have left district dealers groggy. Nevertheless, most items are moving fairly well.

•

ST. LOUIS—Heavy snow in the area early in the week slowed down shipments to the district's mills. The main factor, however, in the movement of scrap both to and through the yards is the manpower available to handle and prepare it. Even the handling of railroad scrap is said to have slowed down because of labor shortages.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
							Low Phos.		Heavy Structural and Plate			Foundry Steel					
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles, Pittsburg, Cal; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.50	15.50	12.50	14.00	15.50

* Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing point (cents per gross ton) are: Chicago, 84c.; Pittsburgh, Brackenridge, 55c.; Detroit, 53c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, Pittsburg, 42c.; Seattle, 38c.; Buffalo, Claymont, Harrisburg, 36c.; Atlanta, Birmingham, 32c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Phoenixville, Bethlehem, Kokomo, Duluth and St. Louis, 28c.; Alabama City, Ala., 26c.; Minnequa, Colo., 22c.; Middletown, 14c.; Conshohocken, Sparrows Point, 11c.

*Basic open hearth and foundry grades, and auto springs and crankshafts, deduct 80c. per ton.

BASING POINT includes switching districts of city named.

Basing point	Switching districts:
Pittsburgh	Bessemer, Homestead, Duquesne, Munhall, McKeesport
Cincinnati	Newport
St. Louis	Granite City, E. St. Louis, Madison, Ill.
Chicago	Gary
Claymont	Chester, Pa.
San Francisco	So. San Francisco, Niles, Oakland

MAXIMUM SHIPPING POINT PRICE: Where shipment is wholly or partially by rail or vessel, or combination of rail and vessel, the scrap is at shipping point when placed f.o.b. railroad or f.a.s. vessel. For motor vehicle shipments scrap is at shipping point when loaded. Then maximum shipping point price shall be: (a) For shipping point located within a basing point, prices shown in above table for scrap at basing point in which shipping point is located, minus applicable switching charge deduction shown in paragraph above labeled "Switching Charges." (b) For shipping points outside basing point, price listed in above table hereof for scrap at most favorable basing point, minus lowest charge for transportation from shipping point to such basing point by rail or water carrier or combination. Where vessel movement is involved, in lieu of established dock charge or any cost customarily incurred at the dock, 75c. per ton must be included as part of deduction in computing shipping point price; 50c. at Memphis; $1 at Great Lakes ports; and $1.25 at New England ports. If no established transportation rate exists for a portion of movement from shipping to basing point, actual charge or cost customarily incurred by shipper in such portion of movement shall be included as part of deduction in computing shipping point price. For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less than maximum prices for the corresponding prepared scrap. In no case, however, shall electric furnace, acid open hearth and foundry grades be used as the corresponding prepared scrap. A preparation-in-transit charge for unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced less $2; 75 to 85% Fe less $4; under 75% Fe less $8 per ton. Mill scale less $8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1% oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5% oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c. mill scale, $8 less than No. 1 heavy melting.

Tool Steel Scrap Prices (MPR 379)

	SEGREGATED Solids Per Lb. Cont. W	SEGREGATED Turnings Per Lb. Cont. W
Type 1. 12% min. W, 1% max. Mo	$1.80	$1.60
Type 2. 5 to 12% W, 1% max. Mo	1.60	1.40
Type 3. 1 to 5% W, 1.5% max. Mo	1.25	1.25
*Type 4. 7% min. Mo, 2% max. W	0.125	0.105
*Type 5. 3.5 to 6% Mo, 4.5 to 6% W	0.135	0.115

UNSEGREGATED SOLIDS: $1.50 per lb. contained W if 5% or more. $1.15 per lb. contained W if 1 to 5%. $0.80 per lb. contained Mo if 1.5% or more.

UNSEGREGATED TURNINGS: $1.30 per lb. contained W if 5% or more. $1.00 per lb. contained W if 1 to 5%. $0.70 per lb. contained Mo if 1.5% or more.

If both W and Mo are within ranges, payment may be for both W and Mo content.

*Per lb. of scrap material.

If segregated, a premium of $1.50 per lb. of contained Co allowed if Co content is 3% or over. No scrap considered segregated if Co content ranges between 0.5 and 3%.

If Cu or Ni content over 0.2o%, price shall be reduced by 50%.

If 500 lb. or less is sold, either segregated or unsegregated, price shall be reduced 2c. per lb. of scrap material.

Price schedules on railroad scrap and cast iron scrap will be carried in the last issue of each month.

Comparison of Prices . . .

Advance Over Past Week in **Heavy Type**; Declines in *Italics*. (Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Mar. 21, 1944	Mar. 14, 1944	Feb. 15, 1944	Mar. 23, 1943
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Mar. 21, 1944	Mar. 14, 1944	Feb. 15, 1944	Mar. 23, 1943
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	23.94	23.94	23.94	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$6.50	$6.00
Foundry coke, prompt	8.25	7.50	7.50	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 171-183.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
March 23, 1944	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes 25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price to be used in figuring annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[3]	3.80¢	3.80¢	3.80¢									4.55¢		4.18¢	4.12¢
Hot Rolled Strip[2]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro Tin Plate, Box	$4.50	$4.50	$4.50						$4.60						
.75 Electro Tin Plate, Box	$4.65		$4.65						$4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[13]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit = 2.70¢)			(Toledo = 2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	(Coatesville and Claymont = 2.10¢) 2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95	4.15¢		3.70¢	3.58¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)			(Duluth = 2.65¢)		3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. $34 Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel Co. $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47.

Sheet Bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. (small) $36 Portsmouth, Ohio; (blooming mill sizes) applicable base, f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2) $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.69 Birmingham; Ford Motor Co. $34 Dearborn, Mich.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts., (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing pts.

Bar Size Shapes—(Angles) W. Ames & Co., 10 tons or over, $3.10 mill.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. $3.20 Pacific Ports.

Merchant Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co. $2.35 Chicago; Central Iron & Steel Co. $2.20 basing pts.; Granite City Steel Co. $2.35 Granite City; Calumet Steel Div., Borg Warner Corp. (8 in. mill bars) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Massfield, Mass., f.o.b. Massfield.; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co., $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Apollo Steel Co. $3.75 basing pts.; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018a	3.922	4.772	3.605	3.668	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.753	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.004	3.70	4.659[17]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.48	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.104	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.354	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.954	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.754	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (N. E.) STEELS
(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar-Strip	Billets, Blooms and Slabs	Bars and Bar-Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25¢	$25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40 .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

*Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports)**

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill.... $34.00
Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast Ports; Empire Sheet & Tinplate Co., $34.25.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00
Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00
Exceptions: C/L delivered Detroit add $2.00; delivered East Michigan add $3.00. Connors Steel Co. may charge $45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton 54.00
Price delivered Detroit $2.00 higher; E. Michigan $3.00 higher.

Shell Steel

	Per Gross Ton
8 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.
Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.
Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 1c. higher.

UNISHEARS Cut Sheet Metal *Faster!*

Stanley Unishears cut sheet materials as fast as you feed, up to 15 feet per minute – follow any line accurately, straight, curved or angle – leaving smooth, clean edges with no waste of material. Plenty rugged for tough production or maintenance use.

Portable Unishears are made in four models – for 18 gauge, 16 gauge, 14 gauge and 12 gauge hot rolled steel or galvanized iron. Stationary Unishears are also available to cut 14 gauge and 10 gauge sheets. Write for literature. Stanley Electric Tool Division, The Stanley Works, New Britain, Connecticut.

Stanley Unishears No. 214 – Cutting capacity 14 gauge hot rolled steel.

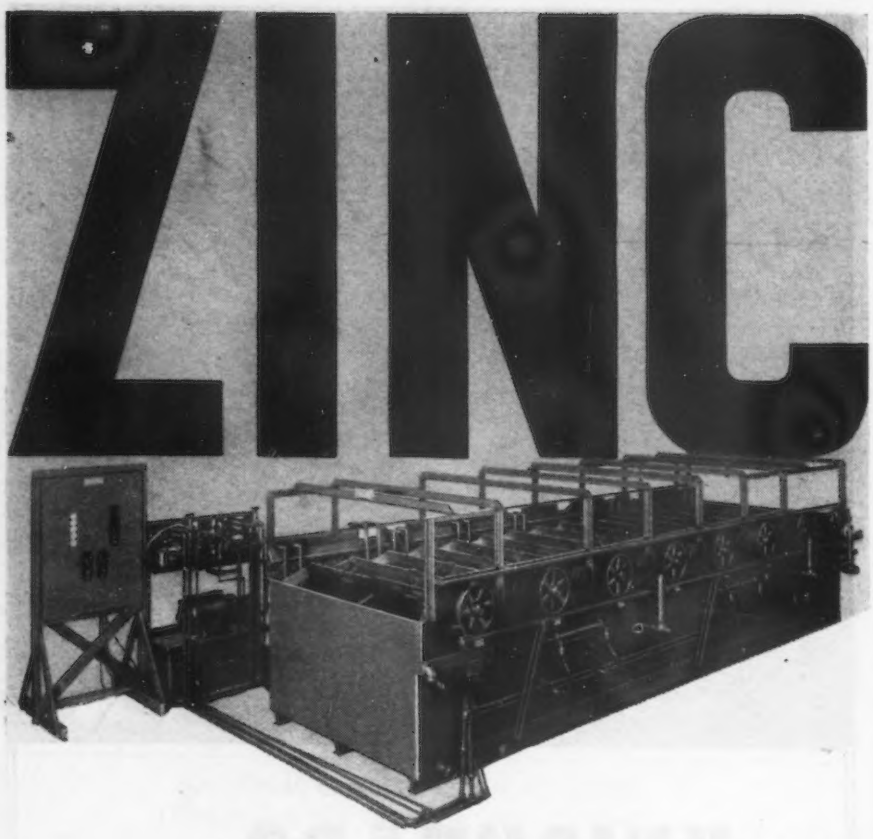
ARMY E NAVY

STANLEY

TRADE MARK

STANLEY UNISHEARS

Electrically Driven Metal Shears



BY UDYLITE

Udylite's years of experience with this practical, inexpensive, protective coating is yours for the asking.

We have the process, nationally known for its efficiency and performance; the equipment, for both plating and dichromating; and the supplies, from chemicals to the efficient ball anode which is an exclusive Udylite development.

The above automatic dichromating machine is a Udylite development for the processing of large quantities of small parts through the complete cycle, from initial rinse to ultimate heat treat. The machine is capable of handling approximately 10 cu. ft. of volume per hour, with excellent uniformity and a minimum of scarring.

Investigate "Zinc by Udylite"—your inquiry will receive our prompt attention.

THE UDYLITE CORPORATION

1651 E. Grand Blvd., Detroit 11, Mich.

Chicago 12, 1943 Walnut Street | Long Island City 1, N. Y., 11-16 44th Drive | Cleveland 3, 4408 Carnegie Ave.

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	24	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.80
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $48 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	*Seamless Hot Rolled*	*Lap Weld, Hot Rolled*
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
Standard wire nails	$2.55	$3.05
Coated nails	2.55	3.05
Cut nails, carloads	3.85	..
	Base per 100 Lb.	
Annealed fence wire	$3.05	$3.55
Annealed galv. fence wire	3.40	3.90
	Base Column	
Woven wire fence*	$0.67	$0.85
Fence posts, carloads	.69	.86
Single loop bale ties	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barbless wire	.70	..

*15½ gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

	Per Cent Off List
⅛ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 in. to 1 in.	59	
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	

In full keg lots, 10 per cent additional discount.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland Chicago, New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 5

Cap and Set Screws

	Consumer Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

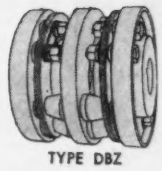
(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

THOMAS

Flexible COUPLINGS

FOR *any* SPEED OR SERVICE



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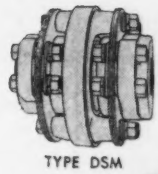

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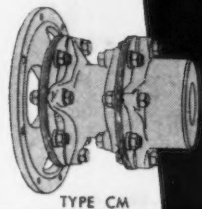

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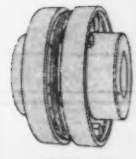

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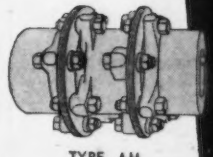

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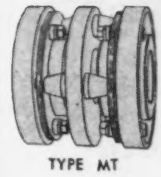

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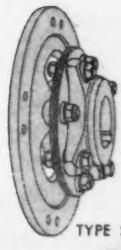

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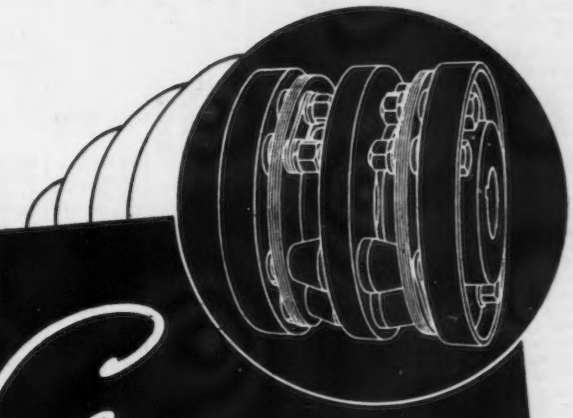


Eliminate

BACKLASH, FRICTION, WEAR AND CROSS-PULL

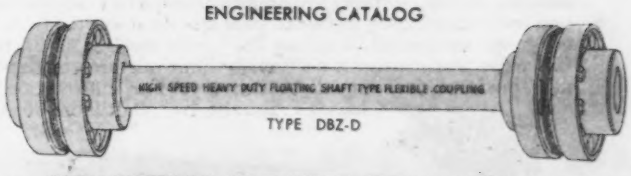
.....the 4 destructive evils found in all other types and makes of couplings.

•

NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT

These are the five essential features of Thomas Flexible Couplings that insure a permanent care-free installation.

WRITE FOR COMPLETE ENGINEERING CATALOG



TYPE DBZ-D

THE THOMAS PRINCIPLE ELIMINATES CHAINS, SPUR GEARS and other VIBRATING MAKESHIFTS

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*		*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.		24.50			29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50			.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*		*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*			.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	..... *$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50		24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn. fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.13*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron and Steel Co. may add another $1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorous iron; high phosphorous sells for $28.50 at the furnace.

(3) E. & G. Brooke Co. Birdsboro, Pa., permitted to charge $1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

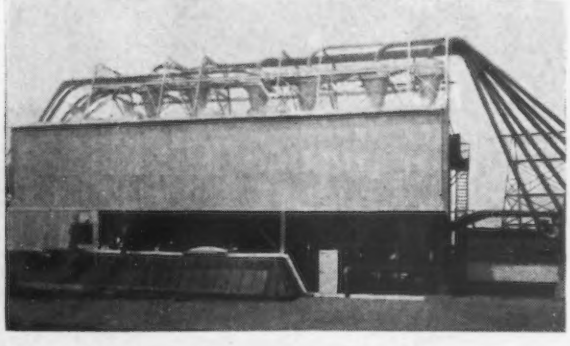
Copper, electrolytic, 150 and 200 mesh	21⅛ to 23½c.
Copper, reduced, 150 and 200 mesh	20½ to 25½c.
Iron, commercial, 100 and 200 mesh, 96 + % Fe	13½ to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh, 11½ to 12½c.	
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh, 8½c. plus metal	
Tin, 100 mesh	58¾c.
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Molybdenum power, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge $7.75 per ton plus transportation charges. **Mo., Ala., and Tenn. producers—$13.35.



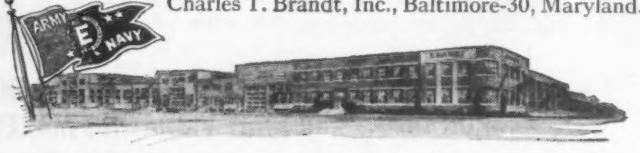
CORK STORAGE BINS, 18 hoppers of No. 10 ga. steel, kept weather proof by a 54'x81'x30' corrugated enclosure . . . System, including structural supports and conveyor ducts designed, fabricated and erected by Brandt.

Big Installations or Small Parts—

Call **BRANDT of Baltimore**

for Precision in Heavy Plate and Sheet Steel Work

Here is an 8½ acre plant . . . with the most modern equipment for shearing, rolling, forming, welding and completely fabricating ferrous, non-ferrous and alloy metals to your specifications . . . from the lightest gauge up to and including 1¼" mild steel or ¾" armor plate. Extensive war contracts necessarily limit our present acceptance of new business for immediate delivery. For information, address: Charles T. Brandt, Inc., Baltimore-30, Maryland.



BRANDT of Baltimore—*Craftsmen in Metal Since 1890*

PRICES

REFRACTORIES
(F.o.b. Works)

	Per 1000
Fire Clay Brick	
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
	Per Net Ton
Chrome Brick	
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton $40.00
Angle splice bars, 100 lb. 2.70

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

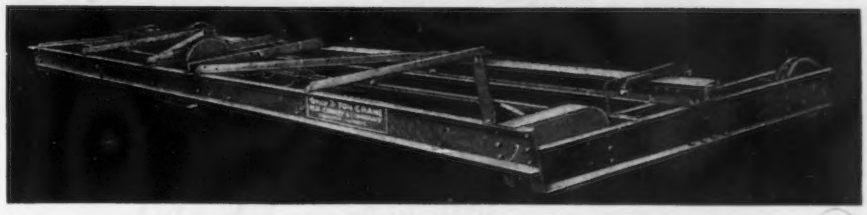
*Includes annealing and pickling

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

CONCO 3-Motor Single Girder CAB OR FLOOR OPERATED ELECTRIC CRANE . . .



● Available in capacities of one through five tons for floor or cab operation. Simply, ruggedly designed for low first cost and maintenance. Used with Low Headroom Type Hoist, provides for maximum space coverage horizontally and vertically. Effective in even a minimum space. Write for Bulletin 2000.

Write for Bulletin 26000 describing the Torpedo Hoist shown. Three capacities 250 lb. — $139.50, 500 lb. — $149.50, 1000 lb. — $159.50. Heavily, simply built, with Push Button Control. Outstanding in CONCO'S complete line of hand-powered and electric Cranes, Hoists, Trolleys.

CONCO ENGINEERING WORKS
Div. of H. D. Conkey & Co. — 15 Grove St. — Mendota, Ill.
Builders Of Conco Torpedo Electric Hoist

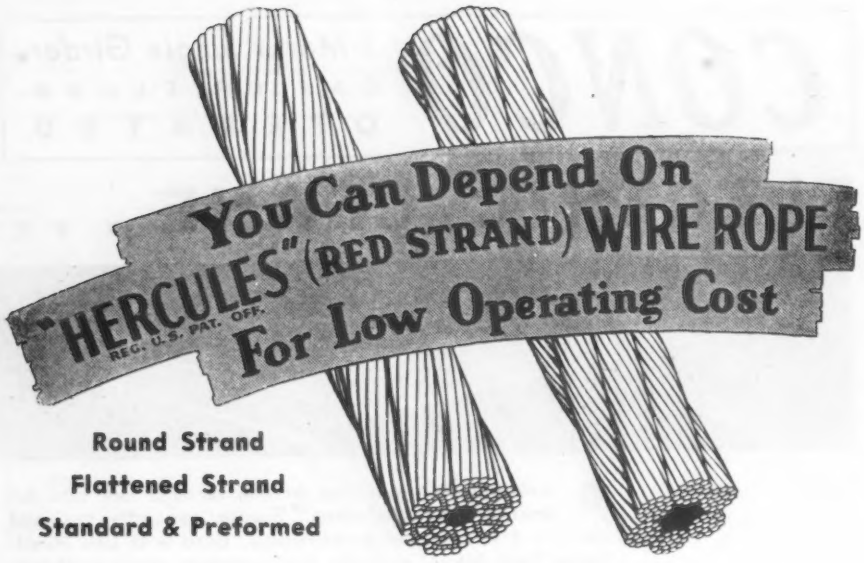
CLARK FORK TRUCKS

Saving

MANPOWER, TIME, COST AND FLOOR SPACE
plus delivering the goods on time to and from factories, yards, docks and warehouses.

A product of
CLARK EQUIPMENT COMPANY
POST WAR ENGINEERING SERVICE AVAILABLE. *WRITE*—
WE ARE READY TO SERVE YOU

CLARK TRUCTRACTOR
DIVISION OF CLARK EQUIPMENT COMPANY
BATTLE CREEK, MICHIGAN, U.S.A.



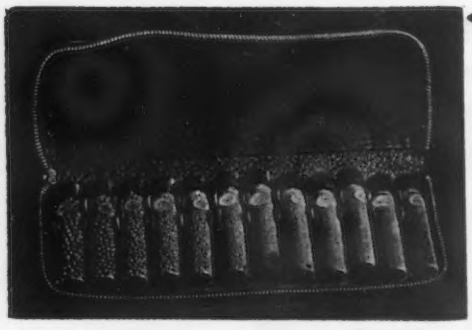
Round Strand
Flattened Strand
Standard & Preformed

WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By **A. LESCHEN & SONS ROPE CO.** *Established 1857*

5909 Kennerly Avenue, St. Louis 12, Mo.

New York • Chicago • Denver • San Francisco • Seattle • Portland



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

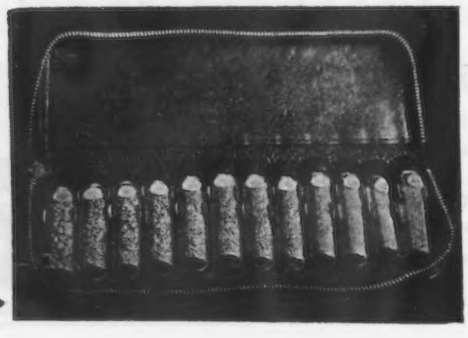
The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire



HEAT-TREATED STEEL GRIT

PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk) $135.00
Carload lots (packed) 141.00
Less ton lots (packed) 148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk ..... 36c.
L.c.l. lots ..... 38c.

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.

Carload, bulk ..... 34c.
L.c.l. lots ..... 35c.

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	48.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% Si ...	6.65c.	7.10c.	7.25c.
75% Si ...	8.05c.	8.20c.	8.75c.
80-90% Si ...	8.90c.	9.05c.	9.55c.
90-95% Si ...	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio $29.50*
Buffalo 30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk ..... 6.05c.
2000 lb. to carload ..... 6.70c.
Under 2000 lb. ..... 6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb..... 5.80c.
2000 lb. to carload ..... 6.30c.
Less ton lots ..... 6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr. 4-10% C	13.00c.	13.40c.	14.00c.

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten. 10,000 lb. of more... $1.90

Ferrovanadium, 50-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.
- Open Hearth $2.70
- Crucible $2.80
- Primos $2.90

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal $1.50

Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5 ..... $1.10

Ferroboron, contract basis, 17.50% min. Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.
- 2000 lb. to carload $1.20
- Under 2000 lb. 1.30
- Per lb. alloy $1.20
- Ton lots $1.25

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)
- Carload lots ..... 25c.
- 2000 lb. to carload ..... 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)
- Carload lots ..... 58c.
- 2000 lb. to carload ..... 59c.

Grainal No. 1, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis, per lb. ..... 87.5c.

Bortram, f.o.b. Niagara Falls
- Ton lots, per lb. ..... 45c.
- Less ton lots, per lb. ..... 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb contained Cb.
- 2000 lb. lots $2.25
- Under 2000 lb. lots $2.30

Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium ... $1.23
- Less ton lots $1.25

Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium $1.35
- Less ton lots $1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload $142.50

Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton $58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton $75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum ..... 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo ..... 80c.

Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo ..... 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo ..... 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales
- Carload lots ..... 14c.

Zirconium, 12-15%, contract basis, lump, f.o.b. plant with usual freight allowances, per lb. of alloy
- Carload, bulk ..... 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk ..... 6.5c.
- Ton lots ..... 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.
- Car lots ..... 8.75c.
- Ton lots ..... 9.25c.

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S & H Bronze Bearings can be furnished in any size or quantity to meet your particular requirements.

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- **X-Ray** and other inspection controls
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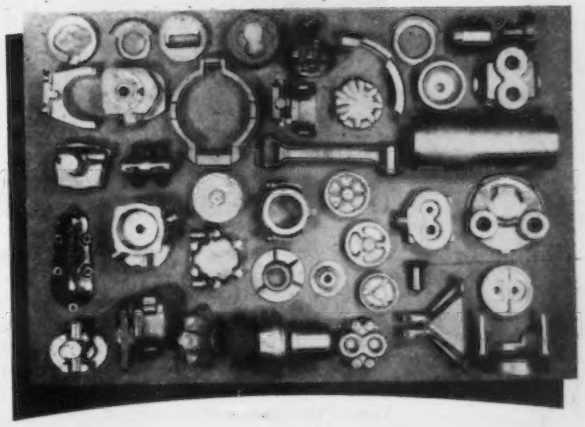
- *Send in your inquiries for war and civilian requirements.*



DETROIT 8-254 Gen. Motors Bldg. BUFFALO 837 Potomac St.

NATIONAL
ALUMINUM MFG. CO., PEORIA, ILL.

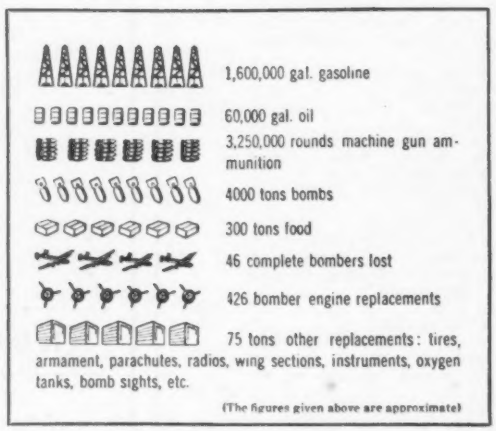
This advertisement is one of a series which is appearing in national magazines and newspapers as Consolidated Vultee's contribution toward a clearer public understanding of transportation's role in the war, and its postwar opportunities and responsibilities.

As a Liberator pilot put it:

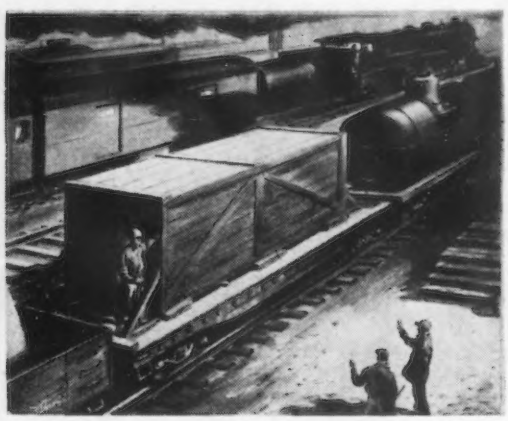
"One of their cities is missing!"

1, 40 minutes ago, there were Nazi factories down there building Focke-Wulf 190's and machine guns. Now there are no factories. Not even a city. For the last of 1000 Allied bombers has just dropped its block busters and is heading for home.

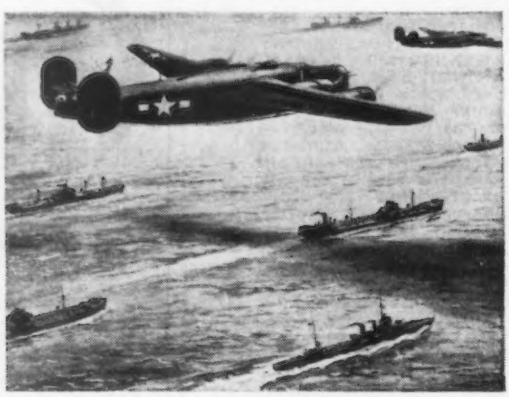
Back of this 1000-bomber sweep is a story not many people know—a story quite apart from that of the heroism and sacrifice of the bomber crews. It has to do with the terrific problem of supply in waging aerial warfare. For example...



2, Above, you get a rough idea of the cost, *in material alone,* to send 1000 4-engine bombers over Germany. How can Bomber Command get *another* 300 tons of food...*1 day's supply for the 150,000 men it takes to put 1000 bombers over the target?* Another 160 tank cars of aviation gasoline? Another 4000 tons of bombs? Not just for tomorrow, but for the next day, and the next. *Answer:* That's where Air Power's three teammates come into the picture—the train, truck, and ship . . .



3, If your sleeper is shunted to a siding, remember this: It is probably being held up to let a fast freight streak through — tank cars of gasoline, cars loaded with spare bomber parts, engines, crates of nested bombs, tons of food, ammunition, and all the rest. Getting Bomber Command's supplies from factory to seaboard is the first lap in a 1000-bomber attack on Germany. And in this relay race to Victory, the railroads of America are doing a magnificent job!



4, Slogging along at a snail's pace, protected by anti-submarine Liberators, a never-ending convoy of cargo ships and tankers becomes the life stream of Air Power. They bridge the Atlantic with supplies and replacements to *keep* the bombers fanning out over Germany. This link in the chain of supply must never be broken. If a cargo is sunk on the way over, Air Service Command and the Navy move heaven and earth to get an exact duplicate cargo loaded into another ship and on its way within 48 hours!

CONSOLIDATED VULTEE